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The Effects of Communication, Knowledge Sharing, and Trust on Agile Virtual Team Effectiveness

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This is to certify that the doctoral dissertation by

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

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Abstract

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by

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MPhil, Walden University, 2022

MS, California Coast University, 2006

BS, California Coast University, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Industrial and Organizational Psychology

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February 2024

Abstract

Ongoing globalization and the evolution of technology in the workplace reinforce the need for virtual teamwork. Individuals working together across the globe comprise virtual teams. Many teams across industries value and use agile methodology to manage their projects. Research shows that agile virtual teams face challenges based on social and organizational problems such as lack of trust, knowledge sharing, and suitable communication. Therefore, this quantitative study aimed to address a gap in the current literature on the effect that communication, trust, and knowledge sharing have on agile virtual team effectiveness. Additionally, the aim was to determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. Data were collected from 119 agile virtual team members working around the world for any organization headquartered in the United States. Binary logistic regression was conducted to examine the relationship between trust, communication, knowledge sharing, and team effectiveness. Communication and knowledge sharing were found to be significant predictors of team effectiveness, whereas trust was not. Communication moderated by trust was not a significant predictor of team effectiveness. Knowledge sharing moderated by trust was not a significant predictor of team effectiveness. Trust was not a significant moderator of the relationship between communication, knowledge sharing and team effectiveness. Strategies that make agile virtual teams successful are chief in stabilizing the global economy and may lead to positive social change. This study can further inform research on helping agile virtual teams thrive to sustain continuous improvement of the global economy.

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Dedication

I dedicate this dissertation to God, my creator, the source of my wisdom, knowledge, and performance. I also dedicate this dissertation to my family for their love, understanding, tireless support, believing in me when I did not, and showing patience when I was stressed. I want to thank James Pino, my husband and life partner, who made it financially possible for me to take on this journey. You listened to my ramblings about what I uncovered in the literature; you allowed me to practice my knowledge of the research process and methods for you. I have valued our intellectual conversations more than ever through this process. You inspired me to study virtual agile teams. To my parents, Milan and Marta Gigic, who instilled in me the work ethic I needed to get to the end of this process. To my youngest child, Malina Pino, for her patience when mommy could not do fun activities, her prayers, and her eagerness to learn about research at such a young age. To my middle child, Maja Pino, who prayed with me, kept me going with her positive attitude, and calming effect. To my firstborn, Milan Pino, who fed me good food when I worked too long, ensured that my work environment was relaxing, and solved many of my technology dealings. My sisters, Snjezana Mikulcic and Blanka Karl, who have been there and understood my feelings and struggles precisely. Lastly, I want to thank the countless others who prayed for me, believed in me, and cheered me on; I thank you from the bottom of my heart.

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I sincerely thank my dissertation chair, Dr. James Herndon, for successfully coaching me through this process. Your experience, wisdom, and knowledge have been of tremendous help during this journey. I enjoyed every conversation because I felt your genuine interest in helping me grow and succeed. I will forever value every minute you poured into seeing me blossom and become confident in my research abilities. The "Round to it" token you gave us in the residency has been sitting on my desk and motivating me to push harder every sleepless night. You are an invaluable asset to your students. I want to thank Dr. Marlon Sukal, my second committee member, for coaching and supporting me through the quantitative analysis. Your encouragement and affirmation regarding my knowledge of the statistical procedures in this dissertation boosted my confidence. I want to acknowledge all the professors at Walden University who invested their time in answering my questions, advising me, and kindly supporting my growth. Lastly, I want to acknowledge and thank all the colleagues I met during this journey, as they were "my village."

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Chapter 1: Introduction to the Study

Continuous globalization and the evolution of the modern workplace support virtual teamwork. Organizations are removing their limits by employing individuals across the globe conducive to delivering a quality product to the customer at a lower cost (Nordbäck & Espinosa, 2019). Global organizational development, employee interdependency, communication via flexible arrangements, and the need for telework due to COVID-19 have created a foundation for the modern workplace (Holtz et al., 2020). Organizations admire and respect collaborative work in teams over individual work (Juárez et al., 2021). Market globalization and the blossoming of the digital era facilitated 85% of global workers to engage in virtual teamwork in 2016 (Handke et al., 2020; Klonek & Parker, 2021). Many teams across industries value and use agile methodology to manage their projects (Cram, 2019; Marlowe et al., 2020). Sathe and Panse (2023) noted that the use of agile in teams has increased from 40% in 2007 to almost 97%.

Agile virtual teams highlight the importance of collaboration; they are self-organized, autonomous, and diverse, working in short cycles, utilizing consistent feedback to learn and solve problems and quickly respond to unpredictable customer requests (Almeida et al.,2019; Garro-Abarca et al., 2021; Ghimire & Charters, 2022; Radhakrishnan et al., 2022; Reunamäki & Fey, 2022; Zavyalova et al., 2020). Agile virtual teams are faced with challenges, such as communication, because it is more problematic for teams to engage and stay active in communication in a virtual setting

(Agren et al., 2022; Bundhun & Sungkur, 2021; Cucolas & Russo, 2023; Sathe & Panse, 2023).

For successful collaboration within a virtual agile team, communication is essential. Knowledge sharing is a segment of the feedback that agile virtual teams employ to learn and solve problems. Trust can impact communication and knowledge sharing. The literature supports the notion that knowledge sharing impacts trust and communication (Castellani et al., 2022; de Bem Machado et al., 2022). Moreover, the literature conveys that open communication is critical in knowledge sharing and that communication and knowledge sharing lead to team effectiveness (Alsharo, 2017b; Kengatharan, 2019). However, research shows that 50% of agile virtual teams are classified as challenged (Sithambaram et al., 2021).

Agile virtual teams are challenged due to social and organizational problems, lack of trust, knowledge sharing, and good communication (Agren et al., 2022; Alsharo et al., 2017b; Alzoubi & Gill, 2021; Sithambaram et al., 2021). Therefore, the goal of this study was to address a gap in the current literature on the effect that communication, trust, and knowledge sharing have on agile virtual team effectiveness and to determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. This study's results can significantly contribute to social change by informing practitioners about aspects of knowledge sharing, trust, and communication that assist in agile virtual team effectiveness. Furthermore, this study can further inform research on helping agile virtual teams thrive to sustain continuous improvement of the global economy.

This chapter commences with a summary of the literature on team effectiveness within agile virtual teams. Based on the gap in the literature, I will present the problem that agile virtual teams face and the purpose of this study. Research problems, hypotheses, and the theoretical framework guiding this research will be presented. The end of this chapter will include potential limitations based on the chosen research design, assumptions, and definitions of all the variables and ways that this study can advance knowledge and create social change.

Background

Organizations across the globe value teams because effective teamwork delivers the most promising outcomes. Research has indicated that successful teams are diverse in ideas, emotions, skills, abilities, training, and background (Davis et al., 2022; Rodriguez-Sanchez et al., 2021; Shuffler & Cronin, 2019; Siangchokyoo & Klinger, 2022). Researchers have also pointed out that teams change members often and that individual members belong to several different teams simultaneously (Shuffler & Cronin, 2019). Frequent team switching can become problematic for individuals because of a lack of belonging to a group that shares thoughts and ideas, which satisfies individual psychological needs related to belonging (Davis et al., 2022; Tannenbaum & Salas, 2021). Effective teams must have adequate collaboration methods (Klonek et al., 2019).

Agile methodology is an adaptable approach to project management, which was developed to assist software development (Zavyalova et al., 2020). Agile methodology assists teams in collaborating. Agile teams also increase revenue, lower costs, and reduce

risk. According to Scrum Inc. (2022), individuals who see the benefits of practicing agile notice a rise in collaboration by 69% and better alignment to business needs by 54%.

Virtual employment was already widespread in organizations before COVID-19, but the pandemic pushed most firms to abruptly switch over to working virtually on a grander scale (Reunamäki & Fey, 2022). During the sudden switch, organizations unprepared to set up employees to work virtually suffered. However, agile teams did not need time to adjust to this change. Teams that are not using agile and are new to virtual work face challenges related to navigating technological tools, setting new ground rules for communication, cultivating trust, and using virtual collaboration tools (Comella-Dorda et al., 2020). Research uncovered that agile software development teams assuming an agile mindset responded well to crises and improved productivity in a situation such as COVID-19 (Sathe & Pasne, 2023).

Although agile virtual teams exist across organizations, industries, and markets, many organizations must undergo agile transitions, transformation, and adaptation processes. While researchers have listed and discussed many agile adaption frameworks, there is still a need to explore instituting and sustaining agile practices due to situational factors in organizations (Gahroee et al., 2022; Jovanović et al., 2020). Agile practices must be tailored to each organization and team based on the type of organization, team structure, project context, and many other factors. Tailoring may include creating a hybrid form of agile by combining traditional team management and agile methods (Cram, 2019; Papadakis & Tsironis, 2020).

Organizations implementing agile processes in virtual teams face difficulties based on team size, complexity, and flexibility as they impact teams' communication, knowledge sharing, and trust. Agile virtual teams communicate through technology, which can cause misunderstanding due to ambiguity of tone and lack of body language cues (Reunamäki & Fey, 2022; Swart et al., 2022). Trust in agile virtual teams is imperative for functional communication and knowledge sharing. Research has revealed that some agile virtual team members feel unsafe discussing critical items in online chats or stand-up meetings (Agren et al., 2022). This fear could stem from the team members knowing that no chat or meeting is private as every word is recorded. Knowledge sharing is a practice of interacting and sharing knowledge between multiple parties, and as such, knowledge sharing allows for more effective performance and innovation (Natu & Aparicio, 2022; Ruilin & Yingshuang, 2022). However, the virtual workplace does not lend itself to effortless knowledge sharing execution, even if the organization uses agile virtual teams (Reunamäki & Fey, 2022). Based on the disputes in the literature regarding communication and knowledge sharing and a need to better understand trust and other factors influencing agile virtual team effectiveness, this study is necessary.

Problem Statement

The concern that prompted me to search the literature is the high rate of challenges agile virtual teams face; in 2019, 50% of agile virtual teams were classified as challenged (Sithambaram al., 2021). Agile virtual teams are challenged due to social and organizational problems, lack of trust, knowledge sharing, and lack of good communication (Alsharo, 2017b; Alzoubi & Gill, 2021; Sithambaram al., 2021). Gamero

et al. (2021) noted that virtual teams face challenges based on communication and collaboration barriers, lower team commitment, challenges building trust, sharing responsibility, and seclusion due to significant social distance. An additional disadvantage to virtual team members, according to Gamero et al., is reduced emotional and oral information.

Research has indicated that there is a need to understand ways to cultivate, promote, and encourage a positive work climate in virtual team settings, including investigating the means virtual teams use to accomplish tasks and the interaction between communication and trust (Gamero et al., 2021; Garro-Abarca et al., 2020; Reunamäki & Fey, 2022; Swart et al., 2022). Research suggests examining different virtual team structures related to communication and knowledge sharing and identifying best practices for successful and precise knowledge sharing. Ghimire and Charters (2022) invited future studies to focus on the impact of communication practices on agile project outcomes. Natu and Aparicio (2022) expressed a demand for future studies to uncover characteristics promoting a better understanding of the precursors that may inhibit or assist in sharing knowledge among virtual teams in organizations.

Additionally, there is a dispute in the literature about documentation related to knowledge sharing and communication in agile virtual teams. Almeida et al. (2019) emphasized that agile teams rely on informal communication for knowledge sharing. However, Theunissen et al. (2022) noted that agile virtual teams use development artifacts and architecture documents to document processes formally. Some research studies have noted that communication is the same in virtual and in-person settings for

agile teams or that agile methods adjust the amount and the type of communication needed for team success (Garro-Abarca et al., 2021; Wiesche, 2021). Other research studies remark that communication is more challenging and problematic in virtual settings (Agren et al., 2022; Bundhun & Sungkur, 2021; Cucolas & Russo, 2023; Sathe & Panse, 2023). Moreover, research has indicated that scholars need more agreement on factors influencing agile virtual team effectiveness (Zavyalova et al., 2020).

Researchers have called for quantitative studies investigating agile virtual teams (Nordbäck & Espinosa, 2019; Tyagi et al., 2022). Furthermore, researchers have called for studies focusing on knowledge sharing, trust, and communication practices within agile virtual teams and the effects that knowledge sharing, trust, and communication have on team success (da Silva et al., 2022; Gamero et al., 2021; Imam & Zaheer, 2021; Juárez et al., 2021; Radhakrishnan et al., 2021). Therefore, the problem addressed in this study is a lack of understanding of how the effectiveness of agile virtual teams is affected by communication, knowledge sharing, and trust and how trust moderates the relationship between those variables.

Purpose of the Study

This quantitative study aimed to investigate the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness and determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. Agile virtual team effectiveness is operationally defined as the result of clear communication, trust, good team performance, a satisfied client, and a satisfied team (Akkaya & Bagienska, 2022; Bundhun & Sungkur, 2021; Lurey &

Raisinghani, 2001; Zaimovic et al., 2021). I used the Virtual Team Effectiveness Survey (see Appendix A) to measure agile team effectiveness in terms of team performance and client and team satisfaction. The criterion variable in this study is agile virtual team effectiveness. The predictor variables are communication, knowledge sharing, and trust. Trust will also be used as a covariate variable.

Research Questions and Hypotheses

In addressing the problem and fulfilling the purpose of this study, I presented the following research questions and hypotheses:

- RQ1: Does communication predict agile virtual team effectiveness?

  $H_0$1: Communication is not a significant predictor of agile virtual team effectiveness.

  $H_1$1: Communication is a significant predictor of agile virtual team effectiveness.

- RQ2: Does knowledge sharing predict agile virtual team effectiveness?

  $H_0$2: Knowledge sharing is not a significant predictor of agile virtual team effectiveness.

  $H_1$2: Knowledge sharing is a significant predictor of agile virtual team effectiveness.

- RQ3: Does trust predict agile virtual team effectiveness?

  $H_0$3: Trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$3: Trust is a significant predictor of agile virtual team effectiveness.

- RQ4: Does communication moderated by trust predict agile virtual team effectiveness?

  $H_0$4: Communication moderated by trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$4: Communication moderated by trust is a significant predictor of agile virtual team effectiveness.

- RQ5: Does knowledge sharing moderated by trust predict agile virtual team effectiveness?

  $H_0$5: Knowledge sharing moderated by trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$5: Knowledge sharing moderated by trust is a significant predictor of agile virtual team effectiveness.

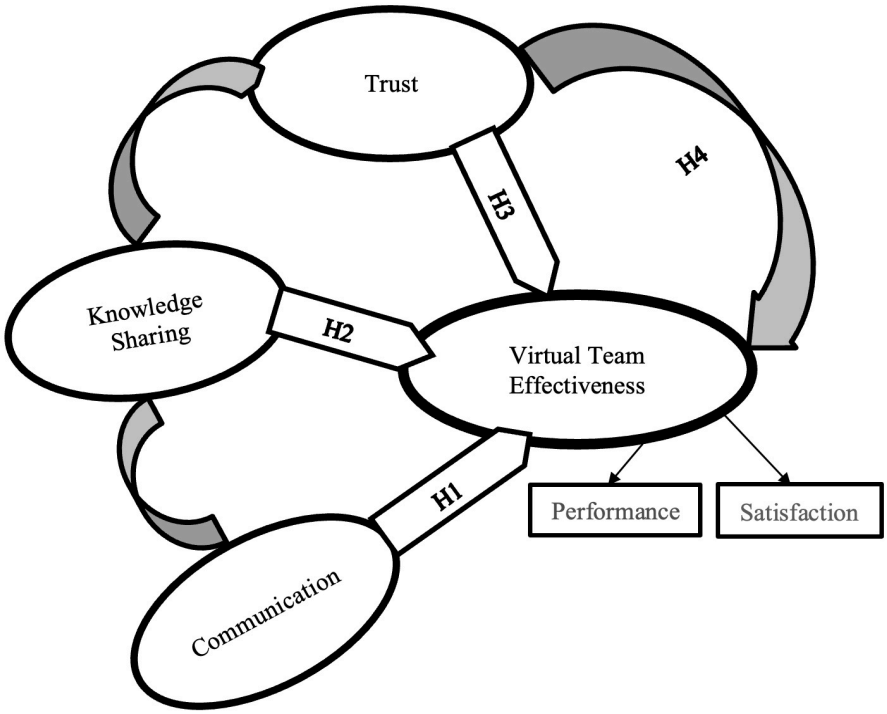
- RQ6: Do communication and knowledge sharing moderated by trust predict agile virtual team effectiveness?

  $H_0$6: Communication and knowledge sharing moderated by trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$6: Communication and knowledge sharing moderated by trust is a significant predictor of agile virtual team effectiveness.

Figure 1

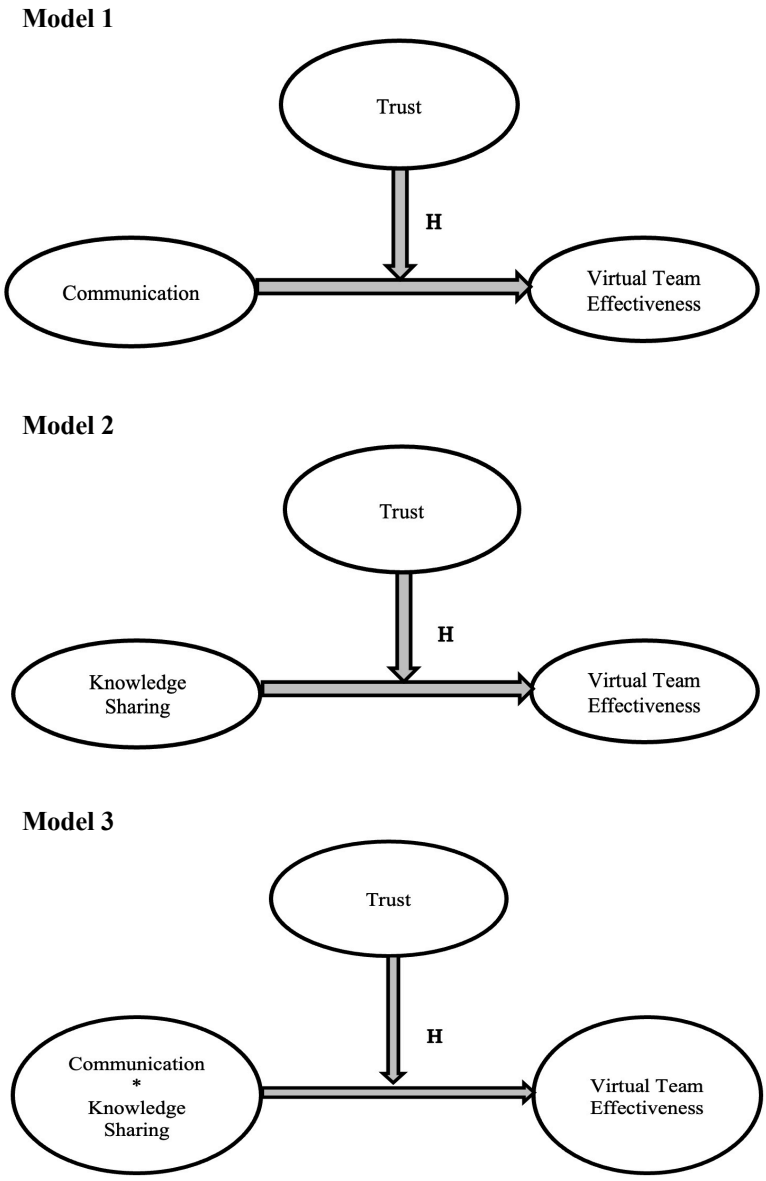
Research Model Showing the Effect of Communication, Trust, and Knowledge Sharing on Agile Virtual Team Effectiveness



Note. This research model shows the effect that communication, trust, and knowledge sharing have on agile virtual team effectiveness, both individually and combined.

Figure 2

Research Models Showing Trust as the Moderator



Note. These models show trust as moderating the effect that communication, knowledge sharing, and communication*knowledge sharing have on agile virtual team effectiveness.

Theoretical Framework for the Study

The knowledge-based view of the firm extends the resource-based view of the firm and considers knowledge the most important strategic resource (Curado, 2006; Grant, 1996a; Marvel, 2012). Advocates of the knowledge-based view of the firm theory saw firms as bodies of cooperation, collaboration, communication, and knowledge storehouses (Srivastava & Mir, 2022). The knowledge management literature links superior knowledge acquired through organizational learning with effectiveness, increased strategic flexibility, and speedier response to environmental shifts (Curado, 2006). Based on the knowledge-based view of the firm, teams can promote the sharing and integration of knowledge between the employees and individuals indirectly associated with the organization to enhance effectiveness (Alsharo, 2017b). Knowledge sharing can significantly impact trust and collaboration in agile virtual teams (Alsharo, 2017b). Knowledge sharing in agile virtual teams starts with communication and collaboration between the team members. Teams practicing collaborating and sharing knowledge are more effective than teams that do not engage in collaborating and sharing knowledge (Alsharo, 2017b). The question and the purpose of this study are to address the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness; therefore, the knowledge-based view of the firm is a suitable framework. Chapter 2 explains the knowledge-based view of the firm in more detail.

Nature of the Study

I employed binary logistic and multiple regression to address the research questions in this nonexperimental correlational quantitative study. I used binary logistic

regression to determine how each predictor variable, knowledge sharing, communication, and trust, can predict the criterion variable, agile virtual team effectiveness. Multiple regression predicted agile virtual team effectiveness from the three variables (knowledge sharing, communication, and trust) and the interaction variables (knowledge sharing*trust, communication*trust, and knowledge sharing + communication*trust).

I used the Virtual Team Effectiveness Survey (Alsharo et al., 2017a) to collect data, answer research questions, and test the hypotheses in this study. Alsharo et al. (2017) published The Virtual Team Effectiveness Survey, which is a 49-item survey that follows a 7-point Likert-type scale (1 = *disagree strongly* to 7 = *agree strongly*) that collects demographic information, includes knowledge sharing, trust, collaboration, and communication as the variables of interest, and to measure team effectiveness in terms of team performance and team satisfaction. Alsharo et al. permitted the measure content to be duplicated and used for noncommercial research and educational aims without soliciting a written permission. The participants in this study were virtual agile practitioners currently working in global teams employed by organizations headquartered in the United States. Please refer to Chapter 3 for more information on methodology and explanation on how my study differs from Alsharo et al.

Definitions

Agile methodology: An adaptable approach to project management, developed to assist information technology (IT) professionals in software development (Zavyalova et al., 2020). In the current study, the agile methodology describes processes that agile teams use to complete a project.

Agile teams: A group of seven to nine professionals holding diverse roles within the team working on delivering the product to the customer in increments (Poth et al., 2020). Agile teams share the responsibility of team leadership; they are autonomous, flexible, and communicate regularly via technological tools (Almeida et al., 2019; Ghimire & Charters, 2022; Reunamäki & Fey, 2022). In the current study, agile teams represented work groups using an agile approach to deliver projects.

Agile team stakeholders: Stakeholders in agile teams include team members, consumers, and end-users. The stakeholders in an agile team cooperate through self-organization in regulating and developing the project (Almeida et al., 2019; Ghimire & Charters, 2022).

Agile virtual team effectiveness: Agile virtual teams that are effective (a) are clear on their roles and expectations; (b) utilize proper technology for feedback, communicating and sharing knowledge; and (c) trust each other and the leaders (Akkaya & Bagieńska, 2022; Greimel et al., 2023; Handke et al., 2020; Klonek & Parker, 2021; Sithambaram et al., 2021). Effective agile virtual teams are successful in fulfilling and satisfying all the client's requests and needs, achieving all the goals; the client values the quality of the teamwork; the process of working together as a team is positive; and the final product needs minimal changes (Lurey & Raisinghani, 2001; Zaimovic et al., 2021). For this study, agile virtual team effectiveness is defined as the result of clear communication, trust, a team open to learning, an efficiently managed project, a product that meets all the required standards, a satisfied client, and a satisfied team.

Communication in agile virtual teams: Agile virtual teams mainly use technology for communication and collaboration. Communication is constant and informal because it fosters an environment where ideas can easily flow between team members (Shameem et al., 2023; Zaimovic et al., 2021). Daily stand-ups, retrospectives, and pair programming are agile practices that foster communication between agile virtual team members (Cucolas & Russo, 2023). This study defines communication as an ongoing, direct, and informal process of sharing information between team members.

Definition of done: An agile practice stipulating that, when all acceptance criteria for each deliverable or iteration are met, the product is ready to be released to a customer.

Knowledge sharing in agile virtual teams: Knowledge sharing in agile virtual teams is a collaborative effort to combine collective knowledge and experience to deliver a sustainable competitive advantage to the team (Shameem et al., 2023; Zaimovic et al., 2021). Agile practices like pair programming facilitate knowledge sharing (Agren et al., 2022). This study defines knowledge sharing as an interactive dynamic approach to uncovering innovative ways of boosting the organization's competitiveness.

Online tools or technology: Tools that agile virtual teams use to visualize, track, and communicate.

Pair programming: An agile work method where a team member asks another team member to work together on a task using one computer.

Retrospective: An agile meeting where the team jointly reflects on what worked, what did not work during the sprint, and how to improve in the future.

Shared leadership: Shared leadership occurs when team members lead each other during product development—shared leadership mandates each team member to be able to lead and follow (Doblinger, 2022). Agile virtual teams comprise diverse and autonomous groups of individuals; as such, leaders emerge based on individual experience and expertise, and the teams are in charge of the workflow.

Sprint: An agile practice where a predetermined amount of time that the team will need to complete a set amount of work.

Sprint goals: Development tasks to be completed by the agile team during a sprint.

Stand-ups: A daily 15-min meeting where agile team members report the progress and challenges associated with their tasks.

Trust in agile virtual teams: Trust encompasses risk, vulnerability, and potential for disappointment (Zapta et al., 2021). Trust sustains the ongoing communication in agile virtual teams, which is a central element in defining the team's success (Razavi et al., 2019; Zapta et al., 2021). Therefore, trust in agile virtual teams in this study is defined as an integral aspect of open communication and knowledge sharing, and it comprises aspects of disappointment, vulnerability, and risk.

Virtual teams: Work teams that use technology to communicate and are geographically dispersed at least some of the time (Natu & Aparicio, 2022). Virtual teams can have a mix of collocated and virtual members (Lechner & Mortlock, 2022). For this study, virtual teams or agile virtual teams will be defined as culturally diverse groups of somewhat geographically dispersed individuals; they are mutually dependent

groups working on the same project and mainly using technology as the primary communication tool.

Assumptions

The main assumptions in this study were related to the participants. One of the assumptions was that I would have an appropriate number of participants. An assumption related to the number of participants was that the responses would vary enough for proper statistical analysis. Another assumption was that the participants would honestly and thoroughly answer the survey questions. I used a large sample to mitigate problems related to the number of participants. Moreover, I ensured that the participants understood the qualifications needed to take the survey and that the instructions for answering the questions were clear.

Scope and Delimitations

This study's scope included understanding the effect of communication, knowledge sharing, and trust on agile virtual team effectiveness and how communication and knowledge sharing moderated by trust predict agile virtual team effectiveness. I chose the IT industry for this study because agile methodology originated within this industry. This study's sample comprised IT professionals in virtual teams utilizing agile methodology for development. The target population for this study included professionals who are currently active members of agile virtual teams employed in organizations headquartered in the United States. Chapter 3 provides more information on the participant inclusion and exclusion criteria.

Limitations

Several limitations were present in this study. Identifying an ample number of qualified participants willing to participate in the study, the data collection, and generalizability issues comprised several possible limitations. The nonprobability sampling technique in this study may have threatened internal validity (Burkholder et al., 2016). Only complete data were analyzed. Moreover, generalizability may have been affected by a smaller sample and incomplete or biased data.

Significance

This study was significant in that it addressed a gap in examining the constituents of successful and strong agile virtual teams by focusing specifically on the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness. This study's results may inform practitioners about aspects of knowledge sharing, trust, and communication that assist in agile virtual team effectiveness. Strategies that make agile virtual teams successful are chief in stabilizing the global economy. Therefore, this study can further inform research on helping agile virtual teams thrive to sustain continuous improvement of the global economy. This study's social change impact is to assist organizations in agile virtual team development and sustained success.

Summary

In this chapter, I provided an overview of the research literature on agile virtual teams and the variables under examination. I identified the gap in the existing scholarly research, which led to the purpose of the study: to investigate the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness and

determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. This chapter furnished a synopsis of the study research questions, hypotheses, theoretical framework, and overall research design. Chapter 2 supplies a comprehensive literature review, providing a deeper understanding of team effectiveness, communication, knowledge sharing, and trust in agile virtual teams.

Chapter 2: Literature Review

Agile virtual teams experience socioemotional management problems (Agren et al., 2022; Gamero et al., 2021). Socioemotional problems comprise communication and collaboration barriers, lower team commitment, challenges building trust, sharing responsibility, and seclusion due to significant social distance (Gamero et al., 2021). Moreover, reduced emotional and oral information is an additional disadvantage to virtual team members (Agren et al., 2022; Gamero et al., 2021).

Research has suggested that virtual teams face challenges related to geographical distance, cultural differences, team member composition, and working in different time zones (Tyagi et al., 2022). Research has implied that technology-based communication mediums could negatively impact the well-being of virtual team members. Hence, researchers and practitioners must understand ways to cultivate, promote, and encourage a positive work climate in virtual team settings (Gamero et al., 2021).

This quantitative study aimed to investigate the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness and to determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. Technological advances make the modern workplace more diverse than the workplace of the past (Juárez et al., 2021). Organizations value teams as they present the new working structure of modern organizations (Juárez et al., 2021).

From 2016 to 2017, virtual work increased by 7.9% (Savina, 2020). Moreover, Savina stated that in the last 5 years, telework increased by 44%, and in the previous 10

years, it increased by 91%. Research showed that 66% of multinational organizations employed virtual teams, of which 53% were geographically dispersed (Lumseyfai et al., 2019). Sathe and Panse (2023) noted that the use of agile in teams has increased from 40% in 2007 to almost 97%. Therefore, agile virtual teams are a vital component of the modern workplace.

The issue that prompted me to search the literature is the high rate of challenges agile virtual teams face; in 2019, 50% of agile virtual teams were classified as challenged (Sithambaram et al., 2021). Agile virtual teams are challenged due to social and organizational problems, lack of trust, knowledge sharing, and good communication (Agren et al., 2022; Alsharo et al., 2017b; Alzoubi & Gill, 2021; Sithambaram et al., 2021). Moreover, Radhakrishna et al. (2021) reported that only 31% of agile projects succeed due to inadequate project team design and insufficient collaboration.

Research indicated that scholars need more agreement on factors influencing agile virtual team effectiveness (Zavyalova et al., 2020). Similarly, there were discrepancies in the literature about communication in agile virtual teams. For example, some researchers have noted that communication is the same in virtual and in-person settings for agile teams or that agile methods adjust the amount and the type of communication needed for team success (Garro-Abarca et al., 2021; Wiesche, 2021). Other researchers have remarked that communication is more challenging and problematic in virtual settings (Agren et al., 2022; Bundhun & Sungkur, 2021; Cucolas & Russo, 2023; Sathe & Panse, 2023). Furthermore, researchers have called for studies focusing on knowledge sharing, trust, and communication practices within distributed virtual teams and the effects that

knowledge sharing and communication have on team success (Bundhun & Sungkur, 2021; da Silva et al., 2022; Gamero et al., 2021; Imam & Zaheer, 2021; Juárez et al., 2021; Radhakrishnan et al., 2022; Swart et al., 2023). Thus, this study aimed to address this gap in the scholarly literature.

In the main sections of this chapter, I focus on the literature strategy, theoretical foundation, and literature review. The literature review comprises an evolution of agile virtual teams, constituents of effective teams, a look into agile virtual teams, and an overview of the key variables under study: agile virtual team effectiveness, communication in agile virtual teams, knowledge sharing in agile virtual teams, and trust in agile virtual teams.

Literature Search Strategy

This literature review included researching various databases available at Walden University library. I used Google Scholar for articles not available in Walden University library. Google Scholar was useful for tracking multiple versions of the articles.

The literature review included dissertations, books, peer-reviewed articles, and seminal works. To locate articles published in the last 5 years on the research topics, the following databases were employed: SAGE journals, ProQuest One Academic, Thoreau Multi-database Search, and Psychology Databases Combined. Additionally, I included several books written by researchers on the topic and seminal research on the theory.

SAGE was the first database searched, using the terms *effective virtual teams OR effective agile teams, OR problems with agile teams*. SAGE yielded 137 total results, with

111 of them being peer-reviewed. A lot of the articles found in SAGE included *knowledge sharing*. ProQuest One Academic yielded 357 total results.

When adding *knowledge sharing* to the search terms, only 13 peer-reviewed articles came up, and *communication* and *trust* were present in some of the articles. Psychology Databases Combined search terms included were *effective virtual teams OR effective agile teams OR problems with agile teams OR knowledge sharing in virtual teams OR communication in virtual teams OR trust in virtual teams.* The search yielded 41 peer-reviewed articles published in 2020 and later. The articles originated from various specializations, including industrial and organizational psychology, management, information and technology, and public health research.

I also reviewed recent meta-analyses centered on theory topics, which allowed me to refine the gaps in the literature. Meta-analyses list seminal authors and related publications. Moreover, meta-analyses help clarify possible disputes in the literature and assist in better understanding the current state of the theory in the literature.

Theoretical Foundation

Theories guide research studies, and research influences the development of new theories (Babbie, 2017). A theory offers researchers a basis for understanding, applying, analyzing, and designing new methods of investigating relationships and solving research problems (Kivunja, 2018). Research studies begin based on a practitioner's specific interest, which may lead a practitioner to an idea corresponding well with an already existing theory that could generate new ideas and form new interests (Babbie, 2017).

Burkholder et al. (2016) pointed out the importance of alignment between theory, research problem, and purpose by explaining that the process starts with the literature review, which assists in articulating a problem and the purpose of the study. Studies based on a theoretical framework employ a choice theory as the direct path to investigating, analyzing, and understanding the research problem (Kivunja, 2018). I used one theory to link this study to existing knowledge on my topic: the effect of communication, knowledge sharing, and trust on agile virtual team effectiveness. The theory I used is the knowledge-based theory of the firm.

The Knowledge-Based View of the Firm

The 21st century has brought numerous changes for scholar-practitioners and professionals in business management. The accelerated growth rate of multinational organizations has caused shifts in work approaches and procedures, which has caused an increase in productivity (Srivastava & Mir, 2022). The most important question for the future is how organizations can utilize new technologies to provide better consumer services.

The knowledge-based view of the firm broadens and expands the resource-based view of the firm and considers knowledge the most important strategic resource (Grant, 1996a; Marvel, 2012). Penrose founded the resource-based view of the firm in 1959. Penrose viewed the firm as an executive organization and a pool of profitable resources (Curado, 2006). The resources in the resource-based view of the firm can be classified as physical capital resources, human capital resources, and organizational capital resources (Braney, 1991). Physical capital resources encompass technology, a factory, tools,

physical location, and crude materials. Human capital resources include practicum, experience, decisions, intelligence, relationships, and managerial and other employee wisdom. Organizational capital resources incorporate the organization's formal and informal structures, planning, directing and corresponding systems, and casual group relations within the organization and its networks (Barney, 1991).

Most management theorists have previously leaned on the transaction cost perspective to understand the firm's existence (Srivastava & Mir, 2022). However, supporters of the knowledge-based theory of the firm try to utilize knowledge and communication to explain the presence of firms. The advocates of the knowledge-based view of the firm theory saw firms as bodies of cooperation, collaboration, communication, and knowledge storehouses (Srivastava & Mir, 2022).

In 1959, Penrose delivered the theory of the growth of the firm, which the literature considers essential in apprehending organizational learning. In 1990, Cohen and Levinthal linked organizational learning and innovation to developing the knowledge-based view of the firm (Eisenhardt & Santos, 2006; Marvel, 2012). Organizational learning is a facet of the footing that supports knowledge-based thinking (Eisenhardt & Santos, 2006).

Grant furthered the knowledge-based theory of the firm in 1996 by emphasizing the importance of tacit individual knowledge as the basis of sustained competitive advantage (Grant, 1996a). Grant clarified that tacit knowledge is personal as it belongs to each employee and not the organization as a whole and that a vital factor of sustained competitive advantage is the power to merge the unique and tacit knowledge of the

employees (Eisenhardt & Santos, 2006). Castellani et al. (2021) defined tacit knowledge as unspoken knowledge because it lives inside an employee, and it is challenging to disseminate because it comprises judgments, intuitions, tricks, and finesses. Tacit knowledge is a pertinent element of corporate wisdom. Castellani et al. described the knowledge-creation operation as starting with tacit knowledge at the foundation level of the knowledge-creation operation and knowledge sharing at the top of the process. Grant (1996b) asserted, and Srivastava and Mir (2022) later agreed that the organization's function is to integrate, store, and use the knowledge introduced by the organizational members.

Knowledge is a single long-term competitive advantage of an organization, and knowledge-based abilities are the most strategically significant abilities to construct and uphold competitive advantage (Curado, 2006). An organization has a sustained competitive advantage when it is executing a valuable strategy that competitors are not executing and that the competitors are incapable of duplicating (Barney, 1991). New product development is another way to maintain a competitive advantage (Ruilin, & Yingshuang, 2022). Therefore, knowledge resources are the core of the resource-based view of the firm (Curado, 2006; Grant, 1996; McEvily & Chakravarthy, 2002).

When organizations use knowledge improvements as a competitive advantage for their success, it creates a suitable organizational climate for employees to develop knowledge manipulation abilities (Castellani et al., 2021). Ruilin and Yingshuang (2022) defined knowledge manipulation as selective knowledge sharing; human factors are responsible for the exactness of shared information. Knowledge is an essential asset for

the viability and advancement of employees. The knowledge sharing process allows employees to acquire the most from the collectively earned knowledge in organizations that endorse creativity and innovation (Castellani et al., 2021).

Castellani et al. (2021) referred to knowledge manipulation as a knowledge sharing intention. They stated that because knowledge symbolizes an individual legacy, frequently, it is obscured and safeguarded—furthermore, Castellani et al. noted that knowledge sharing intention relies on the firm's culture and the individual employees' characteristics and desire to engage in mutually beneficial knowledge sharing. Knowledge sharing is one of the focal competencies for employee originality and innovation (Ruilin & Yingshuang, 2022). Moreover, de Bem Machado et al. (2022) noted that literature is aiming studies on refining the process of knowledge sharing and transforming tacit knowledge to explicit knowledge to boost intellectual capital.

The knowledge-based resources are exclusive and, therefore, more advantageous than the firm's more conventional resources, making knowledge an essential element of competitive advantage (Serenko, 2023). Five assumptions of the knowledge-based theory of the firm noted by Serenko (2023) include the following:

- Organizational knowledge has tremendous potential for value creation if appropriately identified, captured, and integrated into the production processes.
- While explicit knowledge (documents, manuals, procedures, videos) is easily transferred among employees, tacit knowledge (know-how, skills, contextual knowledge) is complicated and costly.

- Knowledge is subject to economies of scale and scope. While the initial creation of knowledge is expensive, the marginal cost of its future application is meager, and it may often be duplicated and applied in new areas.
- Individual workers are considered the primary agents for knowledge creation and accumulation. However, efficiently applying their knowledge requires a great degree of specialization.
- Effective and efficient production processes require the integration of multiple types of knowledge.

New organizational practices and IT in the 1990s allowed organizations to expand geographically and improve production and capital accumulation (Srivastava & Mir, 2022). Technological use and advances pushed corporate limits across the market, the globe, and cultures. For example, in the 1990s, the most significant enterprises in the world were factories, such as GM (annual revenue of $200 billion); however, currently, Walmart, a nonmanufacturing corporation, reported $500 billion in annual sales in 2014, and Google has reported yearly growth of 20% or more consistently (Srivastava & Mir, 2022).

Organizations must recognize, obtain, integrate, and employ new knowledge for overall augmented performance and sustained competitive advantage (Almeida et al., 2019; Candi et al., 2018). Candi et al. (2018) explained that the knowledge-based view of the firm views organizations as knowledge distribution systems and knowledge as part of the individual's social exchanges. Moreover, organizations engage in open innovation

models by utilizing clients' input during development. Therefore, organizations engage in acquiring knowledge outside the firm (Candi et al., 2018).

Tacitness, complexity, and specificity—the three aspects of knowledge—are connected to the resilience of imitation barriers set to protect advantages stemming from an organization's unique knowledge (McEvily & Chakravarthy, 2002). These aspects of knowledge expand "stickiness" or the transfer of knowledge through the organization, making it challenging to identify knowledge assets (Curado, 2006; McEvily & Chakravarthy, 2002). Imitation barriers stall the dispersal of an organization's knowledge, which may suppress competitors' exertions to reproduce its product (McEvily & Chakravarthy, 2002). To protect and regulate organizations' vital knowledge, organizations utilize legal tools that involve intellectual property rights and contracts (Gorga & Halberstam, 2007)

Historically, organizations manufactured material-based products and employed physical laborers. However, the economic shift from material-based to information-based production changed employee structure in organizations (Child & McGrath, 2001). Knowledge workers, such as conception professionals, technology designers, visionaries, managers, and financial specialists, are more popular at the core of organization operations. Other employees are assumed as the firm's periphery as their duties vary, and the tasks they execute represent them as professionals (Curado, 2006).

Research suggests that fostering corporate innovation is crucial to attaining economic sustainability (Zhang et al., 2022). The knowledge-based view presumes knowledge to be the most significant resource of the firm, and that it influences the firm's

innovation performance and abilities to form and sustain competitive advantage (Curado, 2006; Serenko, 2023; Zhang et al., 2022). Knowledge restructuring is a functional innovation fostering a firm's competitive advantage (Zhang et al., 2022). Moreover, research suggests that organizations can boost business knowledge and advance knowledge management through technological innovation (de Bem Machado et al., 2022).

The knowledge-based view of the firm distinguishes organizational knowledge by its depth and breadth (Wenwen et al., 2022). The knowledge breadth and depth represent different areas of knowledge. Wenwe et al. (2022) explained that knowledge depth is the organization's understanding of domain-specific knowledge and in-depth expertise in specific areas. In comparison, knowledge breadth is the number of different knowledge areas that the organization obtained and cultivated.

Knowledge can be categorized by three types: knowledge embedded in machines and products (Kp), knowledge embedded in a firm's organizational structure (Ko), and specialized or technical knowledge and skills embedded in individuals (Ki). Gorga and Halberstam (2007) illustrated how knowledge transformation materializes through the interaction of the three types of knowledge. For example, Ki can be transformed into Ko when an individual or a team designs a practice or a procedure, which then disseminates to the whole organization. Other research studies refer to Ki and Ko as tacit and explicit knowledge, respectively. Tacit knowledge is individual and belongs to one person, while explicit knowledge belongs to the organization (Castellani et al.; 2021; Grant, 1996b; Serenko, 2023).

Knowledge-intensive organizations frown upon formal structures. They attain coordination through social rewards and internal normative systems instead of hierarchical power (Curado, 2006). Child and McGrath (2001) described the new organization as horizontal, where smaller units operate competitively, focusing on core activities. These smaller units are more appropriate for market conditions because they can acclimate to swift external changes (Child & McGrath, 2001). Knowledge-intensive organizations value teams that share leadership responsibilities.

Ziegert et al. (2022) expanded the idea that knowledge-oriented organizations use small units or teams by exploring multiteam systems. Multiteam systems are two or more teams collaborating directly and interdependently (Ziegert et al., 2022; Zuccaro et al., 2020). This transition from a single small unit or a team to a multiteam system emerged due to knowledge-oriented organizations working on intricate problems that modern organizations face (Zuccaro et al., 2020).

A learning organization symbolizes a culture and an organization that exemplifies a firm's knowledge-based view (Yoon et al., 2023). In their study, Yoon et al. found that an employee's knowledge sharing perspective and learning organization's culture positively impact employees' knowledge sharing volition. Consequently, organizations seeking to boost employees' knowledge sharing must be mindful of constructing and promoting an organizational climate conducive to collective learning (Yoon et al., 2023).

Sveiby (2001) explained that the value of knowledge increases when utilized by the organization's members, unlike tangible resources, which values depreciate when underutilized. Sveiby described knowledge sharing as a by-directional action as it

enhances the competence of both the giver and the receiver. In addressing knowledge sharing between individuals, Sveiby pointed out that trust is essential to consider. Employees may have problems trusting their team or the organization enough to share everything they know (Sveiby, 2001). Castellani et al. (2022) confirmed the importance of trust when increasing their knowledge sharing intent because mutual trust allows individuals to accept the knowledge of others and to share what they know openly.

Alsharo (2017b) supported Sveiby (2001), Castellani et al. (2022), de Bem Machado et al. (2022), and others by expressing that knowledge sharing can significantly impact trust and collaboration in agile virtual teams. Centered on the knowledge-based theory of the firm, Kengatharan (2019) asserted that open communication with team members is a crucial element of knowledge sharing, leading to higher productivity levels. Moreover, teams can promote the sharing and integrating knowledge between the employees and individuals indirectly associated with the organization to enhance effectiveness (Alsharo, 2017b).

The Literature Review

Evolution of Agile Virtual Teams Research

Although much literature exclusively connects the evolution of agile software development with Agile Manifesto, a document written by 17 software practitioners in 2001 in Snowbird, Utah, contributions to the emergence of agile were present decades earlier in the literature (Hohl et al., 2018; Larman & Basili, 2003). Larman and Basili (2003) linked the emergence of the agile mindset to the 1930s plan-do-study-act (PDSA) cycles, 1958 NASA’s Project Mercury, 1972 a $100 million TRW/Army Site Defense

software project for ballistic missile defense, 1976 Tom Gilb's book on iterative and incremental development, and NASA's space shuttle software built between 1977 and 1980 (Larman & Basili, 2003).

In the eighties, iterative and incremental development became very popular in the literature through the writings of Weinberg, Daniel McCracken, Michael Jackson, and Grady Booch, all of whom agreed that the work should be done in small increments with feedback cycles, including the customer (Larman & Basili, 2003). Larman and Basili noted that the iterative and incremental development model opposed the waterfall model, which was guided by DoD standards. By the late eighties, the waterfall model, which was document-driven, did not assist in project success rate. In 1988, Gilb published a new book, Principles of Software Engineering Management, dedicated to iterative and incremental development and highlighting quantifying measurable goals and results from each iteration (Larman & Basili, 2003).

In the 1990s, projects such as the Canadian Automated Air Traffic Control System and the Chrysler C3 payroll project used iterative and incremental development in which they relied on short iterations and test-first practices, such as agile virtual teams use today. Moreover, Jeff Sutherland and Ken Schwaber at Easel Corporation started applying time-boxed 30-day-iterations. This practice later became the scrum method, one of the most widely used agile methods (Larman & Basili, 2003).

The agile transformation commenced with software development centering on the product, the team, and the consumer instead of the documentation and planning (Marlowe et al., 2020). Agile was revolutionary because it was the opposite of Waterfall, a

document-driven model requiring practitioners to gather all the requirements and specifications to design a prototype, develop the product, test, deploy, and maintain it (Abdullah et al., 2022; Marlowe et al., 2020). The waterfall model was designed to develop a perfect product before asking the consumer for feedback. This model was better suited for the early years when high-powered computers were uncommon, and most programs were coded using mathematical algorithms or simple data processing (Marlowe et al., 2020; Zavyalova et al., 2020).

Waterfall, or traditional project management, is a structured, plan-driven methodological approach equipped with explicit guidelines (Abdullah et al., 2022). Research shows that traditional project management approach is timely and costly, and the product quality is only sometimes comparable with agile project management (Abdullah et al., 2022; Zavyalova et al., 2020). One of the chief distinctions among agile and traditional project management is that traditional project management aims to predict and limit ambivalence and instabilities, while agile aims to address both ambivalence and instabilities and adapt to changes (Abdullah et al., 2022).

In 2001, in Snowbird, UT, seventeen software practitioners and leaders in the (object-oriented and software engineering) OOSE community created a document called the Agile Manifesto (Hohl et al., 2018; Marlowe et al., 2020). Agile Manifesto comprises four core values and eight principles and guidelines. The core values center around people over processes, working software over documentation, consumer collaboration over agreement negotiations, and flexibility over pursuing a plan (Marlowe et al., 2020). Marlowe et al. noted that some of the core principles incorporate continuous consumer

interaction and delivery of the product, changing the requirements, teamwork, trust and self-organization, feedback, and communication.

After the Agile Manifesto came out and agile became popular in practice, Dingsøyr et al. (2012) noted a need for research studies involving adopting agile methods and examining established agile development teams. Moreover, in the late 2000s, there was a call for management-oriented approaches and a better understanding of agile core principles and ideas (Dingsøyr et al., 2012). Hohl et al. (2018) pointed out that researchers started examining the creation of hybrid agile approaches in the mid and towards the end of the 2000s because the agile approach started booming across organizations.

Hybrid agile approaches combine traditional and agile models, which then creates a single approach (Papadakis & Tsironis, 2020). This type of hybrid model could produce a more efficient model, given that the environment calls for it. A hybrid approach can also be used for a specific part of the project, or only a small portion of the project. Agile and agile hybrid approaches are two major trends in the workplace that will not become irrelevant soon (Reunamäki & Fey, 2022). Abdullah et al. (2022) remarked that a team utilizing both approaches may experience augmented project scope management, flexibility, faster delivery, and customer pleasure with the product.

In contrast, Žužek et al. (2020) warned against expectations to successfully use a hybrid model in any team across organizations because what works well in one environment may be detrimental to progress in another. It may even be challenging for some organizations to adopt an agile mindset and implement agile practices. To mitigate

challenges related to implementing agile methods, an organization must encourage and facilitate a culture of trust (Abdullah et al., 2022). For example, since organizations started back-to-work action post-COVID-19, Apple has agreed to allow their employees to work from home two days per week (Reunamäki & Fey, 2022).

Originally, agile teams were mainly small, and the team members were on-site (Dingsøyr et al., 2018). The agile approach functions best with small self-directed teams (Reunamäki & Fey, 2022). Colocation and the small size allow agile teams to depend more on direct communication and in-person collaboration. Reunamäki and Fey conducted their research before, during the onset, and the peak of COVID-19. This gave them a direct insight into organizational transformation to agile, adaptation to virtual agile teamwork, and ensuing changes making agile virtual teams more successful. Their findings suggest that agile is helpful to different degrees and may be more valuable when adapted at all organizational levels.

Although smaller agile teams are preferable, market globalization and the blossoming of the digital era facilitated 85% of global workers to engage in virtual teamwork in 2016 (Handke et al., 2020; Klonek & Parker, 2021). Dingsøyr et al. (2018) pointed out that large agile virtual teams must find ways to coordinate with one another because their project success depends on it. Large-scale development projects often employ multiple teams that work separately on the same project; therefore, all the teams must coordinate through communication and collaboration tools.

The literature shows that there is a growing number of studies examining agile virtual teams during and post COVID-2019 pandemic. Such studies aimed to examine

factors influencing team performance (Garro-Abarca et al., 2021; Handke et al., 2020; Klonek et al., 2022; Klonek & Parker, 2021). Researchers have been examining factors that positively influence agile virtual team performance during and after the COVID-2019 pandemic to advance the study of agile virtual teams. The researchers uncovered that the factors positively influencing agile virtual performance include building trust through clear communication about task distribution, the distribution of the tasks, and feeling empowered by team cohesion and leadership (Garro-Abarca et al., 2021).

Junker et al. (2022) urged scholars to explore if agile work practices continue facilitating performance among virtual teams after the COVID-19 pandemic. Natu and Aparicio (2022) reported that knowledge sharing in virtual teams still needs to be explored. They suggest future studies study knowledge sharing and expose the features that hinder or increase knowledge sharing among organizations employing virtual teams. In the systematic literature review of 84 peer-reviewed articles, Doblinger (2022) noted a lack of quantitative studies that used a self-reported measure looking at the role of communication from a team member's viewpoint.

Traditional Teams

Tannenbaum and Salas (2021) defined a team as two or more individuals working together as a unit, relying on each other to accomplish a common goal. Teams are mutually dependent groups working together to accomplish a goal (Dinh et al, 2021; Gilson et al., 2021). Research indicates that teams are universally prevalent in organizations across the globe, within all industries and work contexts (Davis et al., 2022;

Rodriguez-Sanchez et al., 2021; Shuffler & Cronin, 2019; Siangchokyoo & Klinger, 2022).

Teams are present in hospitals, schools, flight decks, nuclear power plants, and corporate offices (Salas et al., 2018). Without effective teamwork in the workplace, projects could not reach optimal outcomes (Davis et al., 2022). Teamwork is a collection of interconnected ideas, acts, and emotions that each team member has and that are necessary to serve as a unit and when united, can assist in the facilitation of coordinated task completion, leading to enhanced outcomes (Doblinger, 2022). Teams are diverse in size and team composition. Team types can be defined based on three dimensions: skill differentiation, authority differentiation, and temporal stability (Rodriguez-Sanchez et al., 2021).

Organizations value teams because teams are more effective in accomplishing jobs than individuals working alone. Organizations value teams that are well-organized, interprofessional, interdisciplinary, and cross-cultural (Salas et al., 2018). However, Siangchokyoo and Klinger (2022) pointed out that a well-organized team only sometimes guarantees high efficacy; the team members also must have the needed skills and abilities. Davis et al. (2022) added that teams need adequate training to omit disagreements, violations of trust, and interpersonal misinterpretation due to the emotions involved. Therefore, a team can be effective when it is diverse, the team members are highly skilled, and the team receives training.

Teams with a regular membership, or teams composed of the same individuals and consistently working together on projects are an anomaly in today's workplace

(Shuffler & Cronin, 2019). Due to being interprofessional and interdisciplinary, teams are more dynamic than before: Teams employ external specialists, and members work on different teams and in various locations simultaneously (Shuffler & Cronin, 2019). For team members who do not feel a sense of belonging to a system or a community, psychological needs related to belonging to a specified group with shared attitudes and values are not fulfilled (Davis et al., 2022). For teams that change membership frequently, it is challenging to create long-lasting shared mental models (Tannenbaum & Salas, 2021). Moreover, research indicates that when team membership is more fluid than stable, it presents a problem for practitioners desiring to execute traditional team research methods accurately (Klonek et al., 2019; Shuffler & Cronin, 2019).

Team processes are dynamic. Team processes transform inputs into outputs; they change over time (Klonek et al., 2019). The input factors include individual team members' characteristics (i.e., skills, abilities), team-level input variables (i.e., size, gender), and organizational contexts (i.e., climate). Research demonstrates that team processes are essential for team effectiveness (Klonek et al., 2019). Teamwork quality is a critical factor of team effectiveness; it denotes the level of interaction between the team members and the strength of their motivation to collaborate (Abdullah et al., 2022). Tannenbaum and Salas (2021) found that teams exhibiting higher quality teamwork procedures are 20% to 25% more likely to succeed.

Modern teams have high skill differentiation, low authority differentiation, and members having equal power and low temporal stability (Rodriguez-Sanchez et al., 2021). According to Rodriguez-Sanchez et al. (2021), high skill differentiation means

that team members come with diverse backgrounds and knowledge, and low authority differentiation implies that team members have equal power. Low temporal stability means teams are designated for a single project. Moreover, Rodriguez-Sanchez et al. uncovered that teams could increase collective efficacy by boosting efficacy beliefs through engaging in team tasks and using the successes of previous task performances. However, Davis et al. (2022) pointed out that in situations where teams do not attain both ingroup and belonging, there is a psychological imbalance causing adverse feelings associated with the team. Furthermore, in situations where teams experience psychological imbalance, team members could experience low self-efficacy beliefs resulting in reduced team effectiveness.

Self-managed teams or teams practicing shared leadership are examples of modern teams. Teams practicing shared leadership do not issue leadership obligations to one member alone; teams carefully select and train every member to lead in a particular area (Siangchokyoo & Klinger, 2022). Self-managed teams are responsible for making decisions on what, how, and why of their projects (Doblinger, 2022). In their study, Greenhaus and Callanan (2006) explained that self-managed teams exhibit great interest in answering what the project's goals and standards are, how the goals can be achieved, and why they are essential. Self-managed teams engage in sharing knowledge and learning form one another.

Ahmed and Harrison (2022) suggested that team learning positively influences individual learning and the development of new products as it merges the diverse background and knowledge of the other team members. Moreover, emotional

management training can assist individuals in regulating their emotions so that an optimistic outlook and goal orientation can assist team members in uniting as a cohesive unit by utilizing their differences (Davis et al., 2022). Thereby, research suggests that shared leadership, collaboration, and team learning positively influence team performance (Ahmed & Harrison, 2022; Davis et al., 2022; Rodriguez-Sanchez et al., 2021; Siangchokyoo & Klinger, 2022).

Virtual Teams

The literature refers to virtual teams as virtual teams, distributed teams, remote teams, computer-based teams, online teams, and cross-site teams (Garro-Abarca et al., 2020). Virtual teams use asynchronous electronic or mediated computer communication and information technologies to perform tasks to collaborate and accomplish objectives (Dinca et al., 2023). Virtual teams can be globally dispersed and work together on the same project using technology mediums (Lechner & Mortlock, 2022; Natu & Aparicio, 2022; Zuofa & Ochieng, 2021).

Previously, the research solely referred to teams as virtual or traditional (Handke et al., 2020; Klonek et al., 2022). Currently, the research conceptualizes virtual teams by the level of virtuality or the level at which the team members depend on technology to communicate (Handke et al., 2020). Handke et al. noted that the literature defines a virtual team one that depends on technology for communication and a team that works remotely. The literature categorizes virtual teams by the levels of virtuality.

Lechner and Mortlock (2022) defined virtual teams as geographically distributed teams depending on technology as a primary communication tool. Zuofa and Ochieng

(2021) added cultural diversity and temporariness to Lechner and Mortlock's definition of virtual teams. Natu and Aparicio (2022) defined virtual teams as operating teams performing interdependent tasks. Therefore, virtual teams are culturally diverse and somewhat geographically dispersed mutually dependent groups of individuals working on the same project who mainly use technology as the primary communication tool.

Virtual teams do not always have to use technology for communication and be geographically dispersed: They can meet in person to work as needed (Natu & Aparicio, 2022). Partially virtual teams have at least one-third of the members located off-site, while entirely virtual teams are all geographically dispersed. Moreover, geographic dispersion does not have to be across the country or the globe (Lechner & Mortlock, 2022).

Virtual teams became popular several decades ago when technology permitted employees to work together without needing to be collocated (Costa et al., 2021). The phrase virtual team was first used in 1992 (Gilson et al., 2021). Kniffin et al. (2021) noted that team virtuality is a multidimensional concept as it contains numerous aspects, such as geographical distance and asynchronous electronic communication.

Costa et al. (2021) referred to team virtuality as structural virtuality. Structural virtuality is the physical distance among team members. It can also be the communication technology that those members use to communicate (Costa et al., 2021). Team-perceived virtuality is offered as a construct of team members' perceptions rather than structural elements of their degree of virtuality. There is a difference between actual and perceived virtuality because a team member can be geographically distant from the rest of the team,

use excellent communication technology, and perceive closeness and information richness with the team. Team-perceived virtuality allows teams with more structural virtuality to sense closeness and information richness (Costa et al.). Handke et al. (2021) defined team-perceived virtuality as a shared affective-cognitive emergent state indicated by two aspects: experienced distance and experienced information deficits.

Aside from the structural properties of team virtuality, the literature on virtual teams also focuses on the social properties of team virtuality (Costa et al., 2021; Handke et al., 2021). Structural properties constitute communication technology, the amount and type of social cues the technology can convey, and the physical distance between the virtual team members (Handke et al., 2021). Structural properties of team virtuality bring about possible problems related to the technology used for communication and the mere distance between the team members. If the technology does not work well, the team cannot communicate effectively, and due to the distance, the team members cannot see one another in person as needed to communicate.

Virtual teams are faced with challenges coordinating work due to limited to no face-to-face time (Mysirlaki & Paraskeva, 2020). Virtual teams have difficulty conveying messages due to the distance and the inability to read social cues. Virtual teams must conquer problems based on the lack of trust, social interactions, and in-person collaboration (Dinca et al., 2023; Lechner & Mortlock, 2022). Moreover, the challenges most often experienced by virtual teams are related to problems in communication, teamwork, team cohesion, motivation, and trust (Zuofa & Ochieng, 2021). Research suggests that informal communication is the best practice for virtual teams to mitigate

trust and communication issues (Dinh et al., 2021; Gilson et al., 2021; Lechner & Mortlock, 2022).

Lechner and Mortlock (2022) suggested that virtual team members connect by demonstrating genuine interest in each other by reaching out to check in or sharing appropriate personal information. Dinh et al. (2021) proposed that leaders find ways to engage the teams in informal yet meaningful collaborations outside of work hours. Friday after-work "happy hours" or virtual "coffee breaks" are proposed by Gilson et al. (2021) as ways of developing virtual team trust.

Although well-intended, literature warns against the practice of adding more meetings to keep in contact with virtual teams. One-on-one meetings, informal meetings, and team-building exercise meetings to build open communication and trust are well intended; however, research finds them cumbersome for the employees (Torres & Orhan, 2023). Moreover, these meetings are conducted online, and the employees may feel that the tracking and monitoring may breach the psychological contract, harming autonomy and disintegrating trust (Agren et al., 2022; Torres & Orhan, 2023).

Although they may be problematic, virtual teams bring numerous benefits to organizations and employees. The literature discussed several benefits of virtual teams: geographic dispersion, which allows professionals who are not collocated to work on the same project, resulting in improved productivity, improved competitive advantage, and better customer service (Zuofa & Ochieng, 2021). Moreover, virtual teams can reduce organizational and operational costs as the travel budget is lowered. Because virtual teams bring diverse viewpoints to the table, they can enhance innovation levels (Ruilin &

Yingshuang, 2022; Zuofa & Ochieng, 2021). Lastly, virtual teams can rapidly respond to client demands (Lurey & Raisinghani, 2001; Zaimovic et al., 2021; Zuofa & Ochieng, 2021).

Virtual leadership is an emerging human resource evolution subject matter in the literature. It has acquired new relevance due to the digital transformation and remote work due to the COVID-19 pandemic (Greimel et al., 2023). Virtual work setting enables teams to connect and communicate via technological mediums (Zavyalova et al., 2020). A team that operates under transformational leadership will strive in changing circumstances. Transformational leaders use motivation to help their followers attain higher points of morale and motivation (Greimel et al., 2023). Transformational leaders are charismatic and inspiring, show individualized consideration toward their followers, and intellectually stimulate them. In their literature review, Greimel et al. uncovered that the virtual workplace is a sustainable future concept, and transformational leaders can motivate virtual teams.

Virtual teams differ from traditional teams in leadership needs due to the nature of the team. A leadership type that suits-well virtual teams is emergent or shared leadership. Shared leadership is studied more in traditional or collocated teams (Willson et al., 2021). Shared leadership is an effective leadership style in codependent, highly creative teams and teams working on highly complex tasks (Imam & Zaheer, 2021). Shared leadership occurs when team members lead each other during the process of product development—shared leadership mandates each team member to be able to lead and follow (Doblinger, 2022).

Scholars of organizational studies have been interested in leaders' characteristics and behaviors associated with leadership emergence in teams practicing shared leadership across contexts. The outcomes show that team members' extroversion is not associated with leadership emergence in a virtual setting where teams practice shared leadership. However, the frequency of synchronous communication is associated with leadership emergence (Willson et al., 2021).

Previous virtual leadership research indicates that strong leaders are realistic and optimistic about the future because they are visionary (Kniffin et al., 2021). Future research should examine the degree of remote leader's persuasion if she clearly states her values, communicates the team's visions, and demonstrates confidence in the team's strategic goals. Moreover, future research can examine how to build a results-focused assessment because, in virtual teams, the leader cannot monitor subordinates and build trust remotely (Kniffin et al., 2021).

Virtual project teams conserve monetary resources and allow for flexibility, among many advantages. Nonetheless, the literature indicates that virtual teams bring about a myriad of impediments, such as the lack of trust, social interactions, communication, motivation, team cohesion, teamwork, and others (Agren et al., 2022; Dinca et al., 2023; Lechner & Mortlock, 2022; Swart et al., 2022; Torres & Orhan, 2023; Zuofa & Ochieng, 2021). Zoufa and Ochieng (2021) linked virtual team impediments to coordination problems across geographical boundaries and time zones. They proposed that suitable leadership styles, open communication to encourage trust, and clear objectives must be incorporated into the virtual projects to attain success.

What Makes Teams Effective

A highly effective team maintains continuous achievement, stability, and exuberance (Tannenbaum & Salas, 2021). Tannenbaum and Salas (2021) listed seven drivers of team effectiveness: capability, cooperation, coordination, communication, cognition, coaching, and conditions. Communication is defined as information exchange within the team. Other research refers to the information exchange within the team as feedback. Klonek and Parker (2021) defined information exchange as feedback and connected it to leadership in terms of giving and receiving feedback. In their book, Tannenbaum and Salas demonstrated how drivers relate to one another in an example where information sharing encourages shared understanding, resulting in team members backing up one another as the need arises.

Considering information sharing, Natu and Aparicio (2022) inferred that intrinsic motivation is an essential instrument of knowledge sharing intentions. Organizational knowledge sharing traditions are another vital contributor to knowledge sharing intentions. Research supports the idea that knowledge sharing processes considerably affects the organization's success as knowledge sharing allows individuals, teams, and organizations to augment innovative behaviors (Natu & Aparicio, 2022; Ruilin & Yingshuang, 2022).

Effective teams need carefully selected team members. The team formation problem is locating the most capable individuals from a collection of skilled candidates to form an effective team (Juárez et al., 2021). Human resources and the leadership need to understand what motivates a potential hire and if that could be used to align personal and

organizational goals (Natu & Aparicio). Juárez et al. confirmed that organizations must be concerned with finding the best person for the job and ensuring the person-job fit. Social networks can help locate the best-suited individuals with the necessary social and task skills (Juárez et al., 2021).

Teams that use their diverse backgrounds to the team's advantage to diffuse personal expertise create shared knowledge (Pinjani & Palvia, 2013). Knowledge sharing is the practice of knowledge transfer and the exchange of information between the sender and receiver of knowledge. Therefore, productive knowledge sharing allows individuals, teams, and organizations to enhance work performance and innovate (Ruilin & Yingshuang, 2022). Shared knowledge is a form of cooperation and coordination that could enhance a team's effectiveness. Research indicates that intrinsic motivation at the individual level and social connection at the team level positively influence knowledge sharing (da Silva et al., 2022; Natu & Aparicio, 2022).

Research links feedback to favorable consequences on team functioning (Klonek & Parker, 2021). Klonek and Parker defined feedback as the extent to which team members supply truthful performance information. In teams with consistent feedback, communication channels are open and working well because feedback is given and received. Research points out that leaders benefit from feedback as well as the team members. For example, a transformational leader is adaptable and ongoing feedback is, therefore, a beneficial guideline for altering motivation and leadership style (Greimel et al., 2023). Greimel et al. emphasized that another integral motivator is receiving and delivering positive feedback from the leader and the team members.

Effective teams understand their roles and priorities (Tannenbaum & Salas, 2021). As defined by Handke et al. (2020), role clarity is the extent to which the job provides clear direction regarding the behavioral expectations for the particular job role. Research indicates that teams with heightened levels of role ambiguity show lower well-being, lower performance, and insufficient team functions (Handke et al., 2020).

Sithambaram et al. (2021) noted several environmental issues impacting teams and their effectiveness. For example, inappropriate or insufficient technology is an environmental issue that negatively impacts team effectiveness. If the team does not have the proper tools and technology, it may be difficult or timely to be successful in achieving all the goals (Garro - Abarca et al., 2020; Sithambaram et al., 2021). The cost of such tools must be considered during budget planning. Another environmental issue impacting teams and their effectiveness is the need for more knowledge of the technology and tools the team is using (Sithambaram et al., 2021). Sithambaram et al. state that it is beneficial for organizations to expose all team members to technology regardless of their need to use it during education.

Leadership is an important factor when considering teams and their effectiveness. Literature urges the leaders to ensure trust among leaders and team members. Leadership that establishes the significance of trust between the teams and the leaders is crucial in building effective teams (Akkaya & Bagieńska, 2022). Leaders empower teams, coach, and serve them through difficult times (Tyagi et al., 2022). For leaders to effectively empower, coach, and serve teams in difficult times, trust must be present.

Trust between the leader and the followers, or interpersonal trust within a team contribute to team effectiveness (Akkaya & Bagieńska, 2022). Other research supports the importance of trust in building effective teams (Bundhun & Sungkur, 2021; English, 2020). The first step in establishing trust is cultivating the core culture: the team determines and adopts the culture. The team must also understand the aspects of the culture that cannot be learned; therefore, in adding new team members, these personality aspects need to be considered (English, 2020). Lastly, in coherence with Greimel et al. (2023) and Klonek and Parker (2021), English noted the importance of regularly scheduled feedback in building trust.

Agile Virtual Teams Defined

The software development process is a crucial resource because it provides opportunities for organizations to gain new knowledge. Software development is individualized for each project and irreplicable; however, the process of developing new software allows the practitioners to gain new knowledge and experience, which can assist other practitioners in future projects (Almeida et al. 2019; Natu & Aparicio, 2022). Therefore, establishing knowledge management practices play a vital role in administrating knowledge exchange in teams and producing new knowledge from the experiences gained (Almeida, 2019; Cram, 2019; Ruilin & Yingshuang, 2022).

According to Merriam-Webster (n.d.), the term *agile* stems from Middle French and Latin *agilis*, from agree to drive, be in motion, do, perform, and currently, it is defined as “ready ability to move with quick easy grace” or “having a quick, resourceful, and adaptable character.” The agile software development methodology is in the family

of adaptable approaches to team project management. IT practitioners developed agile team project management to assist software development teams working in highly complex contexts (Zavyalova et al., 2020). Literature links agile development climate with that of continuous improvement, mentoring, and collaborative production (Almeida et al.,2019; Dingsøyr et al., 2018; Žužek et al., 2020). Agile software development is established on basic principles such as consumer happiness, incremental delivery, collaboration, decentralized decision-making, daily meetings, small teams, and flexibility (Almeida et al., 2019; Ghimire & Charters, 2022; Reunamäki & Fey, 2022). Moreover, agile software development calls for a fast delivery of functioning software with little time spent on software requirements and creating accompanying documentation because the requirements are highly dynamic, and communication between the consumers and software developers is of higher importance (Almeida et al.,2019; Ghimire & Charters, 2022; Reunamäki and Fey, 2022).

The literature marks the emergence of the agile software development methodology with a document called The Agile Manifesto. In 2001, a group of 17 IT practitioners created a document comprising 12 core agile principles named *The Agile Manifesto* (Marlowe et al., 2020; Zavyalova et al., 2020). Agile virtual teams highlight the importance of collaboration; they are self-organized, autonomous, and diverse, they work in short cycles, utilizing consistent feedback to learn and solve problems and quickly respond to unpredictable customer requests (Almeida et al.,2019; Garro-Abarca et al., 2021; Ghimire & Charters, 2022; Radhakrishnan et al., 2022; Reunamäki and Fey,

2022; Zavyalova et al., 2020). No universal functional direction for practicing agile exists presently.

Every stakeholder on an agile project, such as the team leaders, team members, consumers, product owner, scrum master, and end-users, cooperates through self-organization in regulating and developing the project (Almeida et al., 2019; Ghimire & Charters, 2022). Moreover, agile teams rely on fast communication and consistent partnership together with all contributors. Learning and adaptiveness are critical elements in an agile work environment. Due to the consistently high rate of change in the workplace, agile software development is essential for software engineering projects to be successful (Almeida et al., 2019; Sathe & Panse, 2023).

Collaboration and self-organization among team members are priorities in agile software development methodology (Ghimire & Charters, 2022). Agile virtual teams value individuals over processes, software over documentation, customer partnership over negotiating contracts, and responding to change over pursuing a plan (Marlowe et al., 2020). In other words, agile virtual teams spend little time pre-planning and documenting every step they will take during the development process; they are not concerned with delivering perfectly functioning software to the customer on the first try. Agile virtual teams work in close contact with each other and the customer daily to collaborate and make quick changes, pair with each other to make the process faster, and share the product with the customer early and often to have the time for necessary changes (Lechner & Mortlock, 2022; Natu & Aparicio, 2022; Zuofa & Ochieng, 2021).

Agile virtual teams are well-organized but flexible regarding change, as change is a significant element of satisfying clients' needs.

Teamwork in agile virtual teams occurs through self-organization, interaction, and role requirements as they engage in daily stand-up and regular retrospective meetings where they interact and fulfill their role requirements by uncovering how team members are doing with their tasks (Agren et al., 2022; Junker et al., 2022; Radhakrishnan et al., 2022). Self-organization is the ability of each team member to independently assign tasks without the external input of a manager and take responsibility for the work to complete the task (Radhakrishnan et al., 2022).

The daily stand-up meeting is a short meeting, which usually takes about fifteen minutes, and the team members supply details about the progress of the project (Ghimire & Charters, 2022; Žužek et al., 2020). During the stand-up meeting, each team member discusses the previous day's accomplishments, the present day's plan, and the blockers that may prevent goal attainment (Žužek et al., 2020). These meetings are not meant to be perceived as punitive; instead, they assist the team in open communication and collaboration.

Retrospective meetings happen at the end of each sprint or a short cycle. After delivering the product to the client, the team reflects on the achievements and evaluates the need for modifications. Moreover, this meeting aims to examine improving team performance and addressing team dynamics such as friction and disagreements (Ghimire & Charters; Junker et al., 2022; Žužek et al.).

In their study, Ghimire and Charters (2022) conducted a literature review to identify standard agile practices widely used across agile software development teams. They used five professionals with at least 15 years of experience working on agile projects to validate the list. This list is comprised of agile practices mentioned in this dissertation and their descriptions:

- Stand-ups - a 15-min standing meeting where the team provides information about the progress of the project and if there are any issues arising.
- Pair Programming - a technique where two developers from the team work together at one workstation.
- Definition of Done - when all acceptance criteria that each deliverable must meet are met and ready to be released to a customer.
- Retrospective - a meeting where the team reflects on what worked, what did not, and why.
- Sprint - a time-boxed period where a team works to complete a set amount of work.
- Sprint goals – development tasks to be completed by the team during a sprint.
- User Stories - general explanation of software features from the user's perspective.
- Online Tools - tools that can be used to visualize, track, and communicate.

Why Agile Virtual Teams Matter

According to Digital.ai. (2022) 51% of agile teams use a hybrid form of virtuality—working most of the time remotely, and only 2% of agile teams work onsite.

When the survey asked what high-performing agile teams have, 89% of respondents replied with: people-centered values, clear culture, tools, and leadership empowerment. Scrum Inc. (2022) outlined why organizations want agile teams: agile teams help increase revenue, lower costs, and reduce risk. Respondents who see the benefits of practicing agile report a rise in collaboration by 69% and better alignment to business needs by 54%.

Agile virtual teams are flexible and adaptable, so they work well during change and disruptions, such as COVID-19. Virtual employment was already popular in organizations before COVID-19, but the pandemic pushed most firms to abruptly switch over to working virtually at a grander scale (Reunamäki & Fey, 2022). Teams that are new to the sudden shift to virtual work are facing challenges related to navigating technological tools, setting new ground rules for communication, cultivating trust, and using virtual collaboration tools (Comella-Dorda et al., 2020).

In contrast, agile virtual teams are well-versed in using technology to conduct their jobs. Agile virtual teams do not need time to adjust to the virtual work context (Sathe & Pasne, 2023). Agile appoints more decision-making power to small teams and gives team members more autonomy than traditional teams over how, when, and where they work, including virtually (Reunamäki & Fey, 2022). Therefore, traditional teams can use agile software development methods to adapt to the modern work environment calling for virtual settings.

During the sudden shift to virtual work due to COVID-19, in their study, Ford et al. (2021) uncovered that teams experiencing challenges had no clear visibility of

colleagues' work, they experienced difficulty communicating with colleagues, and had inadequate hardware. However, in their study, Sathe and Pasne (2023) determined that agile software development teams adopting an agile mindset respond well to crises and improve productivity in a situation such as COVID-19. The agile mindset is a way of thinking that highlights collaboration and adaptability in unstable settings. The agile mindset indicates optimism, learning, pragmatism, ownership, and partnering with team members to achieve organizational goals (Sathe & Panse, 2023).

The Current State of Agile Virtual Teams Research

Agile teams are becoming more popular across organizations, industries, and markets, which include technology services, manufacturing, financial services, healthcare, and human resources (Cram, 2019; Marlowe et al., 2020). Due to the constant changes in business and technology, teams are challenged with understanding and satisfying stakeholders' requirements; therefore, teams are turning to agile adaptions to mitigate problems related to successful product delivery (Radhakrishnan et al., 2022). Moreover, rapid resource limitations can lead to industry changes and cause a new set of consumer demands (Reunamäki & Fey, 2022). Therefore, organizations turn to agile practices to boost their teams' performance and develop the product faster while satisfying the consumer's needs (Gahroee et al., 2022; Junkeer et al., 2022). Organizations wanting to implement agile practices must undergo agile transition and adoption processes.

Gahroee et al. (2022) defined agile transition as the result of organizational transformation processes. In their literature review, Jovanović et al. (2020) compared the

current literature on agile tailoring, transformation, and adoption processes. This literature review concluded that many agile transition and adaptation frameworks exist, and situational factors affect the transition and adaptation process. Gahroee et al. agreed with Jovanovic et al. in that the literature points to solutions for agile transition through numerous frameworks and models; however, they added that there needs to be more research in instituting and sustaining agile practices.

Research states that organizations are getting more compliant with adopting agile methods than they did in the past. Inflexibility in the adoption of agile methods resulted in limited tailoring practices (Cram, 2019). However, recent research indicates that an increasing scope of tailoring is taking place (Jovanović et al., 2020). Literature defines tailoring as the designation and alignment of particular practices and procedures based on the project context (Papadakis & Tsironis, 2020). Tailoring may include creating a hybrid agile team project management method by combining the traditional and the agile team project management methods (Cram, 2019; Jovanović et al., 2020; Papadakis & Tsironis, 2020).

Organizations implementing agile processes in virtual teams face difficulties based on team size, complexity, and flexibility as they impact teams' communication, knowledge sharing, and trust (Agren et al., 2022; Alsharo et al., 2017b; Alzoubi & Gill, 2021; Gamero et al., 2021; Sithambaram et al., 2021). The literature points out that the success of an agile virtual team depends on the team's ability to collaborate and communicate (Alzoubi & Gill, 2021; Cram, 2019). Communication frequently presents a problem sustaining the newly instituted agile process (Agren et al., 2022). Although agile

virtual teams supply team members with the advantage of augmented flexibility, research indicates that it is more challenging to handle the communication processes (Swart et al., 2022). Communicating via technological media typically produces misinformation due to the obscurity of tone and the nonexistence of body language cues, and therefore virtual work environment could not replace team colocation (Reunamäki & Fey, 2022; Swart et al., 2022).

Communication in meetings differs depending on the team type—traditional teams mainly communicate in person, while agile virtual teams communicate via technology. Garro - Abarca et al. (2020) indicated a need for prospective studies to explore different aspects of virtual teams and how those aspects interact. For example, they suggest that scholars investigate virtual teams using technology to accomplish tasks and the interaction between communication and trust.

To mitigate communication issues in agile virtual teams (Klonek & Parker, 2021) suggested splitting agile virtual teams into smaller sub-teams to enable the free flow of ideas and impromptu collaborations. However, Reunamäki and Fey (2022) warned against sub-teams creating informal hierarchies inadvertently. Another way to improve and promote collaboration and communication is pair programming. Pair programming promotes collaboration and communication as two programmers work together on a shared task and practice shared knowledge (Agren et al., 2022; Cram, 2019; Wiesche, 2021).

Knowledge sharing is the process of interacting and sharing knowledge between two parties; therefore, functional knowledge sharing allows for more effective

performance and innovation (Natu & Aparicio, 2022; Ruilin & Yingshuang, 2022). However, the virtual workplace does not lend itself to effortless knowledge sharing execution, even if the organization uses agile virtual teams (Reunamäki & Fey, 2022). Knowledge sharing is essential in decreasing the time spent solving problems (Natu & Aparicio, 2022). Therefore, it is imperative to use online communication tools and agile project management software to improve knowledge sharing within organizations (Reunamäki & Fey, 2022).

Agile teams must have a lot more transparency between each other than traditional teams. A newly practicing virtual agile team could see this transparency as a lack of trust, which may threaten the sustainability of the transformation and adaptation. In their study, Agren et al. (2022) uncovered that some agile virtual team members felt unsafe discussing critical items in online chats or stand-up meetings. This fear could stem from the team members knowing that no chat or a meeting is private as every word is recorded. Reunamäki and Fey (2022) noted that because agile is founded on autonomous teamwork and agile virtual teams work remotely, leaders must be mindful of not crossing over to the more traditional leadership styles. Moreover, they noted that the leaders must create an environment of psychological safety so that the team can build interpersonal trust and an impression of team spirit.

Communication in meetings differs depending on the team type: traditional teams mainly communicate in person, while agile virtual teams communicate via technological mediums. Garro - Abarca et al. (2020) indicated a need for prospective studies to explore different aspects of virtual teams and how those aspects interact. For example, they

suggested that scholars investigate virtual teams using technology to accomplish tasks and the interaction between communication and trust. Swart et al. (2022) called for future studies examining different virtual team structures related to communication and knowledge sharing and identifying best practices for successful and precise knowledge sharing. Ghimire and Charters (2022) invited future studies to focus on the impact of communication practices on agile project outcomes. Natu and Aparicio, 2022 expressed a demand for future studies to uncover characteristics promoting a better understanding of the precursors that may inhibit or assist in sharing knowledge among virtual teams in organizations.

There is a disagreement in the literature about documentation related to knowledge sharing in agile teams. This disagreement in the literature created another gap in the literature related to knowledge sharing. Almeida et al. (2019) and Theunissen et al. (2022) disagreed on documentation as part of knowledge sharing in agile virtual teams - Almeida et al. stressed that agile teams rely on informal communication for knowledge sharing, while Theunissen et al. (2022) noted that agile virtual teams use informal communication, development artifacts for documentation purposes, and architecture documentation format.

Key Variables Examined in This Study

Agile Virtual Team Effectiveness

Coordination, communication, and adaptability are teamwork competencies associated with increasing team effectiveness (Salas et al., 2018). Research deems agile teams successful if they are autonomous, diverse, and collaborate well with clients

(Radhakrishnan et al., 2022). Effective agile virtual teams efficiently attain goals within the set period and budget.

A successful agile virtual team fulfills and satisfies all the client's requests and needs, achieves all the goals, the client values the quality of the teamwork, the process of working together as a team is positive for the team, and the final product needs minimal changes (Lurey & Raisinghani, 2001; Zaimovic et al., 2021). The research infers that communication is vital in increasing affective commitment, positively impacting team effectiveness, and cultivating trust, which promotes effective teamwork. (Akkaya & Bagienska, 2022; Bundhun & Sungkur, 2021). Therefore, it can be argued that virtual agile team effectiveness is the result of clear communication, trust, good team performance, a satisfied client, and a well-operating team.

Communication in Agile Virtual Teams

Communication in agile virtual teams is intended to be informal and ongoing because it fosters an environment where ideas can easily flow between team members (Shameem et al., 2023; Zaimovic et al., 2021). Agile virtual teams communicate directly and openly (Zaimovic et al., 2021). Unreliable telecommunication devices or a lack of candor in communication will impede knowledge sharing between team members (Agren et al., 2022; Shameem et al., 2023; Zaimovic et al., 2021).

Wiesche (2021) pointed out that agile practices constitute extensive communication interruptions in addition to daily standups and pair programming. The interruptions may come from stakeholders or other team members asking for assistance or an explanation. In contrast, Cucolas & Russo (2023) uncovered that communication,

pair programming, and collaboration have decreased in agile virtual teams due to relying on telecommunication devices and finding it more challenging to synchronize availability.

Knowledge Sharing in Agile Virtual Teams

Knowledge sharing is an essential agile practice using experience and knowledge to deliver continuous competitive advantage in the industry. This is a highly dynamic strategy where team members uncover innovative forms of enhancing the organization's competitiveness (Shameem et al., 2023). Zaimovic et al. (2021) warned against any team member taking dominance over the discussions as that may demotivate the rest of the team. Pair programming is a practical knowledge sharing approach (Agren et al., 2022). Agren et al. noted that pair programming is often used as a socializing and knowledge sharing tool. Every team member of the agile virtual team needs to participate in knowledge sharing through collaborative training and the experience acquired via problem-solving among team members (Pinjani & Palvia, 2013).

Trust in Agile Virtual Teams

Trust is vital for appropriate functioning and successful partnership in agile virtual teams. Building trust in an in-person work environment takes time but building trust in a virtual environment is much more challenging because most team members have never met before (Bundhun & Sungkur, 2021). Trust maintains the ongoing communication in agile virtual teams, which is a central element in defining the team's success (Razavi et al., 2019; Zapta et al., 2021).

Trust encompasses risk, vulnerability, and potential for disappointment (Zapta et al., 2021). Agile virtual teams face difficulties related to trust, such as a lack of in-person communication, diverse cultural backgrounds, language barriers, and working across time zones (Razavi et al., 2019). Moreover, Bundhun & Sungkur (2021) uncovered that some of the chief circumstances contributing to the scarcity of trust in agile virtual teams are reluctance to communicate, unwillingness to engage in personal dialogues, certain team members monopolizing airtime during the meetings, and disputes with team members.

Summary and Conclusions

This chapter provides a comprehensive review of the pertinent literature on the evolution of agile virtual teams, traditional teams, virtual teams, factors that make teams effective, the definition of agile virtual teams, reasons why agile virtual teams are essential, the current research in agile virtual teams, communication in agile virtual teams, knowledge sharing in agile virtual teams, trust in agile virtual teams, and agile team effectiveness. Numerous studies in this chapter outline the origins, adoption, and use of agile principles in organizing and managing virtual teams. Agile virtual team effectiveness is central to this study, and various research studies in this chapter discuss the variables and how they impact agile virtual team effectiveness.

This literature review is evidence that a considerable number of studies indicated that communication is vital in increasing affective commitment, positively impacting team effectiveness, and cultivating trust, which promotes effective teamwork (Akkaya & Bagienska, 2022; Bundhun & Sungkur, 2021). Moreover, adequate team knowledge is essential for an agile virtual team to be effective (Shameem et al., 2023). However, due to

most agile virtual teams working predominantly virtually, meetings and pair programming have presented as problematic and thus negatively impacting communication and knowledge sharing (Agren et al., 2022).

Research indicates that scholars need more agreement on factors influencing agile virtual team effectiveness (Zavyalova et al., 2020). Similarly, there are discrepancies in the literature about communication in agile virtual teams. For example, some research studies note that communication is the same in virtual and in-person settings for agile teams or that agile methods adjust the amount and the type of communication needed for team success (Garro-Abarca et al., 2021; Wiesche, 2021).

Other research studies remark that communication is more challenging and problematic in virtual settings (Agren et al., 2022; Bundhun & Sungkur, 2021; Cucolas & Russo, 2023; Sathe & Panse, 2023). Furthermore, research calls for studies focusing on knowledge sharing, trust, and communication practices within distributed virtual teams and the effects that knowledge sharing and communication have on team success (Bundhun & Sungkur, 2021; da Silva et al., 2022; Gamero et al., 2021; Imam & Zaheer, 2021; Juárez et al., 2021; Radhakrishnan et al., 2022). Thus, this study aimed to address this gap in the scholarly literature.

This study's results may inform practitioners about aspects of knowledge sharing, trust, and communication that assist in agile virtual team effectiveness. Strategies that make agile virtual teams successful are chief in stabilizing the global economy. Therefore, this study can further inform research on helping agile virtual teams thrive to

sustain continuous improvement of the global economy. This study's social change impact could assist organizations in agile virtual team development.

Chapter 3: Research Method

This quantitative study aimed to investigate the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness and determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. A quantitative approach was appropriate for this correlational study because it allowed me to investigate the relationships and interactions between the variables and make predictions and generalizations based on the collected data. Chapter 3 starts with a detailed description of the research design and the rationale behind the selected design, followed by a description of the target population for this study, sampling and sampling procedures, recruitment, participation, data collection methods, and instrumentation. The chapter concludes by describing internal and external threats to validity, ethical considerations, and a summary.

Research Design and Rationale

In this study, I used a nonexperimental quantitative research design to investigate the relationships between the variables. A quantitative research design was best suited for this study because this study depended on numerical analyses indicating a relational strength between the variables. The dependent variable in this study was agile virtual team effectiveness. The predictor variables were communication, knowledge sharing, and trust. Trust was also used as a moderating variable. The criterion variable was dichotomous, whereas the predictor variables were ordinal.

The cross-sectional research design is well-suited for studies collecting data at a single point in time to gather opinions or attitudes from a specific group of participants

and to see if changes in one or more variables provoke changes in other variables (Edmonds & Kennedy, 2017), making it an appropriate choice for this study, which answered the following questions and hypotheses:

- RQ1: Does communication predict agile virtual team effectiveness?

  $H_0$1: Communication is not a significant predictor of agile virtual team effectiveness.

  $H_1$1: Communication is a significant predictor of agile virtual team effectiveness.

- RQ2: Does knowledge sharing predict agile virtual team effectiveness?

  $H_0$2: Knowledge sharing is not a significant predictor of agile virtual team effectiveness.

  $H_1$2: Knowledge sharing is a significant predictor of agile virtual team effectiveness.

- RQ3: Does trust predict agile virtual team effectiveness?

  $H_0$3: Trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$3: Trust is a significant predictor of agile virtual team effectiveness.

- RQ4: Does communication moderated by trust predict agile virtual team effectiveness?

  $H_0$4: Communication moderated by trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$4: Communication moderated by trust is a significant predictor of agile virtual team effectiveness.

- RQ5: Does communication moderated by trust predict agile virtual team effectiveness?

  $H_0$5: Communication moderated by trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$5: Communication moderated by trust is a significant predictor of agile virtual team effectiveness.

- RQ6: Do communication and knowledge sharing moderated by trust predict agile virtual team effectiveness?

  $H_0$6: Communication and knowledge sharing moderated by trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$6: Communication and knowledge sharing moderated by trust is a significant predictor of agile virtual team effectiveness.

Methodology

I employed binary logistic regression and multiple regression to answer the research questions and the hypotheses in this study. This study's central research question was "What are the effects of communication, trust, and knowledge sharing on agile virtual team effectiveness?"

I used binary logistic regression and multiple regression to determine whether there was an association between predictor and criterion variables. Binary logistic regression determined whether there was an association between each predictor variable: knowledge sharing, communication, and trust with the criterion variable: virtual team effectiveness. Multiple regression predicted virtual team effectiveness from the

interaction variables: knowledge sharing moderated by trust, communication moderated by trust, and knowledge sharing*communication moderated by trust.

Population

The target population for this study included professionals who were active members of agile virtual teams comprised of at most 10 professionals and employed in organizations headquartered in the United States. The participants were adults who were active members serving on agile teams. No other inclusion criteria were required from the potential participants to qualify for this study. An agile team usually comprises seven to nine professionals (Poth et al., 2020). According to Akiwatkar (2023), 94% of organizations have practiced agile for at least one year, 33% of organizations have practiced agile between 3 and 5 years, and 52% of professionals use agile in their projects. According to recent estimates, 71% of U.S. firms use agile approaches (Djurovic, 2023). Therefore, it was assumed that there would be ample opportunity to find participants reflective of the overall population.

Sampling and Sampling Procedures

The sampling strategy was purposive sampling, a type of nonprobability sample approach. The sample was selected from the target population based on the fit with the purpose of this study and the exclusion criteria. Purposive sampling is less biased and has more generalizable findings than other nonprobability sampling techniques (Daniel, 2012). The inclusion criteria for this study comprised adults who were active members of an agile team and working for any organization headquartered in the United States. The

exclusion criterion was working for an organization headquartered in the United States in an agile team for less than one year.

I utilized LinkedIn Agile groups to locate participants for my study. Online listservs have been successfully utilized in management and psychology research studies. For example, Costa et al. (2021) recruited 477 participants globally, of whom 296 participated in the study. Another example is Shameem et al. (2023), who recruited 107 participants in total for their study.

Although the sampling distribution of the mean is normal with samples as small as 30, Frankfort-Nachmias et al. (2020) suggested that the sample size be higher than 50. However, Prajapati et al. (2010) warned that ethics committees and journal editors like to see research studies supported by sample size and statistical power estimates to defend their conclusions. Based on previous research, such as Cucolas and Russo (2022), I used G*Power (Version 3.1) to conduct an a priori power test to determine the minimum sample size. With a medium effect size, an alpha level of .05, and power of .90, I got the minimum size of 108. Due to the large size of LinkedIn Agile groups participant population, I exceeded the minimum number of participants to allow the data collected to be better generalized and reduce the risk of Type II error (Warner, 2012).

Procedures for Recruitment, Participation, and Data Collection

I recruited participants by posting an invitation to participate in LinkedIn Agile groups. This invitation comprised an invitation letter explaining the purpose of the study, the inclusion criteria, the expected time to complete the survey (approximately 15 minutes), and the link to the survey site. I used LinkedIn Agile groups to locate the

participants for this study and Google Forms on a personal website to collect the data. Google Forms can be entirely anonymous, contain as many questions as needed, and be divided into sections such as demographics and survey questions (Popović & Karl, 2023). Once the participants clicked on the link for the survey, a consent form became available, stating that their participation was voluntary and that the answers were anonymous. Participation in this study was voluntary, and no compensation for participation was available.

The demographic information on the survey included gender, age, experience, education level, and physical location. Upon the completion of the data collection, the data was downloaded and imported into SPSS for subsequent statistical analysis. The introduction letter informed the respondents that participation was voluntary and that they could withdraw at any point.

Instrumentation and Operationalization of Constructs

Alsharo et al. (2017) published the Virtual Team Effectiveness Survey, a 49-item survey that follows a 7-point Likert-type scale (1 = *disagree strongly* to 7 = *agree strongly*) that collects demographic information, includes knowledge sharing, trust, collaboration, and communication as the variables of interest, and measures team effectiveness in terms of team performance and team satisfaction. A mean composite score across all items was calculated. My study aimed to investigate the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness and determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness.

Although I used the entire measure in my study, I did not score items measuring coordination, an aspect of collaboration. This was one of the differences between my study and Alsharo et al. (2017). Another difference was my population—agile virtual team members working globally. Alsharo et al. suggested that future studies test their model by selecting participants who use a collaborative and project management method with the associated technology and who work in global teams. Moreover, Alsharo et al. suggested that future research should better understand the impact of trust on virtual teams' outcomes because trust did not significantly moderate the relationship between collaboration and team effectiveness in their study. By choosing globally dispersed participants using agile methods, I satisfied the limitations and future suggestions Alsharo et al. noted in their research. Lastly, Alsharo et al. stated that their research investigated knowledge sharing in teams not relying on technology and trust, which was a potential limitation as the type of technology used may affect the inception of trust and the knowledge shared by team members. Therefore, my study did not replicate Alsharo et al.

Virtual agile team effectiveness is operationally defined as the result of clear communication, trust, a team open to learning, good team performance, a product that meets the required standards, a satisfied client, and a satisfied team (Akkaya & Bagienska, 2022; Alsharo et al., 2017; Bundhun & Sungkur, 2021; Lurey & Raisinghani, 2001; Zaimovic et al., 2021). A sample item was "My team is meeting its business objectives." Communication in agile virtual teams is operationally defined as an informal, ongoing, direct, and open process of conveying information between team members (Shameem et al., 2023; Zaimovic et al., 2021). A sample item was "My virtual

team members communicate positively to one another." Knowledge sharing in virtual agile teams is operationally defined as a collaborative effort to combine collective knowledge and experience to deliver a sustainable competitive advantage to the team (Shameem et al., 2023; Zaimovic et al., 2021). A sample item was "I am successful in transferring what I have learned to my team." Trust in virtual agile teams is operationally defined as a foundation of a functioning team that includes elements of disappointment, vulnerability, and risk (Razavi et al., 2019; Zapta et al., 2021). A sample item was " I can turn to my team members for help when needed."

The authors granted permission to reproduce and use for research and educational aims without soliciting written permission (see Appendix B). This instrument was reliable as Cronbach's alpha and Dillon-Goldstein's rho reliabilities ranged from 0.83 to 0.96, and composite reliability scores ranged from 0.85 to 0.96 (Alsharo et al., 2017). Existing research ensured content validity. All items loaded higher on their respective construct than the other constructs in the research model, and the square root of the average value explained was higher than interconstruct correlations presenting the measure's discriminant validity.

Data Analysis Plan

I used binary logistic regression and multiple regression to determine if there was an association between predictor and criterion variables. Binary logistic regression determined whether there is an association between each predictor variable: knowledge sharing, communication, and trust with the criterion variable: virtual team effectiveness. Multiple regression predicted virtual team effectiveness from the interaction variables:

knowledge sharing moderated by trust, communication moderated by trust, and knowledge sharing*communication moderated by trust. I used SPSS (Version 28) to analyze collected data from the surveys aimed at answering this study's research questions and hypotheses.

Data cleaning comprises preparation, screening, correcting data problems, checking sample demographics, and checking factor analyses and scale reliabilities (Karam & Ralston, 2016). During preparation, I ensured that the data collected aligned with the purpose of the study, provided answers to the research questions and that the scoring and reverse scoring items corresponded. The screening included checking for significant problems, such as missing data and extreme outliers. In correcting data problems, or in cases of missing data, I checked the original datasheets to see if the participant was careless or if it was a simple error; in such instances, a substitution method may be employed to resolve the error (Karam & Ralston, 2016). Karam and Ralston (2016) suggested 5% to be the standard threshold for missing data. I employed the overall mean as a substitution method for the missing data. The descriptive statistic data was used for average age, gender frequencies, educational level, and experience. Statistics reported included the *p*-values and confidence interval associated with statistical significance, R2 for the effect size, or practical significance for the moderation effect (Frey, 2022).

Threats to Validity

External Validity

Threats to external validity occur when findings are not generalizable across populations, settings, and time frames (Salkind, 2010). Participant selection for my study was based on serving on an agile team of any organization headquartered in the United States, which represented the population under the study so that my results could be generalized to the broader virtual agile team population. I utilized a large sample size. Moreover, my sample represented the population under the study, virtual agile team members, because every participant was a member of an organization practicing agile. Streiner (2005) stated that external validity can be threatened by inaccurate results caused by the researcher selecting an ill-fitting model in the study.

Internal Validity

Threats to internal validity stem from a practitioner not selecting a model that fits the data well. A practitioner can also include variables not related to any of the endogenous variables, omit the inclusion of critical variables, and utilize paths that connect variables not related to each other (Streiner, 2005). Participant selection, controlling biases, and participation are essential when considering internal validity. The instrument I used in this study has been found reliable and valid in the literature.

Face Validity

Selected participants were subject experts in the research topic. The participants were active members of virtual agile teams. Therefore, the survey questions were easy to understand and answer. The survey design was simple, straightforward, and easy to

follow; therefore, the participants were expected to be able to understand the questions, leading to accurate answers (Lavrakas, 2008).

Construct Validity

Construct and face validity are related. A measure with high construct validity will also have high face validity. The virtual team effectiveness survey Cronbach's alpha and Dillon-Goldstein's rho reliabilities ranged from 0.83 to 0.96, and composite reliability scores ranged from 0.85 to 0.96 (Alsharo et al., 2017). Moreover, the respondents who participated in answering the survey were well-equipped to answer the questions accurately, which will keep construct validity (Lavrakas, 2008).

Ethical Procedures

I began data collection upon approval from Walden University Institutional Review Board (IRB). The IRB approval number was 10-23-23-0992775. Due to the nature of this study, the participants did not endure any psychological harm, and there was no compromise on the participants' dignity (Frey, 2022). The surveys were anonymous as I did not collect personally identifiable information. The demographic data, such as age, gender, years of experience, and educational level, were not linked to any particular participant. The data were kept secure on a password-protected device behind a physical lock. Informed consent was presented to the participants once they clicked on the link for the survey. Informed consent included the purpose of the study, the procedure, the expected completion time, the directions on how to respond to the questions, the fact that there is no expected harm due to participating in this study and

that this was anonymous and voluntary. The data will be deleted and disposed of after 5 years.

Summary

Chapter 3 presented methods this study will employ in this quantitative nonexperimental research study. Predictor, criterion, and interaction variables were defined. Research questions and hypotheses for understanding the effects of communication, knowledge sharing, and trust on virtual agile teams' effectiveness were presented and elaborated. This chapter provided a comprehensive description of the research design, how it aligns with the research question, a description of the measure that was used, the participant selection, the flow of data collection, and the related analysis methods. Moreover, the validity of the research results and ethical considerations were discussed. The next chapter will include the presentation and analysis of the study's findings.

Chapter 4: Results

This quantitative study aimed to investigate the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness and determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. The criterion variable in this study was agile virtual team effectiveness. The predictor variables were communication, knowledge sharing, and trust. Trust was also used as a covariate variable. A quantitative approach was appropriate for this study because it allowed me to investigate the relationships and interactions between the variables and make predictions and generalizations based on the collected data. Chapter 4 starts with a detailed description of the research flow, the data collection process, data analysis, and the study results.

Binary logistic regression and multiple regression analysis were used to address the following research questions and hypotheses:

- RQ1: Does communication predict agile virtual team effectiveness?

  $H_0$1: Communication is not a significant predictor of agile virtual team effectiveness.

  $H_1$1: Communication is a significant predictor of agile virtual team effectiveness.

- RQ2: Does knowledge sharing predict agile virtual team effectiveness?

  $H_0$2: Knowledge sharing is not a significant predictor of agile virtual team effectiveness.

$H_1$2: Knowledge sharing is a significant predictor of agile virtual team effectiveness.

- RQ3: Does trust predict agile virtual team effectiveness?

  $H_0$3: Trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$3: Trust is a significant predictor of agile virtual team effectiveness.

- RQ4: Does communication moderated by trust predict agile virtual team effectiveness?

  $H_0$4: Communication moderated by trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$4: Communication moderated by trust is a significant predictor of agile virtual team effectiveness.

- RQ5: Does knowledge sharing moderated by trust predict agile virtual team effectiveness?

  $H_0$5: Knowledge sharing moderated by trust is not a significant predictor of agile virtual team effectiveness.

  $H_1$5: Knowledge sharing moderated by trust is a significant predictor of agile virtual team effectiveness.

- RQ6: Do communication and knowledge sharing moderated by trust predict agile virtual team effectiveness?

  $H_0$6: Communication and knowledge sharing moderated by trust is not a significant predictor of agile virtual team effectiveness.

$H_1$6: Communication and knowledge sharing moderated by trust is a significant predictor of agile virtual team effectiveness.

Data Collection

Data collection followed the outline approved by the Walden University IRB. Data were collected using an online survey created in Google Forms on a personal website and posted in LinkedIn Agile groups. The survey comprised the consent form, a short demographic section, and one validated and reliable instrument. One hundred nineteen participants completed the survey over a period of 2 weeks. A thorough examination of the data was conducted during the data-cleaning process. Several participants missed some of the demographic questions, but all 119 participants filled out the survey questions. The 119 responses were uploaded to SPSS 28 for data analysis. Four items were reverse-coded using the *recode into the same variables* section of the transform tab in SPSS.

Study Results

The sample population in this study consisted of virtual agile team practitioners currently working on a virtual agile team. The participants were primarily male (84.7%). The most significant number of participants (43.6%) were in the age group 18–24, followed by 25–34 (35%). Most participants were active members of a virtual agile team 1–5 years (73.3%). Master's degree was attained by 78 (73.6%) participants, and most of the participants resided in Europe (n = 88, 74.6%).

Table 1

Descriptive Statistics for Demographic Characteristics of Participants

Characteristic	Frequency	Percent
Gender		
Female	18	15.3
Male	100	84.7
Age		
18–24	51	43.6
25–34	41	35
35–49	18	15.4
50+	7	6
Experience		
1–5 years	85	73.3
6–10 years	25	21.6
11+ years	6	5.2
Education		
Undergraduate	24	22.6
Masters	78	73.6
Doctorate	4	3.8
Location		
Africa	1	.8
Asia	16	13.6
North America	7	5.9
South America	2	1.7
Europe	88	74.6
Australia	4	3.4

Binary Logistic Regression Assumptions

Prior to conducting binary logistic regression, I assessed the assumptions for violations. Outliers were tested using casewise diagnostics. None of the residual values exceeded +/-2.5 *SD*. There was no multicollinearity; no correlation coefficients exceeded +/-9. The results of the Box-Tidwell test indicated that the linearity assumption was not violated.

Binary Logistic Regression Analysis

Binary logistic regression was conducted to examine the relationship between trust, communication, knowledge sharing, and team effectiveness and to answer Research Questions 1–3. Table 2 shows the probability of obtaining the chi-square statistic (39.481), given that the null hypotheses are true. The chi-square results indicated that the overall model was significant, $X^2(3, N = 119) = 39.48$, $p < .001$. Cox & Snell R-square showed in Table 3 that the overall model was significant. Nagelkerke showed that the predictor variable accounted for 51% of what could be observed in the outcome variable. Hosmer and Lemeshow Test in Table 4 showed a good model fit, $p > .05$. Table 5 showed that the percentage of the null model's correct prediction was 88.2%, which had team effectiveness (TTE). For the total of 119 observations, 88.2% had team effectiveness (TTE), while 11.8% did not.

Table 2

Omnibus Tests of Model Coefficients

		Chi-square	*df*	Sig.
Step1	Step	39.481	3	< .001
	Block	39.481	3	< .001
	Model	39.481	3	< .001

Table 3

Model Summary

Step	-2Log likelihood	Cox & Snell R square	Nagelkerke R square
	54.473[a]	.282	.517

[a] Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 4

Hosmer and Lemeshow Test

Step	Chi-square	*df*	Sig
1	6.634	8	.577

Table 5

Classification Table

	Predicted		
	Binary TE		Percentage correct
	No TE	TE	
Binary	7	9	43.8
	5	98	95.1
Overall			88.2

Table 6 showed that trust (TT) was not a significant predictor contributor to the model. The Wald ratio for the coefficient associated with trust (TT) was not statistically significant, B = .05, $x^2(df = 1) = .48$, $p > .05$, resulting in not rejecting $H_0$3. Exp(B) for trust (TT) was 1.05, which meant that for one unit increase in trust (TT), team effectiveness (TTE) is 1.05 times more likely to increase. The Wald ratio for the coefficient associated with communication (TC) was statistically significant, B = .17, $x^2(df = 1) = 8.50$, $p < .05$, resulting in rejecting $H_0$1. Exp(B) for communication (TC) was 1.18, which means that for one unit increase in communication (TC), team effectiveness (TTE) is 1.18 times more likely to increase. The Wald ratio for the coefficient associated with knowledge sharing (TKS) was statistically significant, B = .21, $x^2(df = 1) = 5.82$, $p < .05$, resulting in rejecting $H_0$2. Exp(B) for knowledge sharing (TKS) was 1.24, which

means that for one unit increase in knowledge sharing (TKS), team effectiveness (TTE) is 1.24 times more likely to increase.

I am 95% confident that the true odds ratio for trust (TT) on the lowest end is 0.919, and on the highest end is 1.193. I am 95% confident that the true odds ratio for communication (TC) on the lowest end is 1.056, and on the highest end is 1.319. I am 95% confident that the true odds ratio for knowledge sharing (TKS) on the lowest end is 1.041, and on the highest end is 1.481.

Table 6

Variables in the Equation

								95% CI for Exp(B)	
		B	*SE*	Wald	*df*	Sig.	Exp(B)	Upper	Lower
Step1[a]	TT	.046	.066	.476	1	.490	1.047	.919	1.193
	TC	.166	.057	8.498	1	.004	1.180	1.056	1.319
	TKS	.217	.090	5.821	1	.016	1.242	1.041	1.481
	Con	-12.037	3.34	12.936	1	< .001	.000		

[a] Variable(s) entered on step 1: TT, TC, TKS.

Communication (TC) and knowledge sharing (TKS) were significant predictors, reporting an odds ratio of 1.18 and 1.24, respectively. This indicated that a one unit increase in communication (TC) resulted in respondents being 1.18 times more likely to report team effectiveness (TTE). Moreover, a one unit increase in knowledge sharing (TKS) resulted in respondents being 1.24 times more likely to report team effectiveness (TTE).

Multiple Regression Assumptions

Before conducting multiple regression, the first step was checking for multivariate outliers. I calculated the cutoff scores for Mahalanobis distance, Cook's distance, and

Leverage. Mahalanobis distance cutoff score (x^2 (df = 3) $p < .001$) = 16.27, Cook's distance (4/119-3-1) = .034, and Leverage (2*3+2/119) = .07. Although several outliers were noted, after investigating each case, I decided not to remove those cases. Normality and linearity were confirmed by a visual check of the data, as seen in Figures 3 and 4. Homogeneity and homoscedasticity were also confirmed by a visual check of the data, as seen in Figure 5.

Figure 3

Histogram of Dependent Variable TTE

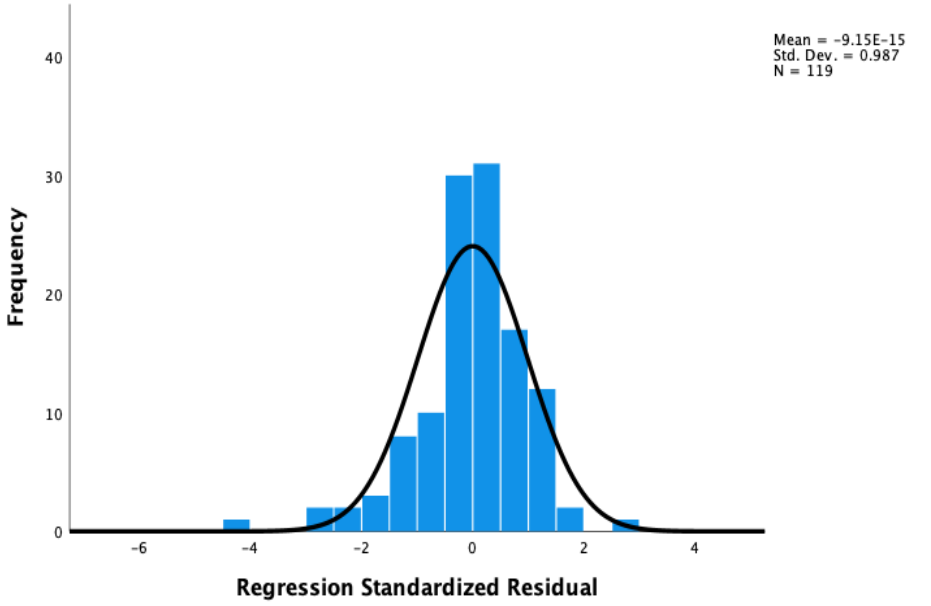


Figure 4

Normal P–P Plot of Regression Standardized Residual for Dependent Variable TTE

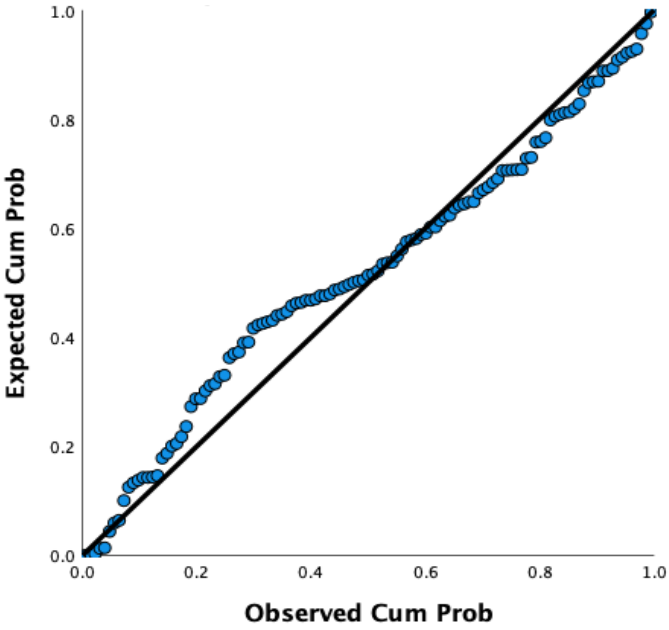
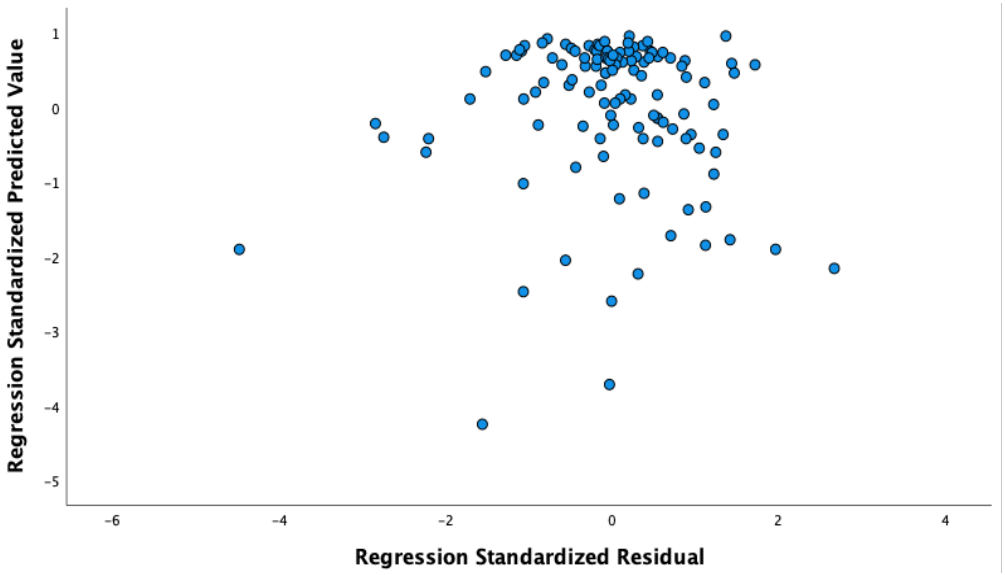


Figure 5

Scatterplot for Dependent Variable TTE



Multiple Regression Analysis

The overall model Table 7 shows that 56% of the variance in team effectiveness (TTE), $F(3,115) = 48.965$, $p < .001$, $R^2 = .56$, is due to the three predictors: communication (TC), trust (TT) and their interaction communication*trust (TC*TT).

Table 7

Model Summary for Communication and Trust

R	R^2	*F*	*df*1	*df*2	*p*
.749	.561	48.965	3.000	115.000	.000

The model summary in Table 8 shows that the predictor variable communication was significant, (TC) $b = 0.071$, $t(115) = 8.322$, $p < 0.001$. Every 1 unit increase in communication (TC) results in a 0.71 unit increase in team effectiveness (TTE). This means that the relationship between communication and team effectiveness is the same among different values of trust. The individual contribution of the moderating variable trust (TT) $b = 0.012$, $t(115) = 1.818$, $p = 0.072$ is not significant as the p is greater than 0.05. The individual contribution of trust helps in team effectiveness. Interaction variable communication*trust (TC*TT) $b = - .002$, $t(115) = -1.4$, $p = 0.164$ is not significant.

In answer to RQ4, "Does communication moderated by trust predict agile virtual team effectiveness," results show that trust (TT) was not a significant moderator of the relationship between communication (TC) and team effectiveness (TTE). Communication (TC) moderated by trust (TT) is not a significant predictor of team effectiveness (TTE) resulting in failing to reject $H_0$4. Communication is a considerable predictor of effectiveness regardless of trust. Results indicated that the individual

contribution of trust helps in team effectiveness, but high trust does not increase the relationship between communication and effectiveness. However, based on this model, for high effectiveness, teams should have good communication and high trust.

Table 8

Model Summary for Team Effectiveness (RQ4)

	Coeff (b)	*SE*	*t*	*p*	LLCI	ULCI
constant	5.559 (a)	.043	128.099	.000	5.473	5.645
TC	.071	.008	8.322	.000	.054	.087
TT	.012	.007	1.818	.072	-.001	.025
TC*TT	-.002	.001	-1.402	.164	-.005	.001

Overall model (see Table 9) showed that 68% of the variance in team effectiveness (TTE), $F(3,115) = 34.472$, $p < .001$, $R^2 = .688$, was due to these three predictors: knowledge sharing (TKS), trust (TT) and their interaction, knowledge sharing*trust (TKS*TT).

Table 9

Model Summary for Knowledge Sharing and Trust

R	R^2	*MSE*	*F*	*df*1	*df*2	*p*
.688	.473	.228	34.472	3.000	115.000	.000

As represented in Table 10, the predictor variable, knowledge sharing (TKS) $b = 0.084$, $t(115) = 7.439$, $p < 0.001$, is significant. Every 1 unit increase in knowledge sharing (TKS) leads to a 0.084 unit increase in team effectiveness (TTE). The individual contribution of the moderating variable, trust (TT) $b = 0.023$, $t(115) = 3.439$, $p < 0.001$, is significant. Every 1 unit increase in trust (TT) yields a 0.23 unit increase in team

effectiveness (TTE). Interaction variable knowledge sharing*trust (TKS*TT) b = - .003, $t(115)$ = -1.702, p = 0.091 was not significant.

Therefore, in answering RQ5, "Does knowledge sharing moderated by trust predict agile virtual team effectiveness," the analysis shows that trust (TT) is not a significant moderator of the relationship between knowledge sharing (TKS) and TTE. Knowledge sharing (TKS) moderated by trust (TT) was not a significant predictor of team effectiveness (TTE) resulting in failing to reject $H_0$5. Both knowledge sharing and trust are essential for team effectiveness, but trust does not increase or decrease the relationship between knowledge sharing and team effectiveness.

Table 10

Model Summary for Team Effectiveness (RQ5)

	Coeff (b)	*SE*	*t*	*p*	LLCI	ULCI
constant	5.550 (a)	.045	124.682	.000	5.460	5.639
TKS*TT	.084	.011	7.439	.000	.061	.106
TT	.023	.007	3.439	.001	.010	.037
TKS*TT	-.003	.002	-1.702	.091	-.007	.001

The overall model (see Table 11) shows that 60% of the variance in team effectiveness (TTE), $F(3,115) = 58.106$, $p < .001$, $R^2 = .60$, is due to these three predictors: communication* knowledge sharing (TC*TKS), trust (TT) and their interaction.

Table 11

*Model Summary for the Interaction Communication*Knowledge Sharing (RQ6)*

R	R^2	*MSE*	*F*	*df*1	*df*2	*p*
.776	.603	.172	58.106	3.000	115.000	.000

The model summary in Table 12 shows that the predictor variable communication* knowledge sharing is significant, (TC*TKS) $b = 0.002$, $t(115) = 9.770$, $p < .001$. For every single unit increase in communication*knowledge sharing (TC*TKS), there is a 0.002 unit increase in team effectiveness (TTE). The individual contribution of the moderating variable, trust is significant, (TT) $b = 0.015$, $t(115) = 2.378$, $p = 0.019$. Every 1 unit increase in communication (TT) results in a 0.019 unit increase in team effectiveness (TTE). Interaction variable communication* knowledge sharing* trust (TC*TKS*TT) is not significant, $b < 0.001$, $t(115) = -1.468$, $p = .145$.

Therefore, in answering RQ6, "Do communication and knowledge sharing moderated by trust predict agile virtual team effectiveness," I can say that trust (TT) is not a significant moderator of the relationship between communication* knowledge sharing (TC*TKS). Consequently, $H_0 6$ was not rejected. Both knowledge sharing*communication and trust are essential for team effectiveness, but trust does not increase or decrease the relationship between communication* knowledge sharing and team effectiveness.

Table 12

Model Summary for Team Effectiveness (RQ6)

	Coeff (b)	SE	*t*	*p*	LLCI	ULCI
constant	5.554 (a)	.045	138.644	.000	5.475	5.639
TC*TT	.003	.001	9.770	.000	.001	.005
TT	.063	.036	2.378	.019	-.008	.135
TC*TKS*TT	.000	.000	-1.468	.145	.000	.000

Overall Results

I conducted binary logistic regression to examine the relationship between trust, communication, knowledge sharing, and team effectiveness. I performed preliminary analyses to assess the assumptions of outliers, multicollinearity, and linearity. The initial analyses' results indicated no outliers, as none of the Residual values exceeded +/-2.5SD. There was no multicollinearity; no correlation coefficients exceeded +/-9. The results of the Box-Tidwell test indicated the linearity assumption was not violated. The chi-square results indicated that the overall model was significant, $X^2(3, N = 119) = 39.48$, $p < .001$. The result indicated that the model could distinguish between respondents who reported and did not report team effectiveness (TTE). The predictor variable accounts for 51% of what can be observed in the outcome variable. The percentage of the null model's correct prediction was that 88.2 % had team effectiveness (TTE) and 11.8% did not. Sensitivity was 95%, and specificity was 43.8%. Communication (TC) and knowledge sharing (TKS) were significant predictors, reporting an odds ratio of 1.18 and 1.24, respectively. This result indicated that a one unit increase in communication (TC) resulted in respondents being 1.18 times more likely to report team effectiveness (TTE). Moreover, a one unit increase in knowledge sharing (TKS) resulted in responders being 1.24 times more likely to report team effectiveness (TTE).

A multiple regression model was tested to investigate whether the association between communication (TC), knowledge sharing (TKS), knowledge sharing*communication (TKS*TC), and effectiveness (TTE) depends on the amount of trust (TT). After centering the variables, I entered the predictors and the interactions into

a regression model. The results indicate that F (3,115) = 48.965, $p < .001$, $R2 = .56$ – 56% of the variance in team effectiveness (TTE) was due to the three predictors: communication (TC), trust (TT), and their interaction communication*trust (TC*TT). For every 1 unit increase in communication (TC), there was a 0.71 unit increase in team effectiveness (TTE), $b = 0.071$, $t(115) = 8.322$, $p < 0.001$. Trust (TT) was not a significant predictor of effectiveness (TTE), $b = 0.012$, $t(115) = 1.818$, $p = 0.072$. Interaction communication*trust (TC*TT) was not a significant predictor of team effectiveness (TTE), $b = -.002$, $t(115) = -1.4$, $p = 0.164$. Therefore, communication (TC) moderated by trust (TT) was not a significant predictor of team effectiveness (TTE).

68% of the variance in team effectiveness (TTE) was due to the three predictors: knowledge sharing (TKS), trust (TT) and their interaction, and knowledge sharing* trust (TKS*TT). $F(3,115) = 34.472$, $p < .001$, $R2 = .688$. For every 1 unit increase in knowledge sharing (TKS), there was a 0.084 unit increase in team effectiveness (TTE), $b = 0.084$, $t(115) = 7.439$, $p < 0.001$. Trust (TT) significantly predicted team effectiveness (TTE). For every 1 unit increase in trust, there was a 0.23 unit increase in team effectiveness (TTE), $b = 0.023$, $t(115) = 3.439$, $p < 0.001$. Knowledge sharing* trust (TKS*TT) did not significantly predict team effectiveness, $b = -.003$, $t(115) = -1.702$, $p = 0.091$. Therefore, knowledge sharing (TKS) moderated by trust (TT) was not a significant predictor of team effectiveness (TTE).

60% of the variance in team effectiveness (TTE) was due to the three predictors: communication*knowledge sharing (TC*TKS), trust (TT) and their interaction, F (3,115) = 58.106, $p < .001$, $R2 = .60$. For every 1 unit increase in knowledge sharing (TKS), there

was a 0.084 unit increase in team effectiveness (TTE), $b = 0.084$, $t(115) = 7.439$, $p < 0.001$. Communication*knowledge sharing (TC*TKS) was a significant predictor of team effectiveness (TTE), $b = 0.002$, $t(115) = 9.770$, $p < 0.001$. For every one unit increase in communication* knowledge sharing (TC*TKS), there is a 0.002 unit increase in team effectiveness (TTE). Trust (TT) was also a significant predictor of team effectiveness (TTE), $b = 0.015$, $t(115) = 2.378$, $p = 0.019$. For every 1 unit increase in communication (TT), there was a 0.019 unit increase in team effectiveness (TTE). The interaction, communication*knowledge sharing*trust (TC*TKS*TT) was not significant, $b < 0.001$, $t(115) = -1.468$, $p = 0.145$. Therefore, trust (TT) was not a significant moderator of the relationship between communication* knowledge sharing (TC*TKS) and team effectiveness (TTE).

Summary

The results of this study provided insight into agile virtual team effectiveness. Communication and knowledge sharing were found to be significant predictors of team effectiveness, while trust was not. Communication moderated by trust was not a significant predictor of team effectiveness. Knowledge sharing moderated by trust was not a significant predictor of team effectiveness. Trust was not a significant moderator of the relationship between communication*knowledge sharing*trust and team effectiveness. The following chapter will include the interpretation of the findings, the study's limitations, the recommendations, potential implications of empirical research, and suggestions for future research. This chapter concluded the research study conducted.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative study was to investigate the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness and determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. The nature of this study was quantitative. Participants included virtual agile practitioners currently working in global teams employed by organizations headquartered in the United States. I used the Virtual Team Effectiveness Survey to collect data, answer the research questions, and test the hypotheses. I used binary logistic regression to determine how each predictor variable—knowledge sharing, communication, and trust—would predict the agile virtual team effectiveness criterion variable. I used multiple regression to predict agile virtual team effectiveness from the interaction variables: knowledge sharing*trust, communication*trust, and knowledge sharing + communication*trust.

Results of the data analysis indicated that communication and knowledge sharing were significant predictors of agile virtual team effectiveness, while trust was not. Communication moderated by trust did not significantly predict agile virtual team effectiveness. Knowledge sharing moderated by trust was not a significant predictor of agile virtual team effectiveness. Trust was not a significant moderator of the relationship between communication*knowledge sharing*trust and agile virtual team effectiveness.

Interpretations of the Findings

Research Question 1

Research Question 1 asked, "Does communication predict agile virtual team effectiveness?" This question addressed the importance of communication through the lens of the knowledge-based theory of the firm, which states that communication with team members is one of the most crucial elements of knowledge sharing, leading to higher productivity (Kengatharan, 2019; Srivastava & Mir, 2022). Doblinger (2022) noted a lack of quantitative studies that used a self-reported measure looking at the role of communication from a team member's viewpoint. The binary logistic regression results indicated that communication is a significant predictor of agile virtual team effectiveness. The Wald ratio for the coefficient associated with communication (TC) was statistically significant, B = .17, $x^2(df = 1) = 8.50$, $p < .05$, resulting in rejecting $H_0 1$. These results support the literature indicating that the success of an agile virtual team depends on the team's ability to collaborate and communicate (Alzoubi & Gill, 2021; Cram, 2019). These results also support research suggesting that informal communication is the best practice for virtual teams to mitigate trust and communication issues (Dinh et al., 2021; Gilson et al., 2021; Lechner & Mortlock, 2022).

Research Question 2

Research Question 2 asked, "Does knowledge sharing predict agile virtual team effectiveness?" This question was based on the knowledge-based theory of the firm and current literature. Alsharo (2017b) stated that teams that promote knowledge sharing can enhance their effectiveness. Research emphasizes the importance of trust in building

effective teams (Bundhun & Sungkur, 2021; English, 2020). The binary logistic regression results indicated that knowledge sharing significantly predicts agile virtual team effectiveness. The Wald ratio for the coefficient associated with knowledge sharing (TKS) was statistically significant, B = .21, $x^2(df = 1) = 5.82$, $p < .05$, resulting in rejecting $H_0$2. These results support current literature indicating that productive knowledge sharing allows individuals, teams, and organizations to enhance work performance (Ruilin & Yingshuang, 2022).

Research Question 3

Research Question 3 asked, "Does trust predict agile virtual team effectiveness?" The knowledge-based theory of the firm supports the notion that knowledge sharing can significantly impact trust and communication in agile virtual teams (Castellani et al., 2022; de Bem Machado et al., 2022; Sveiby, 2001). Research indicates the importance of trust in building effective teams (Bundhun & Sungkur, 2021; English, 2020). The lack of candor in communication will impede knowledge sharing between team members (Agren et al., 2022; Shameem et al., 2023; Zaimovic et al., 2021). Trust between the leader and the followers, or interpersonal trust within a team, contributes to team effectiveness (Akkaya & Bagieńska, 2022). In contrast, Agren et al. (2022) discovered that some agile virtual team members did not exhibit trust as they felt unsafe discussing critical items in online chats or stand-up meetings. The binary logistic regression results indicated that trust does not significantly predict agile virtual team effectiveness. The Wald ratio for the coefficient associated with trust was not statistically significant, B = .05, $x^2(df = 1) = .48$, $p > .05$, resulting in failing to reject $H_0$3.

Research Question 4

Research Question 4 asked, "Does communication moderated by trust predict agile virtual team effectiveness?" Multiple regression results indicate that the predictor variable, communication, is significant, $b = 0.071$, $t(115) = 8.322$, $p < .001$. The individual contribution of the moderating variable trust is not significant, $b = 0.012$, $t(115) = 1.818$, $p = .072$. Therefore, trust was not a significant moderator of the relationship between communication*trust, which resulted in failing to reject $H_0 4$. The results indicate that the individual contribution of trust aids team effectiveness, but increased trust does not increase the relationship between communication and team effectiveness. These results support previous findings that trust does not have a significant moderating effect on communication (Alsharo, 2017b).

Research Question 5

Research Question 5 asked, "Does knowledge sharing moderated by trust predict agile virtual team effectiveness?" This question is based on the literature suggesting future studies to explore knowledge sharing in virtual teams on a deeper level. Aparicio (2022) noted the need for future studies to expose the features that hinder or increase knowledge sharing. Multiple regression results indicate that the predictor variable, knowledge sharing is significant, (TKS) $b = 0.084$, $t(115) = 7.439$, $p < .001$. The individual contribution of the moderating variable, trust (TT) is significant, $b = 0.023$, $t(115) = 3.439$, $p < .001$. Interaction variable knowledge sharing* trust (TKS*TT) is not significant, $b = -.003$, $t(115) = -1.702$, $p = .091$, which resulted in failing to reject $H_0 5$.

Both knowledge sharing and trust are essential for team effectiveness, but trust does not increase or decrease the relationship between knowledge sharing and team effectiveness.

Research Question 6

Research Question 6 asked, "Do communication and knowledge sharing moderated by trust predict agile virtual team effectiveness?" Multiple regression results indicated that the predictor variable communication* knowledge sharing (TC*TKS) is significant, $b = 0.002$, $t(115) = 9.770$, $p < .001$. The individual contribution of the moderating variable trust (TT) is significant, $b = 0.015$, $t(115) = 2.378$, $p = .019$. Interaction variable communication* knowledge sharing* trust (TC*TKS*TT) is not significant, $b < 0.001$, $t(115) = -1.468$, $p = .145$, which resulted in failing to reject $H_0$6. Both knowledge sharing* communication and trust are essential for team effectiveness, but trust does not increase or decrease the relationship between communication* knowledge sharing and team effectiveness.

Limitations of the Study

The results of this study were not without limitations. Although my sample size was larger than needed, having more than 119 participants would allow for results to be more broadly generalized across a larger population and, therefore, increase the statistical power of the study. Another limitation linked to decreased generalizability was that the majority of participants lived in Europe and identified as male. Having more diverse participant characteristics may have aided in results being more generalizable. The measure I used in this study showed high reliability; however, other significant factors that better capture the variables of interest may not be part of the measure.

Additional limitations may be addressed in modifying the research design for future studies. For example, in this study, I used trust as the moderator based on self-rating. It is possible that the participants were biased or not transparent in their responses. Although anonymity was stressed in the consent, I wonder if some participants thought that I could somehow track personal information.

Recommendations

Although this study addressed the gaps in the literature, the results indicate the need for future studies. Agile virtual teams face difficulties related to trust, such as a lack of in-person communication, diverse cultural backgrounds, language barriers, and working across time zones (Razavi et al., 2019). Future research could add variables such as diverse cultural backgrounds and their effect on trust in agile virtual teams. Bundhun and Sungkur (2021) uncovered that the scarcity of trust in agile virtual teams may be due to certain team members monopolizing airtime during the meetings and disputes with team members. Future researchers could investigate the level of team understanding and readiness to utilize agile practices and the need to alter organizational change management before the agile transition occurs.

Future research may benefit from modifications in research design. One of the gaps reported in the literature was a lack of quantitative studies centered on agile virtual team effectiveness (Doblinger, 2022). A research design modification could stem from the study's findings in creating a qualitative research study. A qualitative inquiry into the moderating effect of trust on communication and knowledge sharing and the interaction communication*knowledge sharing, and communication*knowledge sharing *trust via

in-depth interviews may give a deeper understanding of the impact of trust on communication and knowledge sharing.

Implications

The results of this study make an original contribution to the literature on agile virtual team effectiveness. The gap addressed in the current literature was how communication, trust, and knowledge sharing affect agile virtual team effectiveness. This study enhances the understanding of agile virtual team effectiveness by showing that communication and knowledge sharing are significant predictors of agile virtual team effectiveness. Moreover, both knowledge sharing and trust are essential for team effectiveness.

This study's results potentially impact positive social change on individual, organizational, and global levels. The results of this study can significantly contribute to social change on the individual level by informing practitioners about aspects of knowledge sharing, trust, and communication that assist in agile virtual team effectiveness. These results demonstrated the value of increasing communication and knowledge sharing in agile virtual teams. Increasing communication levels of an individual agile virtual team member will result in augmented agile virtual team effectiveness. If an individual agile virtual team member increases the practice of knowledge sharing, the levels of agile virtual team effectiveness will also increase. Moreover, trust exhibited by an individual agile virtual team member is essential for agile virtual team effectiveness.

Organizations can benefit from this study's findings in carefully selecting employees who can communicate, share their knowledge, and trust teammates in a virtual setting. Agile virtual teams use technology for communicating, which can negatively impact individuals who prefer to follow nonverbal communication and tone of voice (Reunamäki & Fey, 2022; Swart et al., 2022). Research has shown that some individuals do not trust their team when discussing critical items because they know that there is no private conversation in an agile virtual team (Agren et al., 2022). Knowledge sharing implementation is complex and difficult in the virtual workplace (Reunamäki & Fey, 2022). Therefore, in selecting individuals to work in an agile virtual environment, these barriers and difficulties in communication, trust, and knowledge sharing must be discussed and ways to mitigate those problems must be investigated.

Furthermore, this study can further inform research in agile virtual team development and sustained success by helping agile virtual teams thrive to sustain continuous improvement of the global economy. Continuous globalization and the development of the modern workplace reinforce virtual teamwork. Organizations are removing their limits in augmented success by employing individuals across the globe who are conducive to delivering a quality product to the customer at a lower cost (Nordbäck & Espinosa, 2019).

Strategies that make agile virtual teams successful are chief in stabilizing the global economy. This study can further inform research on helping agile virtual teams thrive to sustain continuous improvement of the global economy. A flourishing global

economy can create new opportunities to give back to communities in need, which can in turn, positively impact individuals.

Conclusion

The chief goal of this study was to investigate the effect of communication, trust, and knowledge sharing on agile virtual team effectiveness and determine the moderating effect of trust on the relationship between communication, knowledge sharing, and agile virtual team effectiveness. Aligned with this research's purpose and design, I used the knowledge-based view of the firm as a suitable theory leading the study. Having addressed gaps in the literature, this study's results were found to be statistically significant, thus supporting and expanding previous literature.

The results of this study provided insight into agile virtual team effectiveness. Communication and knowledge sharing were found to be significant predictors of agile virtual team effectiveness. Trust was not found to be a significant predictor of agile virtual team effectiveness. Communication moderated by trust was not a significant predictor of agile virtual team effectiveness. Knowledge sharing moderated by trust was not a significant predictor of agile virtual team effectiveness. Trust was not a significant moderator of the relationship between communication*knowledge sharing*trust and team effectiveness.

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Appendix A: Team Effectiveness Survey

TEAM EFFECTIVENESS SURVEY

• DEMOGRAPHICS

1. What is your gender? Male Female
2. What is your age group? 0>24 25-34 35-49 <50
3. How long have you worked in an agile virtual team? ! year 2-5 years 6-10 years m11 years
4. What is your education level? undergraduate master's doctorate
5. What is your location? Africa Asia Australia N. America S. America Europe

DIRECTIONS

Please select the answer that best describes the statements.

SURVEY ITEMS	Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
Team members were asked for their suggestions when the team was originally formed.							
Careful consideration was given to the team's objectives during the design of this team.							
I received sufficient information to understand the team's purpose when I was notified that I will be part of this team.							
My role in the team was clearly explained to me.							
I have received training focused on becoming more effective in the virtual team setting.							
My virtual team is equipped with adequate tools and technologies to perform our tasks.							
The electronic methods we use to communicate with one another are effective.							
My team members were given the opportunity to meet each other in person.							
I'm rewarded individually for my work effort.							
I routinely share my knowledge with my team members.							
I routinely seek out knowledge from other team members.							
If I had my way, I wouldn't let the other team members have any influence over issues that are important to the project.							
I really wish I had a good way to oversee the work of the other team members on the project.							
My virtual team members communicate in a positive manner to one another.							

SURVEY ITEMS	Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
If a team member makes a mistake, others generally point out his error and discuss it with him.							
My team has been effective in reaching its goals.							
My team is meeting its business objectives.							
Overall, I find the information I need to do my job.							
I would be comfortable giving the other team members complete responsibility for the completion of this project.							
I can turn to my teammates for help when needed.							
I would be comfortable giving the other team members a task or problem which was critical to the project, even if I could not monitor them.							
I try to be honest about what I think and feel when working with my team members.							
When several team members are discussing an issue, I can ask questions about anything I do not understand.							
My input is valued by my team members.							
My team members and I respect each other.							
In my team, members' morale is high.							
My virtual team members share knowledge from work experience with each other.							
I share my expertise from my education or training with other team members.							
In carrying out our duties, my team members and I try to act as consultants to each other.							
My team members and I regulate activities with each other.							
Generally, my team is most concerned with finding the best solution.							
My team members and I build on each other's ideas.							
My team members and I coordinate actions and decisions well.							

SURVEY ITEMS	Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
In my team, work items I depend on are changed without my knowledge.							
My virtual team frequently faces problems deciding which member has responsibility for a work item.							
Generally, my team completes its work on time.							
Generally, my team completes its work within the budget.							
I enjoy being a member of this team.							
In the future, I would be interested in participating in another virtual team.							
I am successful in transferring what I've learned to my team							

Appendix B: Permission to Use the Virtual Team Effectiveness Survey

PsycTESTS®

Virtual Team Effectiveness Survey

PsycTESTS Citation:
Alsharo, M., Gregg, D., & Ramirez, R. (2017). Virtual Team Effectiveness Survey [Database record]. Retrieved from PsycTESTS. doi: https://dx.doi.org/10.1037/t65600-000

Instrument Type:
Survey

Test Format:
This 49-item measure utilized forced-choice, multiple-choice, and Likert-type response formats.

Source:
Alsharo, Mohammad, Gregg, Dawn, & Ramirez, Ronald. (2017). Virtual team effectiveness: The role of knowledge sharing and trust. Information & Management, Vol 54(4), 479-490. doi: https://dx.doi.org/10.1016/j.im.2016.10.005, © 2017 by Elsevier. Reproduced by Permission of Elsevier.

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