



INSTITUTO
UNIVERSITÁRIO
DE LISBOA

The effectiveness of shared leadership in virtual teams

Wanjun Zhao

Master in Human Resources Management and Organizational
Consultancy

Supervisor:

Prof. Patrícia Lopes Costa, Assistant Professor

IBS, ISCTE - IUL

June 2025

The effectiveness of shared leadership in virtual teams

Wanjun Zhao

Master in Human Resources Management and Organizational
Consultancy

Supervisor:

Prof. Patrícia Lopes Costa, Assistant Professor

IBS, ISCTE - IUL

June 2025

Acknowledgments

I would like to thank my supervisor, Professor Patricia Costa, for her unwavering patience in answering all of my questions and for providing me with timely and valuable feedback. Her profound insight and deep thought have inspired me to relentlessly pursue excellence and strive for perfection in the quality of my dissertation. Her straightforward and clear working style has also eased my inner anxiety, helping me navigate through uncertainties and move forward with determination.

Moreover, I would like to extend my sincere gratitude to everyone who participated in this research. Every second spent behind each completed questionnaire provided indispensable support for my dissertation.

As well as my parents and friends, I would like to express my sincere gratitude. Throughout this journey, they have always listened to my concerns, stood by my side, and offered me boundless encouragement and care.

Lastly, I would like to thank myself for my efforts. Over the past five months, it was my unwavering perseverance, rigorous focus, and relentless drive that enabled me to reach this point today.

Abstract

Due to COVID-19, the rapid development of digital environments has transformed organizational operations, making virtual teams increasingly common. These teams rely heavily on online communication, posing challenges to traditional leadership models. Shared leadership, which emphasizes collaboration, peer influence, and decentralized decision-making, has shown potential in managing virtual teams. However, its impact on team performance remains underexplored, with inconsistent findings. This study investigates the impact of shared leadership in virtual teams, focusing on: (1) its influence on team perceived virtuality, including perceived distance and perceived information deficits; (2) the mediating roles of perceived cohesion and knowledge sharing; and (3) the moderating role of perceived trust. Analysis of data from 305 employees of global high-tech companies reveals that shared leadership negatively correlates with perceived distance and information deficits. Perceived cohesion mediates the relationship between shared leadership and perceived distance, while knowledge sharing mediates the link between shared leadership and perceived information deficits. However, the moderating effect of perceived trust was not supported. Specifically, higher levels of perceived trust did not enhance the negative impact of team cohesion on perceived distance or knowledge sharing on perceived information deficits. These findings indicate that shared leadership improves virtual team performance through perceived cohesion and knowledge sharing, although perceived trust does not significantly moderate these effects. This study provides actionable insights for managing virtual teams to maximize organizational performance and lays a theoretical foundation for future research on leadership in virtual contexts.

Keywords: Shared Leadership, Virtual Teams, Team Effectiveness, Perceived Distance, Perceived Information Deficits, Perceived Team Cohesion, Knowledge Sharing, Perceived Trust

JEL Classification codes: D23; M50; O15

Resumo

Devido ao impacto da COVID-19, o rápido desenvolvimento dos ambientes digitais transformou significativamente as operações organizacionais, com as equipas virtuais a tornarem-se cada vez mais comuns. Estas equipas dependem da comunicação online, representando desafios aos modelos tradicionais de liderança. A liderança partilhada, que enfatiza a colaboração, a influência entre pares e a tomada de decisão descentralizada, tem mostrado potencial na gestão de equipas virtuais, mas o seu impacto no desempenho da equipa não foi suficientemente estudado e os resultados das pesquisas são inconsistentes. Este estudo analisa a eficácia da liderança partilhada em equipas virtuais, concentrando-se em: (1) o seu impacto na eficácia da equipa, incluindo a relação entre a distância percebida e o desempenho, bem como os défices de informação percebidos e a satisfação; (2) os papéis mediadores da coesão percebida e da partilha de conhecimento; e (3) o papel moderador da confiança percebida. Com base na análise de dados de 305 funcionários de empresas globais de alta tecnologia, os resultados indicam uma correlação negativa entre liderança partilhada e distância percebida, bem como entre liderança partilhada e défices de informação percebidos. Além disso, a coesão percebida medeia a relação entre liderança partilhada e distância percebida, enquanto a partilha de conhecimento medeia a relação entre liderança partilhada e défices de informação percebidos. No entanto, a hipótese de que a confiança percebida moderaria esta relação não foi confirmada. Especificamente, níveis mais elevados de confiança percebida não aumentaram significativamente o impacto negativo da coesão da equipa na distância percebida, nem o impacto negativo da partilha de conhecimento nos défices de informação percebidos. Os resultados sugerem que a liderança partilhada melhora o desempenho das equipas virtuais através da coesão e da partilha de conhecimento, mas a confiança percebida não desempenha um papel significativo na moderação deste efeito. Este estudo fornece perceções acionáveis para a gestão de equipas virtuais e estabelece uma base teórica para futuras investigações sobre liderança em contextos virtuais.

Palavras-Chave: Liderança Partilhada, Equipas Virtuais, Eficácia da Equipa, Distância Percebida, Défices de Informação Percebidos, Coesão Percebida da Equipa, Partilha de Conhecimento, Confiança Percebida

Classificação JEL: D23; M50; O15

Index of Contents

1. Introduction	1
2. Literature Review.....	5
2.1 Virtual Team	5
2.1.1 Current status of virtual team development	5
2.1.2 Definition and Characteristics of Virtual Teams.....	6
2.1.3 Advantages and Disadvantages of Virtual Teams.....	8
2.1.4 Differences Between Working Face-to-Face and Virtually.....	9
2.2 Shared Leadership	10
2.2.1 Definition and Characteristics of Shared Leadership.....	10
2.3 Effectiveness of Shared Leadership	13
2.3.1 Connotation of Shared Leadership Effectiveness	13
2.3.2 Key Consequences of Shared Leadership Effectiveness	14
2.3.3 Mediator and Moderator Mechanisms	18
3. Conceptual Model and Research Hypotheses.	23
3.1 Shared Leadership, Team Perceived Virtually, Perceived Cohesion, and Knowledge Sharing	23
3.2 Perceived trust as moderator	30
4. Methodology	37
4.1 Sampling and Procedure.....	37
4.2 Instruments	38
5. Results	41
5.1 Common method bias.....	41
5.2 Validity Analysis	41
5.3 Analytical strategy and hypothesis testing.....	45
5.3.1 Correlation analysis.....	45
5.3.2 Hypothesis testing	46
6. Research findings.	55
6.1 Discussion	55

6.2 Implications	57
7. Limitations and suggestions for future research	61
8. Conclusion	63
Reference	65
Appendix	79

Index of Tables and Figures

Index of Tables

Table 2.3 Consequences of the Effective of Shared Leadership.....	17
Table 5.1 Variance Explanation Table.....	41
Table 5.2.1 KMO and Bartlett's Test.....	42
Table 5.2.2 Model Fit Indices for Confirmatory Factor Analysis (CFA)	43
Table 5.2.3 Factor Loading Table	44
Table 5.2.4 Model AVE and CR Results	45
Table 5.3.1 Pearson Correlation Analysis	46
Table 5.3.2.1 Direct and Mediation Effect Test Results 1	47
Table 5.3.2.2 Direct and Mediation Effect Test Results 2	48
Table 5.3.2.3 Moderation Analysis Results 1	49
Table 5.3.2.4 Moderation Analysis Result 2.....	51
Table 5.3.2.5 Summary of Hypothesis Results	53

Index of Figures

Fig.3.1 Proposed research model	35
Figure 5.3.2.1 Interaction Effect of Perceived Cohesion and Perceived Trust on Perceived Distance.....	50

1. Introduction

It has been known that leadership theories have evolved over multiple stages, beginning with trait theory (Stogdill, 1948), followed by behavioral theory (Blake & Mouton, 1964), situational leadership theory (Hersey & Blanchard, 1969), transactional leadership theory (Burns, 1978), and transformational leadership theory (Bass, 1985). Later developments include leader-member exchange theory (Graen & Uhl-Bien, 1995) and authentic leadership theory (Avolio & Gardner, 2005), which have made significant contributions to our understanding of leadership. In both trait and behavioral theories, the leader is regarded as the central figure. However, Avolio and Bass (2002) expanded this model to include team dynamics, providing leaders with a framework for dealing with complex environments. In this century, as organizational structures have become flatter and team management practices have evolved, shared leadership has become a focus for both researchers and managers. As opposed than traditional, hierarchical models, shared leadership emphasizes active collaboration among team members, which balances formal and informal roles. Instead of the conventional leadership model, which is often based on top-down influence, shared leadership emphasizes horizontal or peer influence with the goal of enhancing decision-making, collaboration, and organizational performance (Pearce & Conger, 2003; Pearce, 2004). Improvements in this area are essential to the efficient functioning of the team and the long-term sustainability of the organization. Therefore, it is necessary to verify the effectiveness of shared leadership.

As a result of COVID-19, there has been an acceleration of the transition to digital work environments, resulting in more teams relying heavily on technology for communication, task completion, and knowledge sharing (Gilson, Costa, O'Neill, & Maynard, 2021). Geographic dispersion and cultural diversity in virtual teams introduce new complexities, particularly in contrast to traditional in-person teams. These teams present unique challenges, such as fostering trust, managing knowledge exchange, and understanding team dynamics (Dirks, 1999; Hill, 2005; Lurey & Raisinghani, 2001; Morgan, Paucar Caceres, & Wright, 2014; Duarte & Snyder, 2001; Gibson & Cohen, 2003). Due to these factors, single-leader models are becoming less effective in these highly interconnected, interdependent, and knowledge-driven environments.

As Hoch and Kozlowski (2014) found, the more virtual a team is, the less influence hierarchical leadership has on performance, whereas structural support becomes more important. However, No matter the degree of a team's virtuality, shared leadership remains positively correlated with team performance. When leadership roles are distributed across team members, it creates a horizontal, decentralized structure that overcomes many limitations of traditional leadership models (Pearce & Conger, 2003). This approach is particularly useful in navigating virtual teams challenges, supporting organisational growth in today's global environment. Therefore, it is an urgent need in the new era to conduct research on shared leadership in virtual teams.

As the Internet economy grew during the early 21st century, the concept of shared leadership gained prominence. Pearce and Sims (2002) developed a leadership scale based on five dimensions that reflect how roles are distributed within teams. Over the past decade, empirical studies have increasingly supported shared leadership's positive effects on team performance. Notably, multiple studies have demonstrated that shared leadership fosters trust among team members, improves communication, and motivates each individual to develop work-related skills, all of which contribute to the performance of the team (Carte, Chidambaram, & Becker, 2006; Pearce & Sims, 2002; Erkutlu, 2012; Drescher, Korsgaard, Welp, & Picot, 2014; Hoch & Kozlowski, 2014; Robert & You, 2018). In a meta-analysis conducted by D'Innocenzo, Mathieu, and Kukenberger (2016), it was further demonstrated that shared leadership improves team performance, especially in knowledge-intensive settings. As research on shared leadership and virtual teams progresses, two main schools of thought have emerged. In one perspective, shared leadership fosters trust, satisfaction, and creativity among team members, thereby improving team performance (Han & Hazard, 2022; Boies & Gill, 2015; Sun, He, & Wen, 2023; Robert, 2013; D'Innocenzo et al., 2016). On the other hand, some studies highlight the possible downsides of shared leadership, likening it to a double-edged sword (Edelmann et al., 2023). For instance, in teams with lower trust levels or a weaker team culture, shared leadership may give rise to struggles for authority, role conflicts, or even the hiding of information (Mehra, Smith, Dixon, & Robertson, 2006). Moreover, shared leadership may result in a reduction in psychological ownership and leadership motivation on the part of formal team leaders, which may lead to conflict within the team. There is also a possibility that shared

leadership can impede decision-making due to group think or diffusion of responsibility, thereby limiting the creativity and performance of the team (Chen & Zhang, 2022).

In conclusion, with the growing trend of globalization, the rise of virtual teams has made the role of shared leadership increasingly important. It has been proven to strengthen team leadership effectiveness, thereby improving team performance, higher satisfaction, and facilitating rapid organizational development. Although shared leadership has been widely studied for its effectiveness, however, existing empirical findings are mainly address antecedents, influencing factors, and resulting variables. Moreover, research findings on how shared leadership affects team performance are mixed and varied. Additionally, empirical studies on the effectiveness of shared leadership in the virtual environment are relatively scarce. Therefore, studying the effectiveness of shared leadership in virtual teams through empirical research is highly relevant. This dissertation will continue in this research direction, focusing on shared leadership effectiveness within virtual teams. By conducting a literature review, this study will summarize key findings, examine different dimensions of shared leadership, and analyze the main indicators of shared leadership effectiveness. It will select key indicators of team effectiveness and collect original data through a questionnaire survey of members of virtual teams implementing shared leadership. This study will further validate the appropriateness of the fitted data and examine the mediating and moderating factors influencing the effectiveness of shared leadership in virtual teams. Based on these findings, recommendations for management practices will be provided to enhance shared leadership effectiveness in virtual teams.

This study aims to address the existing gap in research concerning shared leadership and its impact on virtual team effectiveness, contributing to both theoretical development and practical applications. Through empirical analysis, it hopes to offer guidance for future management practices. This will help organizations effectively implement shared leadership and improve virtual team performance.

2. Literature Review

2.1 Virtual Team

2.1.1 Current status of virtual team development

Since the 21st century, technology has played an increasingly central role in facilitating communication, coordination, and collaboration across organizations (Handke, Costa, & O'Neill, 2024). The research conducted by International Workplace Group plc indicates that over 70 percent of professionals across various industries now work remotely at least three days per week, reflecting the steady growth of virtual teams over recent years (Carmel & Agarwal, 2001). Virtual teams rely on advanced communication technologies to overcome geographic and temporal barriers, allowing organizations to access specialized expertise and operate more efficiently in a distributed environment (Ale Ebrahim, Ahmed, & Taha, 2009). Consequently, investing in and effectively managing virtual teams has become crucial factor in organizational growth and resource optimization (Munkvold & Zigurs, 2007).

Recently, virtual teams' effectiveness has emerged as a central focus in organizational research (Powell, Piccoli, & Ives, 2004). Research work in this field examine specific performance indicators and satisfaction with virtual team experiences, offering a comprehensive understanding of how virtual teams work. In addition, many studies have explored the factors influencing the effectiveness of virtual teams (Tan, Ramayah, Teoh, & Cheah, 2019; Lin, Standing, & Liu, 2008; Bhat, Pande, & Ahuja, 2017), as well as how task-technology fit guides the efficiency and trust among group members (Maznevski & Chudoba, 2000). However, the conclusions remain inconsistent. Some scholars have also proposed preliminary models of how leadership functions are involved in virtual team processes and outcomes to enhance the understanding of effective leadership in virtual teams. (Liao, 2017). Since 2020, a part of the researcher community has gone beyond mainstream structuralist ideas, shifting towards researching subjective experiences triggered by virtually. The authors focus on how teams perceive virtuality, their emotional experiences, and the cognitive effects on information

flow in an effort to explain the successful collaboration within virtual teams (e.g., Costa et al., 2024; Handke et al., 2024).

As a summary, research on virtual teams is continuously deepening, and its content is evolving along with technological advancements and social changes. However, present research points towards the effectiveness of virtual teams is not influenced by a single factor, but by a complex system of multiple intertwined factors.

2.1.2 Definition and Characteristics of Virtual Teams

The current definition of a virtual team still remains vague to certain degree. According to Jarvenpaa and Leidner (1999, Volume 3, Issue 4), a global virtual team consists of "a temporary, culturally diverse and geographically dispersed workgroup that connected by means of electronic communication." In other words, virtual teams can be formed to accomplish a targeted problem or to be a persistent group focused on a long-run objective. In order to meet team's changing needs, members with diverse experience and expertise may join or leave the team continuously. As DeSanctis & Monge (1999) argue, virtual teams consist of geographically dispersed colleagues who share common goals, practices, and procedures, use communication technologies to coordinate and collaborate across time zones, and work interdependently. Bell & Kozlowski (2002) similarly suggest that virtual teams consist of geographically dispersed members with limited face-to-face contact who rely on electronic communication tools to cooperate and accomplish shared goals. By connecting knowledge workers across time and space, virtual teams are able to integrate diverse resources and collaborate to achieve common objectives. Gassmann & Von Zedtwitz (2003b, p. 244) describes a virtual team as a group of individuals and subgroups collaborating on interdependent tasks, driven by a common goals, and facilitated by information, communication, and transportation technologies. From the perspective of Leenders, van Engelen, & Kratzer (2003), virtual teams are large groups of individual who are geographically and temporally dispersed, working on a project, whether they are inside or outside their organization. Hertel, Geister, & Konradt (2005) found in their study that fully virtual teams, where all team people work in various locations and communicate exclusively through electronic media, are rare. In

most cases, virtual teams maintain some degree of in-person interaction. In fact, electronic communication media are not exclusive to virtual teams but also widely used by traditional teams. As a result, viewing "team virtuality" as one aspect of team characteristics (such as diversity, autonomy, or time constraints) can provide a broader understanding of how teams function. Kirkman & Mathieu (2005) further propose that traditional face-to-face teams and virtual teams are not opposites but rather exist on a continuum that reflects varying degrees of virtuality. This virtuality is characterized by three key dimensions: first, the extent to which team members depend on virtual tools for coordinating and carrying out team processes; second, the richness of the informational these tools offer; and lastly, the level of synchronicity in virtual interactions among team members.

While virtual teams' specific definitions remain unclear, there is consensus on several key characteristics. In the first place, a virtual team is considered a real team (Cohen & Gibson, 2003), as it consists of multiple intact social entities that are interdependent in their tasks (Cohen & Bailey, 1997). Secondly, team members are dispersed geographically, temporally, culturally, or organizationally, with geographical distribution being the most common form. Therefore, virtual teams are commonly described as geographically dispersed or distributed teams (Boh, Ren, Kiesler, & Bussjaeger, 2007). This part is not necessarily true nowadays, considering that all teams, even co-located ones, have virtual interactions. Third, virtual teams are mainly rely on computer-mediated technologies to communicate and manage their tasks, instead of in-person meetings. Technology grants virtual teams the flexibility to work across organizational boundaries and time zones to achieve shared goals (Hertel, Geist, & Konradt, 2005).

In summary, the key characteristics of virtual teams include interdependent collaboration, a diverse and dispersed membership structure, an ad hoc nature, a high degree of flexibility, and a heavy reliance on electronic communication technologies. Virtual teams are dynamic collaborative processes that adapt to complex and evolving external environments, characterized by borderlessness, interpenetration, and team resource reorganization.

To conclude, this dissertation conceptualizes a virtual team as a group of individuals who are geographically, temporally, or organizationally separated and who rely heavily on electronic communication technologies to pursue shared objectives.

2.1.3 Advantages and Disadvantages of Virtual Teams

Virtual teams is a double-edged sword, have both advantages and obstacles. We assess the significant advantages of virtual teams at the individual, organizational, and societal levels (Beer, Walton, & Spector, 1985). At the individual level, virtual teams allow employees to work autonomously and flexibly away from the traditional workplace. This leads to enhanced work-life balance, increased responsibility, motivation, and overall well-being (Maruping & Agarwal, 2004; Hertel, Geister, & Konradt, 2005). At the organizational level, virtual teams remove geographic restrictions, enabling firms to access worldwide talent, collaborate with experts across regions, and work 'round-the-clock'. It brings about. Better knowledge management, improved customer satisfaction, operational effectiveness, and cost reductions in office space and travel (Townsend, DeMarie, & Hendrickson, 1998; Bell & Kozlowski, 2002; Hertel et al., 2005). Additionally, virtual teams promote equality and sustainable development on a societal level by creating employment opportunities in geographically remote areas with limited infrastructure and reducing carbon emissions by minimizing the need to commute (Hertel et al., 2005).

Nevertheless, along with a multitude of benefits, there exist also a lot of challenges. One of the most significant ones is communication difficulty. Communication in virtual teams, largely depends on electronic media, and a lack of direct, in-person coordination can hinder timely and accurate information exchange. As a result, a higher level of misunderstandings, conflicts, and power struggles exist (Sproull & Kiesler, 1986; Crampton, 2001; Gaudes, Hamilton-Bogart, Marsh, & Robinson, 2007; Hardin, Fuller, & Davison, 2007; Ren, 2018). Building trust is also difficult, as there is no common physical context and social clues (Malhotra, Majchrzak, & Rosen, 2007; Bal & Teo, 2001; Paul, Seetharaman, Samarah, & Mykytyn, 2004), leading to a sense of isolation and weaken team cohesion and identity (Powell et al., 2004; Malhotra et al., 2007; Ren, 2018). Even more, for global virtual teams, cultural as well as language differences further complicate communication, coordination, and collaboration. Team collaboration can be hindered by misunderstandings resulting from cultural differences, work styles, or communication preferences (Jarvenpaa & Leidner, 1999; Sarker & Sahay, 2002). That means organizations should make investment in technological infrastructure, data protection, as well

as employee training to ensure virtual teams operate effectively. Moreover, company must reduces risks these challenges pose to team performance (Powell et al., 2004; Hertel et al., 2005).

To successfully operate virtual teams, organizations should take strategies focused on technology, leadership, and team management. Firstly, providing useful technological tools and platforms is crucial for seamless communication as well as collaboration (Ale Ebrahim, Ahmed, and Taha, 2009). Second, virtual team leaders must possess strong e-leadership skills to foster trust, build emotional connections, and effectively motivate and manage geographically dispersed teams (Bell & Kozlowski, 2002; Liao, 2017). Lastly, virtual teams should establish clear collaboration norms and maintain regular interactions to promote trust, shared understanding, and work consistency, particularly in overcoming time zone, cultural, and language barriers (Sarker & Sahay, 2002; Powell et al., 2004). In conclusion, effective communication, strong leadership, and strategic technology use can help virtual teams overcome challenges, enabling them to collaborate efficiently and drive innovation.

2.1.4 Differences Between Working Face-to-Face and Virtually

Face-to-face teams are usually formed at the beginning of a project, with most members working in the same location. They communicate and coordinate through in-person meetings or direct interactions and complete tasks under the guidance of a single leader. In contrast, virtual teams consist of knowledge workers dispersed across different geographical locations, organizations, or time zones. They primarily depend on electronic information and communication technologies to collaborate—whether in real-time or with delays—on one or more organizational tasks in pursuit of shared objectives (Ale Ebrahim et al., 2009; Morrison-Smith & Ruiz, 2020).

There are significant differences between virtual teams and face-to-face teams in many respects, particularly regarding communication methods, task coordination, resource utilization, supervision and control, cultural backgrounds, and team relationship building.

According to Ale Ebrahim et al., (2009), face-to-face communication helps foster trust and team cohesion. However, virtual teams depend more heavily on electronic communication

technologies and lack opportunities for informal information exchange, making it more challenging to build trust and develop strong team relationships.

In terms of task coordination, face-to-face teams can coordinate tasks relatively easily, with members able to work jointly on assignments. Virtual teams, however, face additional collaboration barriers related to physical distance, time zones, and perceived distance, requiring more structured and clearly defined task allocations to reduce task conflicts (Hinds & Mortensen, 2005; Mortensen & Hinds, 2001).

Regarding resource utilization, face-to-face teams can more easily allocate and share resources, whereas virtual teams are constrained by both technical and non-technical infrastructures, meaning they require adequate technical support to collaborate effectively. In addition, managers of face-to-face teams can enhance their management abilities through continuous monitoring of events and activities. By contrast, virtual teams are limited in coordination and accountability, since managers possess relatively lesser direct control over team activity.

With regards to creating team relationships, face-to-face teams typically rely on routine in-person communication and nonverbal cues to build trust and a sense of belonging among members. Virtual teams primarily rely on electronic communication technologies and have fewer opportunities for informal interaction, which further complicates forming cohesive relationships within a limited time period (Furst et al., 2004).

Third, virtual teams are more heterogeneous and composed of people with diverse cultural backgrounds, whereas face-to-face teams are generally more homogeneous (Staples & Zhao, 2006). Moreover, face-to-face teams generally face fewer challenges regarding technology compatibility, whereas virtual teams must negotiate system compatibility in advance to ensure smooth collaboration.

2.2 Shared Leadership

2.2.1 Definition and Characteristics of Shared Leadership

From a behavioral perspective, leadership refers to any action that has the ability to influence organizational matters (Katz & Kahn, 1978). Research has shown that leaders' behaviors can

impact team structure, workflow, and effectiveness (Carson, Tesluk, & Marrone, 2007; Hoch, 2013), thereby influencing organizational success and failure. Today's complex business environments and diverse team types make effective leadership increasingly challenging, since it is challenging for one person to possess every required skill and competence they need to effectively contribute the success to an organization. However, shared leadership has emerged as a leadership structure that addresses this complex and dynamic process of influence and collaboration. Pearce and Sims (2002) argue that shared leadership is especially beneficial for highly autonomous teams engaged in complex tasks. As a result, it is particularly relevant to virtual teams, which operate in an environment which function in environments marked by significant network reliance, interdependence, complexity, and a focus on knowledge (DeSanctis & Monge, 1999). The increasing widespread adoption of digitalization, the rise of cross-functional teams, and the heightened recognition of the value of shared leadership have all been crucial in driving the evolution of shared leadership theory and its practical application (Pearce & Conger, 2003). Currently, shared leadership is entering the phase of adolescence, reflecting its evolving role in organizational contexts (Barnett & Weidenfeller, 2016).

Shared leadership involves the allocation of leadership responsibilities among team members. Pearce and Conger (2003) and Pearce (2004) define it as an interactive and dynamic process of influence among individuals between teams, marked by the continuous exchange of formal and informal leadership. The goal is to foster collective decision-making and collaboration within an organization to achieve its objectives and enhance overall effectiveness (p. 22). Essentially, shared leadership distinguishes itself from traditional leadership models by highlighting both peer or lateral influence, alongside hierarchical influence. Cox, Pearce, and Perry (2003) note that true shared leadership can only be achieved when team members are fully empowered. As stated by Bligh, Pearce, and Kohles (2006), shared leadership conceptualizes leadership as a team-level dynamics, where temporary leaders arise based on the team's needs, the specific tasks, and the knowledge, skills, and abilities of its members.. This means that leadership behaviors are performed collaboratively by multiple individuals, rather than being the sole responsibility of those in formal leadership roles. Carson et al. (2007), Wang, Waldman, and Zhang (2014), and D'Innocenzo et al. (2016) describe shared leadership as an emergent team attribute that diminishes the dominance of vertical leadership by

distributing influence among team members instead of depending on a sole leader. This mutual influence underscores the importance of distributing of sharing both influence and responsibility among team members. In accordance with Hackman and Johnson (2013), shared leadership can be achieved when team leaders and members share leadership responsibilities or when team members rotate leadership roles to achieve collective goals. Common characteristics perceived by team members in shared leadership scenarios include collaborative leadership, collective decision-making, and strong leader-follower relationships (Tran & Vu, 2021). DeRue (2011) argues that shared leadership consists of a range of high-intensity and low-centralized leadership and followership behaviors that occur simultaneously across time and participants. Within the framework of shared leadership, members in leadership roles provide direction, motivation, and support to their peers, while “followers” are seen as recipients of this guidance. Team members assume these roles through a process of claiming and granting leadership status, with leaders and followers emerging from social interactions rather than being defined by fixed criteria. D'Innocenzo et al. (2016) compile various definitions of shared leadership, emphasizing it as a developing phenomenon within teams where leadership roles and influence are collectively shared among members. Zhu and Liao (2018) similarly define shared leadership as an emerging team phenomenon characterized by the distribution of leadership responsibilities and influence across team members.

Therefore, integrating the definitions provided by scholars with the distinctive features of virtual teams—characterized by high network dependence, strong interdependence, complexity, knowledge intensity, and a flat organizational structure—this dissertation defines shared leadership as an emerging phenomenon within teams. Based on the team's tasks and the team members' individual knowledge, skills, and abilities, the members of the team alternate leadership roles through social interaction process to achieve collective goals.

Shared leadership emerges as a natural outcome of full empowerment (Cox, Pearce, & Perry, 2003), where teams are characterized by a flat hierarchy, with members collaborating as equals (Bligh et al., 2006), supporting each other's skill development and working together to accomplish collective tasks (Wood, 2005) in order to enhance decision-making and collaboration capabilities, achieve organizational goals, and improve organizational efficiency. The authors Zhu et al. (2018) emphasize three core features of shared leadership. Firstly, in

terms of the sources of leadership influence, shared leadership encompasses not only top-down influence from team leaders to members but also peer influence among team members and even bottom-up influence from members to leaders (Pearce & Conger, 2003). Thus, shared leadership can create a dynamic network of influence within a team. Second, in terms of the unit of analysis, shared leadership is considered a team-level phenomenon (Carson et al., 2007). Regarding the distribution of leadership influence, shared leadership creates to dual leader-follower relationships within the team due to the broad distribution of leadership roles and influence (Drescher et al., 2014). Therefore, the boundaries between leaders and followers are less clear (Nicolaidis, LaPort, Chen, Tomassetti, Weis, Zaccaro, & Cortina, 2014).

2.3 Effectiveness of Shared Leadership

2.3.1 Connotation of Shared Leadership Effectiveness

Leadership plays a critical role in driving team effectiveness (Morgeson, DeRue, & Karam, 2010). Leadership effectiveness is characterized by a leader's capacity to influence followers and organizational stakeholders to accomplish objectives (Yukl, 2005). It serves as a catalyst for organization success or failure, emphasizing a combination of personal qualities, skills, behaviors, and strategies (Bennis & Nanus, 1985; Denison, Hooijberg, & Quinn, 1995). Leaders who are effective can not only motivate, coach, and support their teams, but also facilitate innovation and promote transformation that can benefit individuals' performance and organization success.

Generally, leaders display leadership effectiveness in three areas: their behavior (e.g., decision-making, motivation, communication), their followers' responses (e.g., satisfaction, performance), as well as their organizational outcomes (Denison et al., 1995). By adopting task-oriented, change-oriented, and relationship-oriented behaviors, leaders can build high-performing teams and ensure long-term success. Yukl (2008) explains that task-oriented behaviors enhance efficiency, change-oriented behaviors improve adaptability, and relationship-oriented behaviors enhance team cohesion, all of which are critical to organization effectiveness.

Taking this concept a step further, shared leadership emphasizes the mutual influence and cooperation between team members and the accomplishment of organizational objectives through the collaborative efforts of multiple formal or informal leaders. (Friedrich, Vessey, Schuelke, Ruark, & Mumford, 2009; Pearce & Sims, 2002). It promotes teamwork and shared thinking, which contributes to improved team performance (Erkutlu, 2012). However, the balance between individual autonomy and shared responsibility is crucial to its success (Pearce & Conger, 2003). Previous research has demonstrated a strong connection between shared leadership and emotional as well as team process outcomes (Bergman, Rentsch, Small, Bergman, & Bull, 2012; Carson et al., 2007; Conger & Pearce, 2003). Based on Roberson and Colquitt's, (2005) and on Whitman et al's, (2012) research on team/unit level standards, Wang et al. (2014) further step to categorize team effectiveness into four types: attitudinal outcomes (including team satisfaction, team commitment, team identification or emotional conflict), behavioral processes and contingencies (such as collaboration, helpfulness, and cohesion), and subjective and objective performance (such as productivity and actual sales). Through their meta-analysis, they concluded that shared leadership is more strongly associated with team efficiency compared to other leadership styles. This further confirms that the consistency of the content shared within the team is crucial.

In summary, shared leadership effectiveness refers to multiple members of a team collectively sharing leadership responsibilities to achieve team goals through collaboration and mutual influence. This leadership approach contrasts with the traditional single-leader model by focusing on collective involvement and shared decision-making. It is crucial to recognize that shared leadership not only improves teamwork and trust but also fosters innovation and efficiency in team operations, ultimately leading to positive effects on team attitudes, behaviors, and outcomes (Wang et al., 2014).

2.3.2 Key Consequences of Shared Leadership Effectiveness

During a remote work era, the ability of organizations to oversee complex tasks as well as adapt to fast-changing environments has becoming increased its importance (Eisenhardt & Martin, 2000; Teece, 2007). By assessing the effectiveness of shared leadership, organizations can

assess its impact on team goal achievement, productivity, and innovation. As well as providing insight into whether this leadership model enhances team member engagement, accountability, and trust, which are all essential factors in the success of complex projects.

Katz and Kahn (1978) stated in their study of organizational social psychology that shared leadership can contribute to a competitive advantage by enhancing team members' commitment and resource contributions. Similarly, Yukl (1994) emphasized various indicators of leadership effectiveness, including team performance, employee satisfaction, organizational commitment, psychological well-being, the organization's adaptability, employee development, the leader's position within the organization, and his or her ability to promote. Perry, Pearce, and Sims (1999) have developed an integrative model combining transactional, transformational, directive, empowering, and supportive behaviors within shared leadership. Active engagement with these behaviors has been demonstrated to lead to positive affective outcomes, including commitment, satisfaction, and cohesion, as well as behavior outcomes, such as effort and communication.

In their research, Pearce & Sims (2002) identified shared leadership as a significant predictor of team effectiveness. They emphasize how shared leadership autonomy encourages employee ownership and responsibility, especially in virtual environments. These factors provide meaningful benchmarks for measuring shared leadership effectiveness. In addition, Roberson and Colquitt (2005) pointed out that team members' perceived consistency in fair decision-making and resource allocation can be a significant indicator of shared leadership effectiveness. They categorize team outcomes into four key areas: attitudes (such as job satisfaction, trust and commitment), processes (such as interpersonal behavior, including cooperation, helping, conflict management, and task strategies), withdrawal behaviors (such as distraction, lateness, long breaks, and voluntary resignation), and performance. Further research by Carson et al. (2007) suggested that factors such as having clear shared goals, the level of internal support, and the opportunities for team members to be involved in the decision-making process can help understand the quality of teamwork and the level of engagement among team members. Additionally, Wood and Fields (2007) discovered that shared leadership negatively correlates with work overload, job stress, and role conflict while positively impacting job satisfaction and overall work outcomes. Using team initiative and organizational cultural

support as metrics, Erkutlu (2012) studied the effect of shared leadership on team dynamics across various organizational contexts. In turn, this shed light on the role it plays as a facilitator.

As demonstrated by Robert (2013), shared leadership has a significant impact on the identity, satisfaction, and performance of a team. Ullah and Park (2013) argue that a shared leadership attitudes, specifically an emphasis on teamwork, can be an indicator of effective leadership. Moreover, Hoch and Kozlowski (2014) are convinced that shared leadership not only intensifies the sense of connection among team members but also enhances trust, cohesion, and commitment to the team, which helps teams overcome global virtual teams' communication problems, thereby leading to better team performance.

In addition, a meta-analysis conducted by Wang et al. (2014) and D'Innocenzo et al. (2016) also demonstrated a strong positive correlation between shared leadership and group performance. Specifically, shared leadership plays a crucial role in shaping team attitudes, behavior processes, and overall dynamics, especially when dealing with complex tasks. Zhu & Lee (2017) confirmed that task execution, cohesion, motivation, utilization of resources, as well as inter-member's trust can serve as predictors of effective shared leadership. Robert and You (2018) went on to contribute that thresholds of satisfaction, trust, as well as group performances are effective parameters to measure effective shared leadership. Drawing from these studies, Ul Hadi & Chaudhary (2020) propose group reflexivity and performance as indicators that can demonstrate effective shared leadership as well as adaptability in complex tasks. It demonstrates how well the group members are able to interact as well as utilize teamwork effectively through shared leadership, thereby enhancing team performance and efficiency. Then, Castellano, Chandavimol, Khelladi, and Orhan (2021) highlighted the critical role of trust in achieving shared leadership through self-leadership.

Furthermore, Eseryel, Crowston & Heckman (2021) who specifically pointed out that a degree of shared mental models together with common norms are positively correlated with teamwork success. When a group of individuals share mental models, not only improves communication to avoid conflict and misunderstandings, but also the group's ability to handle complex operations are facilitated. Furthermore, consistent shared norms can be beneficial to improving teamwork and cohesion, thereby improving the overall performance and satisfaction. Based on Hassan & Zaheer's research, they discovered that shared leadership contributes to

project success in both direct and indirect ways. Lastly, Imam & Hazard (2022) identified key metrics for measuring shared leadership effectiveness, such as team performance, satisfaction, efficiency, trust, member engagement, shared decision-making ability, and supportive team dynamics. Following a literature review, Table 2.1 summarizes the main indicators of shared leadership effectiveness:

Table 2.3 *Consequences of the Effective of Shared Leadership*

Scholar (year)	Shared Leadership Effectiveness Metrics
Katz & Kahn (1978)	Organizational commitment, resource quality and quantity, information sharing
Yukl (1994)	Team performance, employee satisfaction, employee mental health, organizational adaptability, employee personal development, the leader's status within the organization, and the leader's promotion potential
Perry, Pearce & Sims (1999)	Affective outcomes (e.g., commitment, satisfaction, potency, cohesiveness), and cognitive, and behavioral outcomes (e.g., effort, communication, citizenship behavior)
Pearce & Sims (2002)	Team effectiveness, employee autonomy, sense of ownership, accountability
Carson, Tesluk & Marrone (2007)	Shared purpose, social support and voice, external team coaching
Wood & Fields, (2007)	Role conflict, role clarity, job stress, workload, job satisfaction, work outcomes
Erkutlu (2012)	Team initiative, Supportive organizational culture
Roberson & colquitt, (2005); Whitman et al., (2012)	a) Team attitudes (e.g., job satisfaction, trust, commitment; b) Team process (e.g., cooperation and helping, conflict management, and task strategies); c) Team withdrawal (daydreaming to tardiness, or from long breaks to absenteeism, voluntary turnover from an organization); d) Team performance
Robert (2013)	Team Satisfaction, team Identification, team Performance
Ullah & Park (2013)	Attitude towards teamwork and effectiveness
Hoch & Kozlowski (2014)	Team trust, cohesion, commitment, ability of overcoming communication challenges and team performance
Wang, Waldman, & Zhang (2014);	Team performance, job satisfaction, commitment, cooperation, helpful, cohesion
D'Innocenzo, Mathieu & Kukenberger (2016)	
Zhu & Lee (2017)	Trust, cohesion, motivation, resource utilization and ability to perform tasks among team members
Robert & You (2018)	Team trust, Team Satisfaction, Team Performance
Ul Hadi & Chaudhary (2021)	Team reflexivity and performance
Castellano, Chandavimol,	Level of trust, potency, and commitment

Khelladi & Orhan (2021)	
Eseryel, Crowston & Heckman (2021)	Shared mental model, shared norms
Imam & Zaheer (2021)	Knowledge sharing, team cohesion, trust in team
Han & Hazard (2022)	Team performance, team satisfaction, team efficiency, support atmosphere, shared decision-making ability, trust within the team, engagement.

Upon reviewing and comparing existing literature, it has been determined that researchers have chosen different indicators for identifying the effectiveness of shared leadership in response to varying research objectives, perspectives, and focal points. Additionally, the chosen indicators differ based on the context and form of shared leadership under investigation. However, researchers often adopt indicators such as performance, satisfaction, team efficiency, and organizational commitment.

2.3.3 Mediator and Moderator Mechanisms

Shared leadership is a complex concept. Cox et al. (2003) proposed a shared leadership model that included input factors, mediating factors, and outcome indicators. In order to provide managers with specific practical guidance, It is essential to thoroughly investigate how shared leadership impacts team performance and team satisfaction as outcome variables, and to uncover the underlying causal mechanisms. At the same time, shared leadership's effectiveness is often moderated by context factors, so managers can implement shared leadership more effectively by identifying these factors within virtual teams.

We view shared leadership as a process where several team members collectively assume leadership responsibilities, with a strong focus on collaboration and joint decision-making (Pearce, & Conger, 2003; Carson et al., 2007; Wang et al., 2014; D'Innocenzo et al., 2016; Hackman, & Johnson, 2013; Zhu, & Liao, 2018).

Through a meta-analysis, Wang et al. (2014) discovered that job complexity moderates the link between shared leadership and team effectiveness, suggesting that more complex tasks demand a greater level of shared leadership. In another meta-analysis regarding task complexity as a moderator, D'Innocenzo et al. (2016) found that for highly complex tasks, shared leadership

does not seem to benefit team performance. The difference in these results may be due to the different nature of the teams. As tasks become infinitely complex, the marginal utility of the effectiveness of shared leadership may gradually diminish with increasing management difficulty. Müller, Pintor, and Wegge (2018) considered the subjectivity of individuals' perception of task complexity and conducted a team decision-making experiment using a standardized board game as the basis while keeping the objective task complexity constant. They further demonstrated that shared leadership within a team can enhance the quality of team performance (by reducing team errors), with perceived task complexity serving as a key moderating factor in this relationship. This suggests that even when the objective difficulty of the task remains constant, higher levels of perceived task complexity by team members make it more likely to achieve higher quality performance.

Nicolaides et al. (2014) demonstrated through their research hypothesis that task interdependence positively moderates the relationship between shared leadership and team performance, because task interdependence requires a higher level of collaboration between teams, such as problem-solving and distributed expertise exchange, coordination, and guidance (Alper, Tjosvold & Law, 1998; Wageman, 1995). The meta-analysis results of D'Innocenzo et al. (2016) and Burke, Stagl, Klein, Halpin, & Salas (2006) support this view, while Ebrahim Ullah & Park (2013) reached the opposite conclusion.

Imam and Zaheer (2021) examined trust as a moderating factor between shared leadership and project success, finding that trust weakened the connection between shared leadership and successful project outcomes. This is consistent with the findings of Robert Jr and You (2018), who observed that high levels of trust diminish the effect of shared leadership on satisfaction.

In addition, the type of results (subjective and objective team performance indicators) also played a moderating role. Since objective performance is influenced by the objective environment and is not controlled by the team, there is less relationship between shared leadership and team performance. Conversely, subjective performance has a stronger relationship with shared leadership. It was also found that team tenure may be an exploratory moderator of shared leadership, with Nicolaides et al. (2014) suggesting that long-tenured teams may become rigid over time as a result of political and power struggles or commitment to specific working methods, making it difficult to maintain the benefits of shared leadership.

D'Innocenzo et al. (2016) found that when shared leadership is measured using network density and (de)centralization methods, the connection between shared leadership and team performance is stronger compared to when it is measured through aggregate methods. Jeppesen and Jønsson (2013) concluded that autonomy enhances the effectiveness of shared leadership, with shared leadership serving as a more significant predictor of team performance in teams that have greater freedom. Additionally, not all teams are suitable for shared leadership. Specifically, in manufacturing teams, shared leadership was negatively correlated with performance, while in knowledge teams, it was positively correlated. Moreover, Hoch, Pearce, & Welzel (2010) found that shared leadership is closely associated with team performance when team members' age diversity and coordination are low. Mehta & Sharma (2019) further demonstrated that the positive relationship between shared leadership behavior and team efficiency is moderated by team diversity and member proximity as team structure factors.

In summary, the success of shared leadership is influenced by factors like job complexity, task interdependence, team tenure, trust, and the nature of performance indicators (subjective vs. objective). Although many studies have demonstrated that shared leadership positively influences team performance and satisfaction, its effectiveness can differ based on the particular team dynamics and context. Therefore, understanding these moderating factors is crucial for the effective implementation of shared leadership, especially in virtual teams, where the dynamics of collaboration and communication are more complex.

Most studies on shared leadership focuses on how it impacts team processes, which subsequently play a role in the success of teams. Several studies have also examined how teams function cognitively and motivationally. For example, Nicolaides et al. (2014) found that team confidence played a greater role than shared leadership in predicting team performance. Drescher et al. (2014) used a longitudinal three-wave survey design to study mediating effect of trust behaviors between shared leadership and team performance. Their findings revealed that enhanced group trust partially mediated the link between the increase in shared leadership and improved team performance. Therefore, changes in trust are considered a key mechanism by which increased shared leadership leads to improved performance. Robert Jr & You (2018) supplemented the role of trust as a mediator, claiming that trust can also indirectly enhance team satisfaction. Mathieu, Kuenberger, D'Innocenzo, & Reilly (2015) discovered that shared

leadership influences team performance over time indirectly by enhancing team cohesion. Imam & Zaheer (2021) further confirmed that shared leadership ultimately affects project success by enhancing team cohesion and knowledge sharing. As a result, trust, cohesion, and knowledge sharing within teams may also interact in order to influence the achievement of a project. Chen, Zhang, & Zhang (2022) developed a sequential mediation process, demonstrating that the positive impact of shared leadership on team performance is sequentially mediated by team trust and team learning behavior.

Tran and Vu (2021) have investigated team cooperation as a mediator of its relationship to shared leadership and team effectiveness. The results were that team cooperation orientation mediates the relationship between shared leadership and team effectiveness, but it is not the sole mechanism, and upcoming research urged to put emphasis on additional mechanisms that are potential, for instance, trust in leaders, along with organizational commitment.

During entrepreneurship team research, Chen, Chen, Yu, & Huang. (2020) confirmed that shared leadership can facilitate team reflexivity by emphasizing lean practices, thereby increasing the quality of teamwork decisions, as well as affecting startup performance. Hadi & Chaudhary (2021) supplemented this findings by emphasizing the positive impact of shared leadership on team reflexivity and its substantial influence on team performance, not only in entrepreneurial teams but also in other contexts.

According to Han, Yoon, Choi, & Hong (2021) discovered that shared leadership positively influences team performance through a mediator, i.e., team PsyCap. With regard to team PsyCap is present, relationship-oriented shared leadership has a positive relation to team performance, whereas task-oriented shared leadership has a negative correlation.

Jeoung, Han, Lee, Beyerlein & Kolb (2017) considered relationships among shared leadership and coordination, goal commitment, knowledge sharing, and team performance. They found that shared leadership can enhance team coordination, goal commitment, and knowledge sharing, which in turn positively impact team performance. Although the direct effect of shared leadership on team performance was not significant, each team process factor served as a mediator in this relationship.

In addition, some research has examined team behavioral processes to explain how shared leadership improves team performance. The results show that shared leadership can not only

increase team proactivity (Erkutlu, 2012) but also promote team learning behaviors ((Liu, Hu, Li, Wang, & Lin, 2014), thereby enhancing overall team efficiency.

In this dissertation, team cohesion and knowledge sharing will be utilized as mediators, along with trust as a moderator, in order to explore the effectiveness of shared leadership in virtual teams, concerning team perceived virtuality. By exploring how these factors interact in virtual team environments, this dissertation aims to highlight the significance and potential application of shared leadership in modern team management. In the third section of this paper, we will elaborate on the detailed content, including establishing relevant theoretical frameworks and research hypotheses. We aim for this study to offer empirical evidence and practical insights to help managers successfully implement shared leadership in virtual teams.

3. Conceptual Model and Research Hypotheses

3.1 Shared Leadership, Team Perceived Virtually, Perceived Cohesion, and Knowledge Sharing

Team Perceived Virtually

Team perceived virtuality emerges both from virtual team interaction, as well as from virtual team dynamics. Initial virtual teams research focused on technology reliance, i.e., whether or not the members employed electronic communication to measure virtuality (Schaubroeck & Yu, 2017). However, as more has been discovered about heterogenic teamwork, researchers have come to appreciate that a concept of virtuality in a team goes beyond technology utilization but also extends to how individuals perceive, as well as feel, interactions between themselves in a team environment. As proposed by Handke et al. (2021), the TPV (Team Perceived Virtuality) emphasizes how team members collectively construct and experience virtuality during team interactions rather than relying solely on structural indicators as the basis for research on virtual teams.

TPV rests on an account of cognitive and affective responses of members towards virtual communication. It consists of two dimensions: perceived distance and perceived information deficits. The former refers to emotional detachment and inaccessibility among team members, while the latter refers to a lack of information sharing, determining whether understanding among teammates as well as its feedback capacity are influenced. These two dimensions reflect the emotional disconnection and cognitive barriers team members may experience during interactions respectively (Handke et al., 2021). This collective state is shaped by factors such as technology use in team interactions and team familiarity, which influence team collaboration outcomes.

Although early measurements of virtuality focused on technology usage and its characteristics (e.g., media richness), TPV places greater emphasis on teamwork's collective experience. Therefore, it is applicable to various team environments (Handke et al., 2021).

Shared Leadership, virtual team perceived distance and perceived information deficits

As virtual work environments become increasingly widespread, organizations need dynamic capabilities to address complex tasks and adapt to rapidly changing conditions (Eisenhardt & Martin, 2000; Teece, 2007). As a significant complement to the traditional single-leader model, shared leadership is becoming increasingly important in virtual teams. Shared leadership is an emerging phenomenon. Based on the requirements of team tasks, team members alternate in taking on leadership roles, utilizing their knowledge, skills, and abilities through social interactions to accomplish the team's shared objectives. Shared leadership facilitates rapid adaptation to environmental changes and enables flexible decision-making by empowering members to take on leadership responsibilities in diverse contexts. This approach mitigates to some extent the limitations of traditional leadership within virtual team structures. Research by Martins, Gilson, & Maynard (2004) and Ortiz de Guinea, Webster, & Staples (2012) categorizes virtual team outcomes into three dimensions: (1) performance, encompassing metrics such as task efficiency, duration, and quality; (2) emotional responses, reflecting the team's psychological and affective states, such as commitment and satisfaction; and (3) behaviors, including team interaction and conduct, such as turnover and conflict. Team performance and individual satisfaction are commonly used as primary indicators of virtual team effectiveness.

We propose that shared leadership, as a structural concept at the team level (Carson et al., 2007), can effectively activate and capitalize on team resources (Burke et al., 2006), thus having a positive impact on virtual team effectiveness. Specifically, shared leadership enhances members' self-efficacy through empowerment to enable team members to develop emotional connections through alternating leadership roles. This frequent role rotation provides the team with increased opportunities for interaction, thereby enhancing emotional support and a sense of belonging among team members, making them more willing to take on responsibilities and more engaged in their work (Hoch & Dulebohn, 2013). The interaction between shared leadership and empowerment further motivates members to contribute their ideas and expertise proactively. This fosters high-quality communication which strengthens team cohesion, reduces perceived emotional distance between members in order to positively affect overall team satisfaction (Bergman et al., 2012).

Consequently, we hypothesize that in virtual teams where shared leadership is extensively practiced, team members will experience heightened satisfaction derived from a sense of

“closeness” to one another. This closeness is expected to reduce perceived distance, create psychological safety, and further enhance their identification with and satisfaction within the team. Building on the above analysis, we put forward the following hypothesis:

H1: Shared leadership will be negatively related to perceived distance.

Additionally, perceived information deficits among team members have a considerable effect on task performance in virtual teams (Handke, Costa, & Feitosa, 2024). As a result of technical limitations, time differences, and other factors, virtual team members may experience information asymmetry, which can result in communication challenges and coordination difficulties that affect task alignment and team efficiency (Handke et al., 2024). In such situations, we believe that the shared leadership can mitigate the negative impact of information deficits in several ways.

In Muethel et al. (2012)'s research, he indicates that shared leadership has a positive impact on team performance even in geographically dispersed teams. Notably, shared leadership encourages mutual support and collaboration among its members, which can help mitigate information shortfalls. Specifically, when a member is involved in a position of leadership in a given task, then they would ensure active information sharing so that appropriate communication can be achieved, averts misunderstandings, and delays that are prone to arise from information asymmetry. As a result of shared leadership, team members are more intense motivation to contribute (Drescher & Garbers, 2016), resulting in more proactive information sharing and feedback. When information turns out to be missing or ambiguous, they are more likely to seek clarification, thereby preventing information deficits from affecting task performance. Second, shared leadership creates a dynamic task coordination mechanism enabling the team members to respond more flexibly to information gaps, ensuring timely updates and transparent information sharing.

According, we hypothesize that shared leadership would improve team performance by reducing perceived information deficits through information sharing and dynamic task assignment. More specifically, shared leadership provides information sharing and feedback among a group, making access to required information readily available, enhancing a group's ability to perform activities more efficiently. Therefore, we propose the following hypothesis:

H2: Shared leadership will be negatively related to perceived information deficits.

In order to better understand the mechanisms by which shared leadership impacts virtual teams, we take into account possible mediating variables that shape team members' perceptions and interactions, thereby impacting their experiences and performance. One of a key factor is perceived cohesion, which reflects the strength of relationships and psychological connections among team members. In virtual work environments, physical distance and limited informal communication can rise challenges, however, perceived cohesion can effectively mitigate these dark sides in order to fostering team collaboration then ultimately enhancing overall performance.

Perceived Cohesion

In general, cohesion is considered to be the relationship between team members, which influences their commitment, collaboration, and the overall level of integration within the organization (Beal, Cohen, Burke, & McLendon, 2003). Studies suggest that team cohesion is positively linked to team effectiveness. Teams with greater cohesion typically experience higher member satisfaction, improved communication, and lower levels of social disengagement (Barrick et al., 1998; Karau & Hart, 1998).

It might be challenging where virtual collaboration takes place remotely for members to come near each other, therefore cohesion is particularly important for effective team functioning ((Hambley, O'Neill, & Kline, 2007). In addition to communication media, social cue transmission quality and shared norms all serve a function in determining team cohesion within virtual teams (Tekleab, Quigley, & Tesluk, 2009). Higher cohesion can mitigate the negative effects of geographical and cultural diversity, reducing emotional detachment caused by fault lines (Chidambaram, 1996), while also enhancing team performance and member satisfaction ((Drouin, Bourgault, & Gervais, 2010; Yoo & Alavi, 2001).

Furthermore, cohesion helps team members establish a sense of belonging and morale, facilitating internal coordination as well as consensus, thereby strengthening the team's overall identity and willingness to collaborate (Evans & Dion, 1991; Pazos & Beruvides, 2011). It has been discovered that cohesive groups have increased chances of creating common goals, along with higher stability and performance in group activities (Lu, 2015).

Overall, cohesion in virtual team environments not only varies in intermember relationship quality but also directly impacts team performance as a whole and its member satisfaction (Beranek & Martz, 2005).

Shared leadership, perceived cohesion and virtual team perceived distance

Research suggests that shared leadership enhances perceived cohesion within a team because goals are shared among team members (Mach & Baruch, 2015). In sharing leadership, team members take on leadership responsibilities together, which fosters close relationships and commitment to common tasks, thereby strengthening team alignment with goals and values, leading to improved team cohesion (Salas, Vessey, & Estrada, 2015; Mach & Baruch, 2015).

Due to geographical dispersion and lack of face-to-face interaction in virtual teams, team members often experience a sense of emotional distance or detachment among members (Chidambaram, 1996). According to TPV, subjective perceptions of team members are more significant than physical factors in influencing team interaction and cooperation (Walther & Parks, 2002; Handke et al., 2024). Since team members' subjective perceptions have a major influence on how they perceive and respond to the team environment, directly affecting the quality of interactions and willingness to collaborate. Under such conditions, team cohesion can play a major role. When members feel a higher sense of cohesion, they are more likely to participate in interactions, communication, and coordination efforts to advance team goals (Powell et al., 2004), thereby psychologically bridging emotional distance among members (Mortensen & Hinds, 2001). In other words, the establishment of cohesion not only enhances members' sense of belonging but also significantly reduces perceived distance, enabling members to feel psychologically close and supported despite physical separation (Hoch & Kozlowski, 2014).

Therefore, we hypothesize that team cohesion may serve as a mediator between shared leadership and perceived distance. In virtual teams, members' intrinsic motivation becomes increasingly crucial to team performance through empowerment (Kirkman, Rosen, Tesluk, & Gibson, 2004). By improving shared leadership, team members are more attached to their team and collaborate more frequently and actively. When a higher sense of cohesion between virtual

team members appear can alleviate the perceived emotional distance between them, which helps to bridge the physical distance inherent in virtual teams (Handke et al., 2024). In other words, shared leadership strengthens emotional bonds among members by fostering team cohesion in order to effectively mitigate feelings of detachment due to physical distance in virtual teams. This enables team members to overcome spatial challenges and maintain effective collaboration and communication while working toward common goals. Based on this, we propose the following hypothesis:

H3: Team member's perceived cohesion in the team mediates the relationship between shared leadership and virtual team perceived distance.

When exploring how shared leadership affects perceived distance within virtual teams, another critical factor knowledge sharing also warrants attention. Knowledge sharing not only influences the enhancement of team members' professional skills but also largely determines the team's ability to integrate information when facing complex tasks. To better explore the mechanisms by which shared leadership functions within virtual teams, we further explore its relationship with knowledge sharing and perceived information deficits.

Knowledge sharing

Knowledge sharing is a crucial component of a team's intellectual capital (Pinjani & Palvia, 2013). In global virtual teams, members can utilize others' knowledge while simultaneously developing their own capabilities, thereby enhancing overall team performance (Xiao & Jin, 2010). As a result of joint training, collaborative problem-solving, and other mechanisms, knowledge is typically shared among team members (Pinjani & Palvia, 2013). This process entails transforming individual knowledge into a format that others can understand, grasp, and utilize (Ipe, 2003). Essentially, knowledge sharing is a mechanism that transfers knowledge from one individual to another (Pangil & Chan, 2014). Generally, knowledge sharing takes place when individuals with common experiences and objectives collaborate to exchange ideas and information (McNeil, 2003).

Knowledge sharing enhances team members' professional skills, enabling individuals to leverage existing knowledge resources within the team to solve problems (Griffith, Sawyer, &

Neale, 2003). Additionally, it optimizes problem-solving efficiency, allowing teams to rapidly integrate resources and identify the most effective solutions when facing challenges (Pinjani & Palvia, 2013), ultimately contributing to overall team performance improvement (Xiao & Jin, 2010). If knowledge sharing is inadequate, the connection between team members will weaken, and the likelihood of knowledge integration will be reduced as well (Pinjani & Palvia, 2013). Therefore, effective knowledge sharing is essential for successful team collaboration.

Shared leadership, knowledge sharing and virtual team perceived information deficits

Knowledge sharing is a cognitive process within a team, referring to team members exchanging knowledge, skills, and information to assist each other in solving problems related to work tasks to achieve goals (Srivastava, Bartol, & Locke, 2006; Yu, Tsai, & Chin, 2013). In other words, knowledge sharing helps team members bridge information gaps to reduce their perception of information deficits, thereby fostering a shared understanding of tasks within the team. As a component of collaborative capital, knowledge sharing has been recognized as a crucial factor in team success (Hill, 2015).

However, effective knowledge sharing among team members in virtual teams faces greater challenges (Powell et al., 2004). In virtual environments, communication speeds are slow and face-to-face interactions are rare, preventing tacit knowledge from being transferred, thus hindering the formation of a collective team identity. Nevertheless, because of virtual teams' geographical diversity, they often possess a broad range of knowledge resources not constrained by location (Pangil & Chan, 2014). Additionally, research has shown that knowledge shared within virtual teams can significantly enhance team performance (Xiao & Jin, 2010), and high performance is often linked to lower perceptions of information deficits. Therefore, knowledge sharing is crucial for reducing team members' perceived information deficits in virtual teams with shared leadership. Shared leadership is recognized as a key factor influencing team effectiveness, social cohesion, problem-solving capabilities, and perceived efficiency (Pearce, Yoo, & Alavi, 2004). Pearce and Sims (2001) emphasize that shared leadership is particularly pivotal in virtual teams as it promotes communication and knowledge integration among team members, enhancing task coordination (Pearce & Conger, 2003). The division of roles in shared

leadership increases opportunities for knowledge exchange among members, enabling them to collaboratively tackle complex tasks by integrating their diverse backgrounds and skills (Cruz, Henningsen, & Smith, 1999; Henningsen, Henningsen, Jakobsen, & Borton, 2004). In addition, shared leadership in virtual teams can reduce communication barriers associated with geographical distance through a collective leadership model to encourage team members to actively share knowledge and skills as a result of enhanced participation and sense of responsibility.

In virtual teams, knowledge sharing can effectively reduce team members' perceived information deficits. Perceived information deficits refer to the general experience of communication barriers faced by team members, including difficulties in (1) achieving timely feedback, (2) meeting individual needs (e.g., adjusting information to help specific members understand), (3) integrating multiple cues (e.g., conveying content and emotional tone), and (4) using rich language expressions. These information deficits usually hinder team consensus and synchronization on tasks which directly impact team performance (Handke et al., 2024). However, by engaging in knowledge sharing, team members can obtain more comprehensive and accurate information to reduce uncertainty in the information transfer process. They can also achieve better understanding of tasks and team goals, ultimately lowering their perceived information deficits.

Therefore, we expect that virtual teams driven by shared leadership can overcome structural barriers to information exchange through knowledge sharing in order to reduce perceptions of information deficits and thereby enhance overall team task performance. Based on the above analysis, we propose the following hypothesis:

H4: Knowledge sharing mediates the relationship between shared leadership and virtual team perceived information deficits.

3.2 Perceived trust as moderator

Trust functions as a collective phenomenon (Costa & Anderson, 2011), representing a psychological state among team members that is built on shared expectations, mutual experiences, and constructed meanings (Breuer, Hüffmeier, & Hertel, 2016; De Jong & Dirks,

2012; De Jong & Elfring, 2010; Fulmer & Dirks, 2018). In the context of shared leadership, team trust can be understood as a collective psychological state where team members, driven by a common expectation of team success, are willing to display openness to vulnerability (Cummings & Bromiley, 1996; Breuer et al., 2016). In essence, trust can be described as the degree of confidence that exists among team members (Pinjani & Palvia, 2013). In virtual teams, trust refers to the belief that each member has in the integrity, fairness, and reliability of the other (Costa & Anderson, 2011), characterized by three components, competence, goodwill, and integrity (Jarvenpaa, Knoll, & Leidner, 1998). However, virtual teams face increased perceived distance and a higher likelihood of missing information, making it more difficult for members to assess one another's competence, goodwill, and integrity. Therefore, trust becomes particularly critical (Paul, Drake, & Liang, 2016; Jarvenpaa et al., 1998; Jarvenpaa & Leidner, 1999; Cummings & Bromiley, 1996).

Trust plays an integral role in a team dynamics. First, trust is a key predictor of group efficacy, enhancing members' willingness to collaborate beyond formal role responsibility (e.g., Colquitt, Scott, & LePine, 2007; McEvily, Perrone, & Zaheer, 2003). Several studies have shown that higher levels of trust within teams contribute to stronger bonds among members, fostering enhanced engagement, collaboration, and proactive knowledge-sharing behaviors. With enhanced trust, team members are more prone to dedicate themselves to shared goals, which in turn strengthens overall team effectiveness (Cho & Poister, 2014; DeOrtentiis, Summers, Ammeter, Douglas, & Ferris, 2013; Gillespie & Mann, 2004; Bond-Barnard, Fletcher, & Steyn, 2018; McEvily et al., 2003). Moreover, trust reduces the need for internal supervision within a team (Mayer, Davis, & Schoorman, 1995; Langfred, 2004), thereby enabling team members to concentrate on improving workflow and performance (Drescher et al., 2014).

Due to the lack of face-to-face interaction and the diversity of backgrounds among members of virtual teams, this can create distrust, thereby disrupting communication and reducing the effectiveness of the team. Thus, trust is critical for bridging the physical distance between team members and enhancing team cohesiveness (Clemmensen, Khryashcheva, & Podshibikhina, 2008; Gilson, Maynard, Jones Young, Vartiainen, & Hakonen, 2015; Robert, Denis, & Hung, 2009). Furthermore, trust creates a conducive environment for knowledge

sharing (Levin & Cross, 2004), which fosters deeper collaborations between team members and proactive involvement in the organization.

Perceived trust, perceived cohesion, and virtual team perceived distance

Perceived distance in virtual teams refers to the psychological and emotional estrangement between team members (Handke et al., 2024), which adversely affects interaction and collaboration. By contrast, cohesion refers to emotional bonds, a sense of belonging, and mutual commitment among team members. As a key mechanism for fostering team cohesion, trust plays an important role. It has been shown by Lipnack and Stamps (1997) that teams with high degree of trust are more inclined to develop cohesion and to possess stronger self-management abilities. As well, Pace (1990) found that teams with low cohesion are more prone to experience personal conflicts, whereas teams with a high degree of cohesion exhibit smoother collaborations. By enhancing trust and promoting communication, cohesion not only improves collaboration but also reduces the perceived distance between members (Lu, 2015).

Due to the absence of non-verbal communication in virtual teams, trust helps fill the emotional support shortfall among team members. Trust alleviates psychological stress and uncertainty, making them more willing to exhibit vulnerability, engage in mutual support, and foster understanding. This promotes information sharing and effective open communication (Pinjani & Palvia, 2013), thereby reducing feelings of isolation caused by the lack of face-to-face interaction and further strengthening emotional connections (Jarvenpaa & Leidner, 1999). In other words, trust provides emotional support for team members, thereby fostering increased willingness to collaborate and, in turn, building positive team relationships (Mayer et al., 1995; Jarvenpaa & Leidner, 1999). In the process of deepening team relationships, the bond between members strengthens, thereby bridging the psychological disconnects caused by geographical distance and cultural differences (Pinjani & Palvia, 2013).

In conclusion, trust can be viewed as a moderator in virtual teams, influencing the relationship between perceived cohesion and perceived distance within the team. Therefore, we propose the following hypothesis:

H5: Perceived trust moderates the relationship between perceived cohesion and virtual team perceived distance, in such a way that a high degree of trust in the team strengthens the negative impact of team cohesion on virtual team perceived distance.

Perceived trust, knowledge sharing and virtual team perceived information deficits

Besides influencing team cohesion and perceived distance, trust also plays a crucial role in the relationship between knowledge sharing and information deficiency. Trust not only determines whether team members are willing to share knowledge but also affects their ability to maintain openness and transparency during information exchange.

In virtual teams, trust plays a critical role in moderating the impact of knowledge sharing on perceived information deficits. Trust deficits lead to a reluctance by members to share information (Peters & Manz, 2007), resulting in perceived information deficits that ultimately undermine team performance. In contrast, in high-trust teams, members exhibit higher levels of collaboration (Gillespie & Mann, 2004; Kanawattanachai & Yoo, 2007; Mesmer-Magnus & DeChurch, 2009), with more frequent interactions and communication, and members are more open and proactive when sharing information. Therefore, in high-trust teams, members are more willing to share knowledge with one another (Lin & Huang, 2010) in order to reduce perceived information gaps effectively.

It is through trusting each other that virtual workers will be able to commit and influence each other. By doing so, they will be able to share knowledge effectively while reducing perceived information deficits. Furthermore, openness and transparency in knowledge sharing are boosted by trust (Costa & Anderson, 2011). When members of a high-trust team recognize each other's professional capabilities and integrity, they are more likely to share information openly, reducing the risk of information loss in the organization. Lastly, trust brings about a sense of responsibility among members, where they are encouraged to participate actively in sharing valuable knowledge and information (Bhat, Pande, & Ahuja, 2016). In virtual teams, cultural and background differences among members may lead to misunderstandings in knowledge transfer, but trust helps coordinate each other's expertise, thereby reducing

information deficits and misunderstandings arising from cultural differences (Kanawattanachai & Yoo, 2007).

According to Holste and Fields (2010), trust is crucial to the promotion of knowledge sharing within virtual teams. As evidence, trust has been found to be positively correlated with knowledge sharing and team performance (Wiewiora, Murphy, Trigunarsyah & Brown, 2014) and team performance (DeOrtentiis et al., 2013). Given their heavy dependence on electronic communication and the absence of social cues and opportunities for social oversight, virtual teams face increased perceived risks in collaboration (Jarvenpaa et al., 1998). In such a situation, trust plays a moderating factor by reducing uncertainty during information sharing, enhancing cooperation as well as coordination across its members, hence further stimulating knowledge sharing (Gillespie & Mann, 2004). In addition, several studies have shown that higher levels of trust facilitate knowledge sharing (McEvily et al., 2003; Levin & Cross, 2004; Mayer et al., 1995). Meanwhile, trust is also a key predictor of group efficacy (Mayer et al., 1995). Therefore, we hypothesize that perceived trust positively moderates the relationship between knowledge sharing and perceived information deficits in virtual teams.

In conclusion, we propose the following hypothesis:

H6: Perceived trust moderates the relationship between knowledge sharing and virtual team perceived information deficits, in such a way that a higher degree of trust in the team strengthens the negative impact of team knowledge sharing on virtual team perceived information deficits.

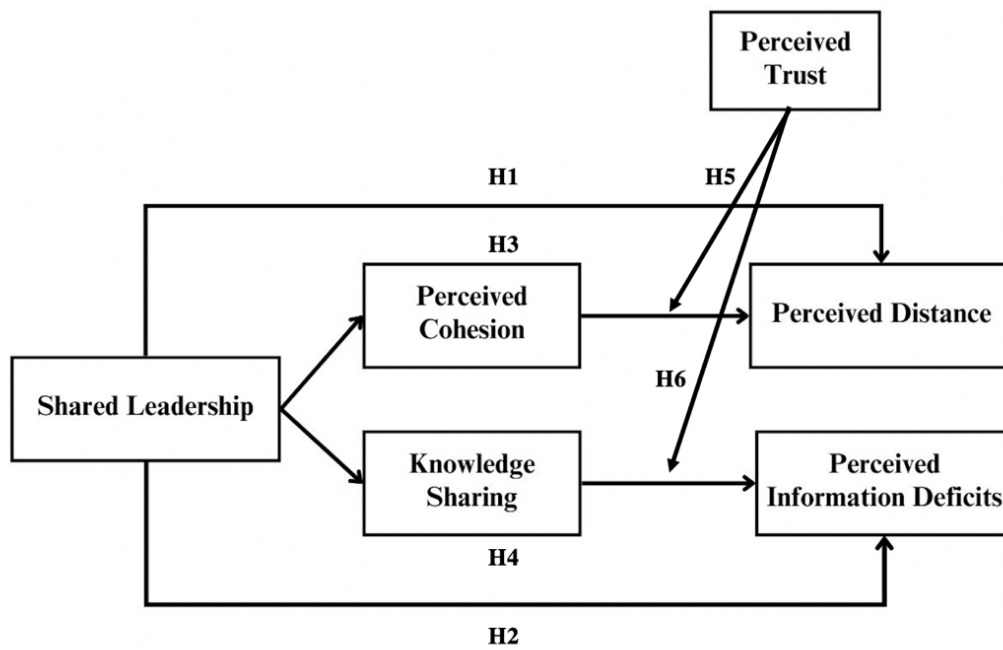


Fig.3.1 *Proposed research model*

4. Methodology

4.1 Sampling and Procedure

Since global high-tech companies were more likely to implement shared leadership flexibly and widely use virtual teams, this research focused on team members from global technology organizations with virtual work experience as the primary target population. This population group had accumulated extensive team collaboration experience in virtual work environments, and their characteristics were closely related to the shared leadership and virtual team effectiveness explored in this study. The target sample for this research consisted of 342 team members with virtual work experience working in global technology companies. The study used a non-probability sampling method, combining convenience sampling and snowball sampling techniques. Participants were recruited through my personal social network, recommendations from former colleagues, friends, and alumni, as well as through direct contacts who were asked to share the questionnaire with their colleagues to expand the sample size and ensure data diversity.

This study employs an anonymous self-administered survey format, with questionnaires distributed through Qualtrics links and QR codes. To ensure inclusivity and minimize any potential language bias, both Chinese and English versions of the survey are available. Participants can complete the questionnaire in around 10 minutes.

To further enhance the data reliability, the questionnaire for this research was carefully designed to include the questions that verified whether participants met the study's criteria and were responding consistently, thereby ensuring the appropriateness of the sample. The survey begins with a consent question, where participants are asked whether they agree to take part in the study. As this is a retrospective study focusing on the effectiveness of shared leadership in virtual teams, we also inquire about the proportion of time participants spend working virtually with their teams. In the last part of the survey, demographic information is collected, including gender, age, education background, current position, and their team size. The full version of the questionnaire is provided in Appendix 1.

In total, 342 survey responses were collected, of which 305 were fully completed and valid. The sample consisted predominantly of male participants, who made up 79.67% of the

respondents, while 20.33% were female. Participants' ages ranged from 22 to 56 years, with an average and median age of 36 ($SD=7.65$). The educational background is divided into several intervals: 43.28% held a bachelor's degree, 33.11% had a master's degree, 12.13% had a college diploma, and 11.48% possessed a doctoral degree or higher. Regarding their professional roles of current positions, 52.13% of participants were general employees, while 24.59% were frontline managers. Middle managers accounted for 15.08%, and senior managers made up 8.2% of the participants. As for team sizes, the respondents were part of teams with a wide range of sizes, with the smallest team consisting of 2 members and the largest being a multinational team consisting of 200 members. The average team size was 28 ($SD=21.08$). This variation in team size provides a comprehensive view of team dynamics within the context of the study, capturing experiences from both small and large team settings.

4.2 Instruments

Shared leadership — This was measured using the sub-scales from the shared leadership questionnaire described by Hoch (2012; Hoch et al., 2010). This questionnaire is a shorter version of Pearce and Sims' (2002) instrument. It assesses four leadership behaviors: transformational, transactional, empowering, and aversive leadership, with 4–6 items per behavior (24 items total). Aversive leadership was reverse-coded so that higher scores indicated more negative behaviors, while lower scores indicated more positive behaviors. The scale items assessed various aspects of shared leadership behavior, including vision, idealism, inspirational communication, intellectual stimulation, performance expectations, material rewards, personal rewards, participative goal-setting, independent action, self-development, self-reward, teamwork, intimidation, and reprimand. Respondents were asked to assess the leadership situation in teams using a five-point Likert scale, where 1 = strongly disagree and 5 = strongly agree. A sample item is “*My team colleagues provide a clear vision of whom and what our team is.*” The Cronbach's alpha was 0.96.

Team Perceived Virtuality— This was measured with a scale of 10 items by Handke et al. (2024). This scale evaluates team-perceived virtuality, which has been shown to have a strong connection to team outcomes, including performance and satisfaction. A 7-point Likert scale

was used, where 1 = strongly disagree and 7 = strongly agree. This scale is divided into two dimensions with 5 items for each, one is perceived distance, an example of a sample item is “*In my team, we feel detached from each other.*” The other dimension is the perceived information deficits, an example of a sample item is “*The ways in which we can express ourselves are limited.*” The sub-scale of perceived distance had a Cronbach's alpha of 0.90. and the sub-scale of perceived information deficits had a Cronbach's alpha of 0.89.

Perceived cohesion — This was measured by adapting a 3-item scale of Lin et al. (2008). Responses were collected using a 7-point Likert scale, with the question ranging from 1 = strongly disagree to 7 = strongly agree. The scale is designed to assess an individual's perception of the emotional and behavioral connection, unity, and cooperation within their team. A sample item is “*My group was a very cohesive unit.*” The Cronbach alpha was 0.911.

Knowledge sharing — This was assessed using a scale adapted from Connelly & Kelloway (2003) to gauge individuals' perceptions of how their team members share various forms of knowledge (Choi, Lee, & Yoo, 2010). This measure has previously been utilized by Staples & Webster (2008). It contained four items and used a 7-point Likert scale, where 1 = strongly disagree and 7 = strongly agree. A sample item is “*People in this team share their ideas openly.*” The Cronbach's alpha was 0.84.

Perceived trust — This was measured using a 4-item scale adapted from Jarvenpaa and Leidner (1999) to assess the level of trust among team members. An example item is: “*My team members had a high degree of trust between each other.*” Responses were recorded on a 5-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. The Cronbach's alpha for this scale was 0.84.

5. Results

Upon data collection, the data was analyzed using IBM SPSS Statistics 28 software. To assess structural validity, confirmatory factor analysis (CFA) was performed with AMOS 26.0. For examining moderation and mediation effects, the Process macro (Hayes, 2013) was applied, with Model 1 for moderation analysis and Model 4 for mediation analysis.

5.1 Common method bias

This study utilized Harman's single-factor test (Harman, 1976) to assess common method bias. According to the accepted standard, if the cumulative variance explained by the first factor among all extracted components is less than 50% (Hair, Black, Babin, & Anderson, 2019), it presents that the sample data is not significantly affected by common method bias. As shown in the table below, the cumulative variance explained by the first factor is 37.465%, which is below the commonly accepted threshold of 50%. Therefore, it can be concluded that the data passed the common method bias test.

No.	Eigenvalue			Component Extraction		
	Eigenvalue	Total	Cumulative%	Eigenvalue	Total	Cumulative%
		Variance Explained%			Variance Explained%	
1	16.859	37.465	37.465	16.859	37.465	37.465
2	6.038	13.418	50.882	6.038	13.418	50.882
3	2.733	6.073	56.956	2.733	6.073	56.956
4	1.232	2.738	59.694	1.232	2.738	59.694
5	1.107	2.46	62.154	1.107	2.46	62.154
6	0.929	2.064	64.218	0.929	2.064	64.218

Table 5.1 *Variance Explanation Table*

5.2 Validity Analysis

Before conducting factor analysis, a KMO test and Bartlett's test of sphericity must be carried out to assess the adequacy of the data for analysis. The KMO value determines the suitability of the sample data, while Bartlett's test examines whether the variables in the data set possess enough correlation to conduct factor analysis. Interpretation of the KMO statistic is described

below: a value greater than 0.9 reflects excellent suitability for factor analysis; the values between 0.8 and 0.9 indicate good suitability; values from 0.7 to 0.8 denote acceptable suitability; values between 0.6 and 0.7 means marginal suitability; whereas a score less than 0.5 results in unsuitable data to conduct factor analysis (Kaiser, 1974).

According to the test results present in table 5.2.2, the KMO value for the scale was 0.953 that is far above 0.7 indicates that the data is highly appropriate for factor analysis. Additionally, Bartlett's test of sphericity yielded an approximate chi-square value of 9098.020, with a significant p-value ($p < 0.001$) and provides further evidence of data suitability. Therefore, based on these results, factor analysis can be performed to get common factors and reconstruct the original indicators.

KMO Value		0.953
Approximate Chi-Square		9530.681
Bartlett's Test of Sphericity	<i>df</i>	990
<i>p-value</i>		0.000

Table 5.2.1 *KMO and Bartlett's Test*

Confirmatory Factor Analysis (CFA) is employed in the current study to establish the structural validity of the measurement model, with the use of the Maximum Likelihood Estimation (MLE) method to estimate model parameters.

AMOS 26.0 is used to conduct the CFA. In conducting CFA, internal structural and overall model fit is to be assessed. The overall fit is examined through several indices, such as the chi-square/degree of freedom ratio (CMIN/DF), Goodness of Fit Index (GFI), Comparative Fit Index (CFI), Normed Fit Index (NFI), and Root Mean Square Error of Approximation (RMSEA) (Hu & Bentler, 1999).

As shown in Table 5.2.2.2, the chi-square/df ratio for the CFA model is less than 3, and the RMSEA value is 0.042, meeting the criterion of being less than 0.08. The GFI value stands at 0.831, which is higher than 0.8 indicating an acceptable model fit. Furthermore, the CFI, NFI, TLI, and IFI values all exceed 0.9, demonstrating a strong model fit. Overall, these results confirm that the data is compatible with the CFA model.

Chi-Square to Degrees of Freedom ratio χ^2/df	GFI	RMSEA	CFI	TLI	TLI	RMR
1.540	0.831	0.042	0.945	0.941	0.945	0.07

Table 5.2.2 *Model Fit Indices for Confirmatory Factor Analysis (CFA)*

Convergent validity indicates how strongly the measurement items are correlated with the constructs they are intended to represent. When the measurement items show strong intercorrelations, they are more likely to cluster within the same dimension, thereby reinforcing the convergent validity of that dimension, as proposed by Fornell and Larcker in 1981. In the research in hand, we measured convergent validity using standardized factor loadings, composite reliability (CR), average variance extracted (AVE), and the square root of AVE. According to statistical standards, a model with good convergent validity should meet the following criteria: standardized factor loadings ≥ 0.5 , composite reliability ≥ 0.7 , and both AVE and the square root of AVE higher than 0.5 (Hair et al., 2019).

As shown in Table 5.2.2.3, the standardized factor loadings for all items on their corresponding variables are ≥ 0.5 , which meets the criteria for convergent validity and further confirms the strong convergent validity of the measurement model in this study.

Factor (Latent Variable)	Measurement Item (Observed Variable)	Unstandardized Loadings (Coef.)	Standard Error	z (CR Value)	p	Standardized Loadings (Std. Estimate)
Shared Leadership	SL24	1				0.682
Shared Leadership	SL23	0.889	0.079	11.208	***	0.678
Shared Leadership	SL22	0.905	0.08	11.279	***	0.682
Shared Leadership	SL21	1.027	0.086	11.987	***	0.729
Shared Leadership	SL20	1.133	0.091	12.406	***	0.757
Shared Leadership	SL19	0.913	0.08	11.367	***	0.688
Shared Leadership	SL18	1.071	0.09	11.933	***	0.725
Shared Leadership	SL17	1.004	0.085	11.755	***	0.714
Shared Leadership	SL16	1.037	0.09	11.52	***	0.698
Shared Leadership	SL15	1.087	0.092	11.866	***	0.721
Shared Leadership	SL14	1.14	0.093	12.261	***	0.747
Shared Leadership	SL13	1.083	0.091	11.843	***	0.719
Shared Leadership	SL12	1.139	0.094	12.131	***	0.738
Shared Leadership	SL11	1.095	0.092	11.949	***	0.726
Shared Leadership	SL10	1.006	0.085	11.902	***	0.723
Shared Leadership	SL9	1.127	0.09	12.548	***	0.766

Shared Leadership	SL8	1.169	0.093	12.533	***	0.765
Shared Leadership	SL7	1.038	0.088	11.738	***	0.712
Shared Leadership	SL6	1.027	0.087	11.773	***	0.715
Shared Leadership	SL5	1.031	0.088	11.662	***	0.707
Shared Leadership	SL4	1.03	0.088	11.678	***	0.709
Shared Leadership	SL3	1.007	0.082	12.224	***	0.744
Shared Leadership	SL2	1.038	0.088	11.755	***	0.714
Shared Leadership	SL1	1.088	0.089	12.2	***	0.743
Perceived Distance	PD5	1				0.822
Perceived Distance	PD4	0.946	0.058	16.255	***	0.805
Perceived Distance	PD3	0.871	0.057	15.187	***	0.768
Perceived Distance	PD2	0.945	0.057	16.568	***	0.816
Perceived Distance	PD1	0.968	0.061	15.971	***	0.796
Perceived Information Deficits	PID5	1				0.739
Perceived Information Deficits	PID4	1.046	0.071	14.653	***	0.836
Perceived Information Deficits	PID3	0.91	0.067	13.63	***	0.782
Perceived Information Deficits	PID2	1.005	0.067	14.959	***	0.853
Perceived Information Deficits	PID1	0.907	0.068	13.359	***	0.767
Perceived Cohesion	PC3	1				0.89
Perceived Cohesion	PC2	1.057	0.052	20.239	***	0.854
Perceived Cohesion	PC1	1.08	0.049	22.118	***	0.898
Knowledge Sharing	KS4	1				0.797
Knowledge Sharing	KS3	1.02	0.061	16.752	***	0.874
Knowledge Sharing	KS2	1.016	0.062	16.256	***	0.85
Knowledge Sharing	KS1	0.665	0.069	9.575	***	0.545
Perceived Trust	PT4	1				0.728
Perceived Trust	PT3	1.017	0.085	11.998	***	0.73
Perceived Trust	PT2	0.961	0.081	11.884	***	0.723
Perceived Trust	PT1	1.131	0.085	13.385	***	0.82

Table 5.2.3 *Factor Loading Table*

Table 5.2.2.4 shows that the Average Variance Extracted (AVE) values for all scale variables are higher than 0.5, and the Composite Reliability (CR) values above 0.7. This indicates that the questionnaire demonstrates acceptable convergent validity.

Factor	Average Variance Extracted (AVE)	Composite Reliability (CR)
Shared Leadership	0.520	0.963
Perceived Distance	0.643	0.900
Perceived Information Deficits	0.634	0.896
Perceived Cohesion	0.776	0.912
Knowledge Sharing	0.605	0.856
Perceived Trust	0.565	0.838

Table 5.2.4 *Model AVE and CR Results*

5.3 Analytical strategy and hypothesis testing

5.3.1 Correlation analysis

This study includes 305 valid responses, and large sample data typically conform to the Central Limit Theorem (CLT). Even if the data is not strictly normally distributed, the sample means generally approximate a normal distribution as the sample size increases. Therefore, we conducted a Pearson correlation analysis on these variables. The results indicated that shared leadership has a significant positive correlation with other variables such as perceived trust, perceived cohesion, and knowledge sharing ($p < 0.01$), especially with perceived trust, which shows a strong correlation. In addition, perceived distance and perceived information deficits have significant negative correlations with most other variables ($p < 0.01$), indicating that these two variables may have a negative impact on team cohesion and trust. Moreover, perceived cohesion and knowledge sharing have a strong positive correlation ($p < 0.01$), suggesting that higher cohesion may foster increased knowledge sharing. And, perceived trust has a significant correlation with all other variables ($p < 0.01$), these findings emphasize the crucial role of trust in shaping the connections between these variables. They offer valuable insights into the complex interactions between shared leadership, perceived distance, information gaps, cohesion, knowledge sharing, and trust.

	M	SD	SL	PD	PID	PC	KS	PT
SL	3.887	0.811	1	-	-	-	-	-
PD	2.385	1.165	0.336**	1	-	-	-	-
PID	2.527	1.204	0.369**	0.762**	1	-	-	-
PC	4.646	1.274	0.354**	0.503**	0.404**	1	-	-
KS	4.385	0.976	0.364**	0.436**	0.403**	0.712**	1	-
PT	3.833	0.854	0.448**	0.630**	0.610**	0.517**	0.552**	1

* p<0.05 ** p<0.01

SL=Shared Leadership

PD=Perceived Distance

PID=Perceived Information Deficits

PC=Perceived Cohesion

KS=Knowledge Sharing

PT=Perceived Trust

Table 5.3.1 *Pearson Correlation Analysis*

5.3.2 Hypothesis testing

Mediation and Direct Effects

	b	SE	t(df)	p	LL95%CI	UL95%CI
Perceived Distance (Y) ON Shared Leadership (X) (a1 path)	-0.259	0.075	-3.460	0.001	-0.407	-0.112
Perceived Cohesion (M) ON Shared Leadership (X) (b1 path)	0.557	0.085	6.590	0.000	0.390	0.723
Perceived Distance (Y) ON Perceived Cohesion (M)(c path)	-0.402	0.048	-8.427	0.000	-0.496	-0.308

	Unstand. value	SE	LL95%CI	UL95%CI
Bootstrap results for indirect effect	-0.224	0.044	-0.317	-0.144

LL = lower limit, CI = confidence interval, UL = upper limit. All predictor variables were mean - centered.

Table 5.3.2.1 *Direct and Mediation Effect Test Results 1*

Table 5.3.2.1 summarizes the test results for Hypotheses 1 and 3, which explore direct and indirect relationships between shared leadership and perceived distance. Hypothesis 1 examines whether shared leadership negatively affects perceived distance, while Hypothesis 3 further investigates whether this relationship is mediated by perceptions of team cohesion among team members. In addition to assessing the direct impacts of shared leadership on perceived distance, the study also explored its indirect effects on perceived cohesion.

An analysis of the regression-based path data was conducted to determine whether there is a negative correlation between shared leadership and perceived distance. The results show that the direct effect of shared leadership on perceived distance is significantly negative ($b = -0.259$, $SE = 0.075$, $t = -3.460$, $p = 0.001$), with a 95% confidence interval of $[-0.407, -0.112]$, which does not include zero. As a result, it can be concluded that the path is statistically significant. Therefore, Hypothesis 1 is supported, indicating that in virtual teams, a higher level of shared leadership is associated with lower perceived distance between team members.

Moreover, shared leadership significantly and positively influences perceived team cohesion ($b = 0.557$, $SE = 0.085$, $t = 6.590$, $p = 0.0001$), while perceived cohesion in turn significantly and negatively predicts perceived distance ($b = -0.402$, $SE = 0.048$, $t = -8.427$, $p = 0.0001$). Based on the bootstrap method, a mediation effect was tested. According to the results, the indirect effect was -0.224 with a standard error of 0.044 and a 95% confidence interval of $[-0.317, -0.144]$, which does not encompass zero. In this case, the mediation effect is statistically significant. Thus, thereby confirming support for Hypothesis 3, suggesting that shared leadership can reduce perceived distance among team members by enhancing team cohesion.

b	SE	t(df)	p	LL95%CI	UL95%CI
---	----	-------	---	---------	---------

Perceived Information Deficits (Y2) ON Shared Leadership (X) (a2 path)	-0.380	0.081	-4.687	0.000	-0.540	-0.220
Knowledge Sharing (M2) ON Shared Leadership (X) (b2 path)	0.439	0.064	6.810	0.000	0.312	0.565
Perceived Information Deficits (Y2) ON Knowledge Sharing (M2) (c2 path)	-0.382	0.067	-5.679	0.000	-0.515	-0.250
	Unstand. value	SE	LL95%CI	UL95%CI		
Bootstrap results for indirect effect	-0.168	0.044	-0.262	-0.085		

LL = lower limit, CI = confidence interval, UL = upper limit. All predictor variables were mean - centered.

Table 5.3.2.2 Direct and Mediation Effect Test Results 2

The results of Hypotheses 2 and 4 are presented in Table 2, which explore the direct and indirect relationships between shared leadership and perceived information deficits. In particular, Hypothesis 2 explores the connection between shared leadership and perceived information deficits, while Hypothesis 4 further investigates the impact of knowledge sharing on this relationship. The analysis tests both the direct effect of shared leadership on perceived information deficits and the indirect effect via knowledge sharing.

An analysis of the regression-based path data was conducted to test Hypothesis 2 - whether shared leadership is negatively associated with perceived information deficits. A 95% confidence interval of [-0.540, -0.220], which excludes zero, shows that shared leadership significantly reduces perceived information deficits ($b = -0.380$, $SE = 0.081$, $t = -4.687$, $p = 0.001$). In this instance, we can conclude that the path is statistically significant. In this regard,

Hypothesis 2 is supported, indicating that in virtual teams, an increased level of shared leadership is linked to a decreased perception of information deficits among team members.

Moreover, shared leadership significantly and positively predicted knowledge sharing within the team ($b = 0.439$, $SE = 0.064$, $t = 6.810$, $p < 0.001$), and knowledge sharing, in turn, significantly and negatively predicted perceived information deficits ($b = -0.382$, $SE = 0.067$, $t = -5.679$, $p < 0.001$). Based on bootstrapping, we found an indirect effect of -0.168 with a standard error of 0.044 and a 95% confidence interval of $[-0.262, -0.085]$ which does not zero. In this case, we can conclude that the mediating effect is statistically significant. Thus, Hypothesis 4 is also supported, suggesting that shared leadership can reduce perceived information deficits by fostering knowledge sharing behavior among team members.

Moderation Effects

Predictor Variable	b	SE	t(df)	p	LL95%CI	UL95%CI
Perceived Cohesion (M)	-0.204	0.046	-4.474	0.000	-0.294	-0.114
Perceived Trust (Z)	-0.607	0.073	-8.360	0.000	-0.749	-0.464
Int_1	0.164	0.052	3.156	0.002	0.062	0.266

Table 5.3.2.3 *Moderation Analysis Results 1*

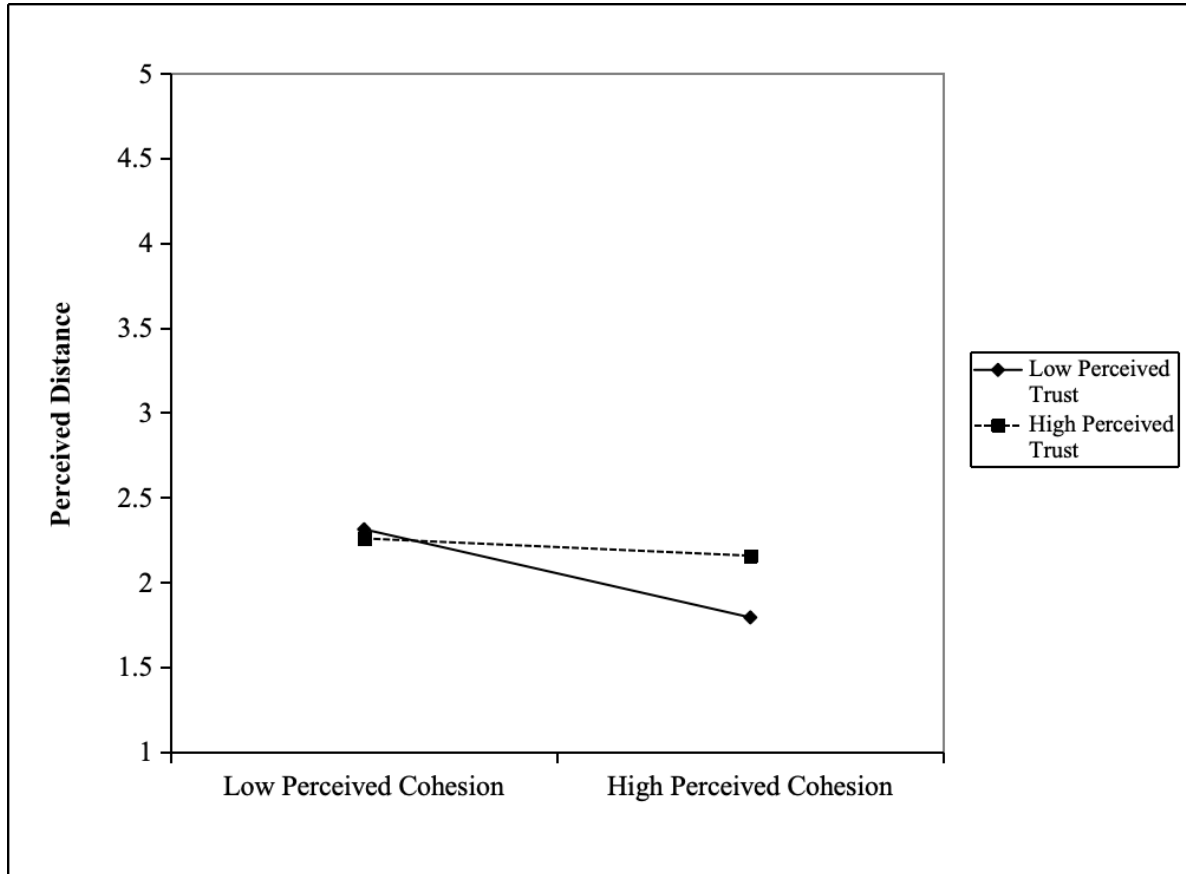


Figure 5.3.2.1 *Interaction Effect of Perceived Cohesion and Perceived Trust on Perceived Distance*

Hypothesis 5 indicates that perceived trust moderates the relationship between perceived cohesion and perceived distance in virtual teams, in this way, a higher level of perceived trust enhances the negative impact of perceived cohesion on perceived distance.

In order to test hypothesis 5, a moderation analysis was conducted. The findings revealed that the main effect of perceived cohesion on perceived distance was significantly negative ($b = -0.204$, $SE = 0.046$, $t = -4.474$, $p < 0.001$, $95\% CI = [-0.294, -0.114]$), indicating that the stronger the perceived cohesion among team members, the lower their perceived distance in a virtual team context.

In addition, perceived trust itself was found to be a significant negative predictor of perceived distance ($b = -0.607$, $SE = 0.073$, $t = -8.360$, $p < 0.001$, $95\% CI = [-0.749, -0.464]$).

It is crucial to highlight that the interaction term between perceived cohesion and trust, denoted as Int_1, had a regression coefficient of 0.164 ($SE = 0.052$, $t = 3.156$, $p = 0.002$, $95\% CI = [0.062, 0.266]$), indicating a significant moderating effect. However, because the

interaction term has a positive coefficient whereas the main effect of cohesion on perceived distance is negative, this suggests that as trust increases, the negative impact of perceived cohesion on perceived distance becomes weaker, rather than stronger as originally hypothesized. Therefore, Hypothesis 5 was not supported.

Figure 5.3.2.1 clearly illustrates the specific pattern of the moderation effect. When perceived trust is low, perceived cohesion has a stronger negative effect on perceived distance in virtual teams. However, when perceived trust is high, the relationship between cohesion and distance becomes much weaker as shown by the flatter slope of the line. This supports the positive direction of the interaction term, and shows that trust reduced the strength of cohesion's effect on perceived distance.

Based on these statistical results and the figure, it can be concluded that perceived trust is a more important predictor of perceived distance than perceived cohesion in virtual teams. In high-trust teams, regardless of the level of team cohesion, members consistently report significantly lower levels of perceived distance. Therefore, under high levels of perceived trust, the marginal effect of cohesion on perceived distance becomes much weaker, and its importance is relatively lower.

Predictor Variable	b	SE	t(df)	p	LL95%C I	UL95% CI
Knowledge Sharing (M2)	-0.084	0.070	-1.212	0.226	-0.221	0.053
Perceived Trust (Z)	-0.744	0.080	-9.338	0.000	-0.901	-0.587
Int_2	0.127	0.070	1.814	0.071	-0.011	0.264

Table 5.3.2.4 Moderation Analysis Result 2

To test Hypothesis 6, which proposes that perceived trust moderates the relationship between knowledge sharing and perceived information deficits in virtual teams, a moderation analysis has been conducted, in which higher levels of perceived trust strengthen the negative impact of knowledge sharing on perceived information deficits.

Table 4 displays the results. First, the direct impact of knowledge sharing on perceived information deficits was negative ($b = -0.084$), but not statistically significant ($SE = 0.070$, $t =$

-1.212, $p = 0.226$, 95% CI = [-0.221, 0.053]). Consequently, across the full sample, knowledge sharing did not have a statistically significant effect on reducing information deficits.

Second, the main effect of perceived trust on perceived information deficits was significantly negative ($b = -0.744$, $SE = 0.080$, $t = -9.338$, $p < 0.001$, 95% CI = [-0.901, -0.587]), indicating that in virtual teams, as the level of perceived trust among team members increases, their experience of information deficits reduced. This reflects that having a strong sense of trust can effectively mitigate challenges related to information asymmetry and insufficiency.

It was found that the key interaction term (Knowledge Sharing $\times$ Perceived Trust, labeled Int_2) had a regression coefficient of 0.127 ($SE = 0.070$, $t = 1.814$, $p = 0.071$, 95% CI = [-0.011, 0.264]). Despite the positive coefficient direction aligning with the hypothesized direction (i.e., higher perceived trust strengthens the negative effect of knowledge sharing on information deficits), however, the p -value was greater than 0.05, suggesting that the results did not achieve conventional levels of statistical significance. Additionally, the confidence interval crossed zero, further suggesting that the interaction effect was not statistically significant.

Therefore, even though the direction of the moderating effect is consistent with Hypothesis 6, there is not sufficient statistical evidence to conclude that perceived trust moderates the relationship between knowledge sharing and perceived information deficits. Therefore, Hypothesis 6 was not supported.

Summary of Hypothesis Results

Hypothesis	Supported/ Not Supported
H1 Shared leadership will be negatively related to perceived distance.	Supported
H2 Shared leadership will be negatively related to perceived information deficits.	Supported
H3 Team member's perceived cohesion in the team mediates the relationship between shared leadership and virtual team perceived distance.	Supported
H4 Knowledge sharing mediates the relationship between shared leadership and virtual team perceived information deficits.	Supported

H5 Perceived trust moderates the relationship between perceived cohesion and virtual team perceived distance, in such a way that a high degree of trust in the team strengthens the negative impact of team cohesion on virtual team perceived distance.	Not Supported
H6 Perceived trust moderates the relationship between knowledge sharing and virtual team perceived information deficits, in such a way that a higher degree of trust in the team strengthens the negative impact of team knowledge sharing on virtual team perceived information deficits.	Not Supported

Table 5.3.2.5 *Summary of Hypothesis Results*

6. Research findings

6.1 Discussion

This research examines the effectiveness of shared leadership in virtual teams within global technology companies, as well as how shared leadership enhances team outcomes. Specifically, it explores how shared leadership mitigates perceived distance and perceived information deficits in virtual teams by fostering team cohesion and knowledge sharing among team members. Additionally, this research also explores the moderating effect of perceived trust on the pathways of *perceived cohesion*perceived trust → perceived distance*, and *knowledge sharing*perceived trust → perceived information deficits*.

It has been demonstrated in this study that shared leadership reduces perceived distances and perceived information deficits within virtual teams within global technology companies. In addition to empowering team members, shared leadership blurs vertical leadership authority (Pearce & Perry, 2003), and fosters dynamic, decentralized leader-follower relationships through social interaction (DeRue, 2011; Tran & Vu, 2021), which enhances collective goals (Hackman & Johnson, 2013). In other words, shared leadership is a result of full empowerment (Cox et al., 2003), characterized by equal collaboration among team members (Bligh et al., 2006), supporting each other's knowledge and skill development, and driving the completion of collective tasks (Wood, 2005), thereby enhancing decision-making capabilities and improving the achievement and efficiency of organizational goals.

The research also investigates the way perceived cohesion acts to mediate between shared leadership and perceived distance and the role of knowledge sharing in mediating the relationship between shared leadership and perceived information deficits. The results confirm that team cohesion mediates the relationship between shared leadership and perceived distance. In virtual teams, team members' intrinsic motivation is enhanced through shared leadership, which consequently leads to improved team performance (Kirkman et al., 2004). By sharing leadership, team members feel more connected to the team, which promotes frequent and active team interaction. When team members perceive enhanced cohesion, their emotional distance is

reduced, helping to bridge physical gaps in virtual teams (Walther & Parks, 2002; Handke et al., 2024).

Furthermore, shared leadership reduces the perceived information deficits in the team by promoting knowledge sharing. The global technology industry often consists of decentralized teams with a diversity of expertise and knowledge, which are often called knowledge-based organizations dedicated to collective learning and knowledge sharing (Zakrzewska-Bielawska, 2010). Therefore, knowledge sharing becomes an important means to continuously support skill development and team learning. In addition, shared leadership increases opportunities for knowledge exchange among members, enabling them to combine different professional backgrounds and skills to accomplish complex tasks (Cruz et al., 1999; Henningsen et al., 2004). As a result of knowledge sharing, team members are able to obtain more comprehensive and accurate information, thereby eliminating the uncertainty inherent in the information transfer process. The result will be a better understanding of tasks and team goals, ultimately reducing perceived information deficits. In other words, through shared leadership, virtual teams are able to overcome structural barriers to information flow by fostering knowledge sharing, which in turn reduces perceived information deficits and enhances overall team performance in task execution (Erkutlu, 2012).

However, in global teams, the diversity resulting from differences in culture, values, and individual perceptions among team members that increases the likelihood of conflicts and misunderstandings, which in turn intensifies perceived distance and perceived information deficits, ultimately affecting team member satisfaction and team performance. As a consequence, this study includes trust as a key mechanism for promoting team cohesion and knowledge sharing. However, surprisingly, when perceived trust is high, the direct effect of perceived cohesion on perceived distance is weakened. This suggests that high perceived trust may reduce the direct impact of cohesion on psychological distance. This counterintuitive finding can be explained for several possible reasons: First, at high levels of perceived trust, team members may have already built up strong emotional support and psychological safety (Jarvenpaa & Leidner, 1999; Mayer et al., 1995), thereby diminishing the role of cohesion in reducing perceived distance. This implies that high levels of perceived trust might partially substitute for perceived cohesion's direct impact (Gillespie & Mann, 2004). Second, higher

levels of trust may reduce team members' reliance on emotional bonds, such as cohesion. This may lead them to communicate more in terms of tools, processes, and task performance and thus weaken the influence of cohesion on perceived distance.

Furthermore the interaction effect of perceived trust and knowledge sharing did not demonstrate significant findings. This may be because the impact of knowledge sharing on reducing perceived information deficits is significant to a great extent that it is difficult for the moderating role of perceived trust to manifest in this direct relationship. Thus, regardless of the level of perceived trust, knowledge sharing will significantly reduce information deficits, thereby removing the moderating effect. Additionally, perceived trust directly influences information flow and collaboration by fostering open communication and informal information exchange among team members (Jarvenpaa & Leidner, 1999) and by encouraging a sense of obligation to increase commitment towards goals (Mayer et al., 1995). These direct effects may undermine the role of perceived trust as a moderator variable. In virtual teams especially, communication channel effectiveness, skills of the members of the group, and cultural differences may restrict the effects of trust and knowledge sharing (Jarvenpaa & Leidner, 1999). There is a likelihood that these potential complexities may account for the insignificant moderating effect of perceived trust in case of the study.

6.2 Implications

Following the empirical validation of H1-H4, the current study suggests practical methods of applying shared leadership to mitigate perceived distance and perceived lack of information. It is common for virtual teams to face challenges related to perceived distance and lack of information sharing among their members. The presence of these issues can hinder team collaboration, lower performance, and decrease satisfaction. Therefore, finding a successful leadership strategy to build cohesion and knowledge sharing in teams and ultimately enhance general effectiveness of the team has been an urgent management concern. From theoretical reasoning and empirical research evidence, the current research demonstrates that shared leadership plays a great role in alleviating these challenges among virtual teams. Specially, shared leadership promotes cohesion among team members, reduces distance perceived by

team members, and facilitates knowledge transfer to mitigate information deficits, ultimately enhancing the performance of the team and the satisfaction of the team members.

Strategies and Training Programs for Implementing Shared Leadership

To effectively implement shared leadership in virtual teams, managers and human resource professionals should focus on establishing a foundation for shared leadership and developing the comprehensive capabilities of team members. Based on Zaccaro, Rittman, & Marks (2001), shared leadership includes establishing a clear team vision, defining goals and strategies, providing timely feedback, establishing team norms, and coordinating team activities. To ensure these competencies are implemented, organizations should provide scenario-based team training to help members acquire the necessary collaboration skills and clarify the roles within shared leadership (Day, Gronn, & Salas, 2004). It is also crucial for team members to possess both soft skills (such as communication and collaboration skills) and hard skills (such as technical proficiency with technological tools). Consequently, vertical leadership styles such as transformational leadership and empowering leadership should assist them in accepting and implementing shared leadership (Morgeson et al., 2010). It is the responsibility of HR professionals to design and implement training programs specifically tailored to shared leadership, which concentrate on developing skills including trust-building, knowledge sharing, and teamwork. By participating in these programs, team members will be able to transition smoothly into shared leadership positions. Furthermore, regular evaluations of existing leadership development plans and assistance in selecting team members are essential to assure a shared understanding of norms and expectations (Barnett & Weidenfeller, 2016).

Enhancing Team Collaboration Efficiency and Cohesion

It is important for HR professionals and virtual team members to focus on improving the team's social dynamics in order to enhance the efficiency of collaboration. Due to the fact that cohesion and unity can be strengthened and collaboration can be promoted when team members' expectations are shared and clear guidelines for conflict resolution are established (Lin et al., 2008). These steps are critical to enhance virtual team satisfaction, team viability, and overall performance (Mysirlaki & Paraskeva, 2019). In addition to teamwork learning and systematic

team-building interventions, which stimulate individual and collective growth and development in general, is critical to the long-term development of virtual teams (Holton, 2001). This is because the technique helps members of teams to create shared meaning and enhance trust in each other, which in turn increases cooperation and cohesion. In global teams that operate in cultures, having teleconferences that meet at regular intervals, web-based conferences or face-to-face conferences can effectively strengthen team relationships and improve cohesion. In addition, managers should encourage emotional feedback within virtual teams by means of group software or computer-based feedback tools that are tailored to the demands of the team (Tan et al., 2019).

Fostering a Knowledge Sharing Culture

Shared leadership can effectively promote knowledge sharing within teams, making it imperative for managers and HR professionals to cultivate a team culture that supports this practice. Such a culture can enhance collaboration among team members, especially those with less experience or complementary skills, fostering alignment and concerted action (Imam & Zaheer, 2021). Among the specific measures are: providing systematic training, as well as role assignments and conflict management plans to assist team members in clarifying goals and strengthening their shared understanding and collaboration skills. It should include topics such as understanding team development stages, strategies for leading cross-cultural teams, and team-building activities that enhance mutual trust among team members (Tan et al., 2019). Additionally, tasks that require close collaboration among team members can be designed to strengthen interdependence to motivate team members to actively participate in sharing knowledge for the collective benefit of the team (Rutten, Blaas-Franken, & Martin, 2016).

Complexity and Challenges of Trust

Although this research did not verify a significant role of trust as a moderating factor, its potential value in knowledge sharing and team cohesion remains worthy of further exploration. It is important to recognize that trust in virtual teams is dynamic in nature, and its impact can vary significantly at different stages. Therefore, managers need to combine technological tools (such as using efficient communication tools and feedback systems to strengthen connections

among team members, reducing misunderstandings and information gaps) with emotional development (such as regular virtual meetings or face-to-face meetings to enhance team relationships, build mutual trust, and create a positive psychological safety environment for collaboration). Therefore, management can address the flexibility and complexity involved in trust management and maximize the benefits it can bring to a team's overall effectiveness by making continuous investments in trust management. Despite the limited moderating effect found in this study (H5 and H6), trust remains an important variable in team dynamics, warranting continued managerial attention.

This study provides fresh theoretical perspective and empirical support for the applicability of shared leadership in virtual teams. Through the inclusion of key factors such as perceived cohesion, knowledge sharing, and perceived trust, this research reveals how shared leadership affects perceived distance, information deficits, and overall performance between team members. This not only enriches the theoretical foundation of shared leadership in virtual team environments but also provides more directions for future research. Meanwhile, the study provides practical guidelines for managers to improve virtual team performance and encourages management to reconsider strategies and adopt more effective approaches.

7. Limitations and suggestions for future research

The findings of this study should be viewed with caution. This study analyzed perceived distance and information deficits among shared leadership teams. It operationalized perceived cohesion, knowledge sharing, and levels of perceived trust within the team, and based on individual-level data, this research provides deeper insights for practitioners and scholars.

We adopted two mediators in this study (knowledge sharing and perceived cohesion). Additionally, other important factors that could impact team performance include team confidence (Nicolaidis et al., 2014), team goal commitment (Han et al., 2017), and team cooperation (Tran & Vu, 2021). Although perceived trust was chosen as a moderator in this study, its moderating effect was not confirmed for perceived cohesion and perceived distance, as well as perceived knowledge sharing and perceived information deficits. It should be noted that trust is a dynamic, multidimensional variable whose impact varies as a result of context and stage (McAllister, 1995; De Jong & Elfring, 2010). However, this study did not explore the multidimensional nature of trust, such as how cognitive and emotional dimensions of trust affect relationship between perceived cohesion and perceived distance, and knowledge sharing and perceived information deficits. Researchers may consider longitudinal tracking to explore the role of trust at various stages of team development, while capturing its dynamic characteristics over the course of time. It is also necessary to incorporate more mediators (e.g., communication frequency, team familiarity) or explore nonlinear relationships to further explain the complex relationships between perceived trust, perceived cohesion and perceived distance, as well as between perceived trust, knowledge sharing, and perceived information deficits.

The data gathered in this study were self-reported, with team members providing responses through questionnaire surveys, which could be impacted by social desirability bias or response bias, thus potentially affecting their accuracy. To complement survey data, future research could use multiple data collection methods (including observations, leadership performance evaluations, etc.) to offer a more holistic view and mitigate self-report bias. Additionally, since this study used cross-sectional data collected from a single time point, it cannot reveal causal relationships or long-term effects. Future studies could employ a longitudinal approach,

gathering data over several time points to investigate the long-term effects of shared leadership on team effectiveness in virtual teams.

Additionally, variables such as team size may affect shared leadership effectiveness. Teams of varying sizes may experience varying levels of shared leadership implementation and effectiveness. For example, smaller teams may be more likely to be able to implement shared leadership compared to teams with larger size where communication and coordination become more challenges. Without appropriate control or analysis, significant variations in team size could limit the generalizability of the study. Therefore, future studies may include team size as a control variable and categorize teams according to their size to control for its potential impact. This approach would increase the reliability of the research findings and offer a deeper insight into the development of shared leadership effectiveness over time.

8. Conclusion

Currently, virtual teams play a key role in the success of any organization in these times of the digital era in which communication and working from home is widespread practice. The empirical results of H1 through H4 strongly support the critical role of cohesion and knowledge sharing as mediators, with H5 and H6 providing novel insights on the perceptive role of trust in virtual collaboration. In the context of Covid 19, 80% of business around the globe shifted to virtual teams and it was organizations that were forced to work towards making their virtual teams more efficient. This study explores shared leadership in virtual teams within global tech companies. The researchers concluded that shared leadership significantly reduces perceived distances and information deficits by fostering team cohesion and knowledge sharing, thereby enhancing team performance. Nevertheless, the moderating role of trust in these relationships still requires further investigation to fully understand its impact on virtual team performance.

Reference

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Ale Ebrahim, N., Ahmed, S., & Taha, Z. (2009). Virtual teams: A literature review. *Australian Journal of Basic and Applied Sciences*, 3(3), 2653-2669. <https://doi.org/10.6084/M9.FIGSHARE.103369>
- Alper, S., Tjosvold, D., & Law, K. S. (1998). Interdependence and controversy in group decision making: Antecedents to effective self-managing teams. *Organizational Behavior and Human Decision Processes*, 74(1), 33–52. <https://doi.org/10.1006/obhd.1998.2748>
- Avolio, B. J., & Bass, B. M. (2002). Developing potential across a full range of leadership: Cases on transactional and transformational leadership. Mahwah, NJ: Lawrence Erlbaum Associates. <https://doi.org/10.4324/9781410603975>
- Avolio, B. J., & Gardner, W. L. (2005). Authentic leadership development: Getting to the root of positive forms of leadership. *The Leadership Quarterly*, 16(3), 315-338. <https://doi.org/10.1016/j.leaqua.2005.03.001>
- Avolio, B. J., Sivasubramaniam, N., Murry, W. D., & Garger, J. (2003). Assessing shared leadership: Development and preliminary validation of a team multifactor leadership questionnaire. In *The Sage Handbook of Leadership* (pp. 147-159). Sage Publications. <https://doi.org/10.4135/9781452229539.n7>
- Bal, J., & Teo, P. K. (2001). Implementing virtual teamworking: Part 2 – A literature review. *Logistics Information Management*, 14(3), 208-222. <https://doi.org/10.1108/09576050110390248>
- Barnett, R. C., & Weidenfeller, N. K. (2016). Shared leadership and team performance. *Advances in Developing Human Resources*, 18(3), 334–351. <https://doi.org/10.1177/1523422316645885>
- Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. (1998). Relating member ability and personality to work-team processes and team effectiveness. *The Journal of Applied Psychology*, 83(3), 377–391. <https://doi.org/10.1037/0021-9010.83.3.377>
- Bass, B. M. (1985). *Leadership and performance beyond expectations*. New York: Free Press.
- Beer, M., Walton, R. E., & Spector, B. A. (1985). *Managing human assets: The groundbreaking Harvard Business School program*. New York: Simon and Schuster Adult Publishing Group.
- Beal, D. J., Cohen, R. R., Burke, M. J., & McLendon, C. L. (2003). Cohesion and performance in groups: A meta-analytic clarification of construct relations. *The Journal of Applied Psychology*, 88(6), 989–1004. <https://doi.org/10.1037/0021-9010.88.6.989>
- Bell, B. S., & Kozlowski, S. W. J. (2002). A typology of virtual teams: Implications for effective leadership. *Group & Organization Management*, 27(1), 14-49. <https://doi.org/10.1177/1059601102027001003>
- Bennis, W. G., & Nanus, B. (1985). *Leaders: The strategies for taking charge*. New York: Harper & Row.
- Beranek, M., & Martz, B. (2005). Making virtual teams more effective: Improving relational links. *Team Performance Management*, 11(5/6), 200-213. <https://doi.org/10.1108/13527590510617774>

- Bergiel, B. J., Bergiel, E. B., & Balsmeier, P. W. (2008). Nature of virtual teams: A summary of their advantages and disadvantages. *Management Research News*, 31(2), 99-110. <https://doi.org/10.1108/01409170810846821>
- Bergman, J. Z., Rentsch, J. R., Small, E. E., & Bergman, S. M. (2012). The shared leadership process in decision-making teams. *The Journal of Social Psychology*, 152(1), 17-42. <https://doi.org/10.1080/00224545.2010.538763>
- Bhat, S. K., Pande, N., & Ahuja, V. (2017). Virtual team effectiveness: An empirical study using SEM. *Procedia Computer Science*, 122, 33-41. <https://doi.org/10.1016/j.procs.2017.11.338>
- Blake, R. R., & Mouton, J. S. (1964). *The managerial grid: The key to leadership excellence*. Houston: Gulf Publishing Company.
- Bligh, M. C., Pearce, C. L., & Kohles, J. C. (2006). The importance of self and shared leadership in team based knowledge work: A meso-level model of leadership dynamics. *Journal of Managerial Psychology*, 21(4), 296-318.
- Boh, W. F., Ren, Y., Kiesler, S., & Bussjaeger, R. (2007). Expertise and collaboration in the geographically dispersed organization. *Organization Science*, 18(4), 595-612. <https://doi.org/10.1287/orsc.1070.0263>
- Boies, K., Fiset, J., & Gill, H. (2015). Communication and trust are key: Unlocking the relationship between leadership and team performance and creativity in virtual teams. *The Leadership Quarterly*, 26(6), 1080-1092. <https://doi.org/10.1016/j.leaqua.2015.07.007>
- Bond-Barnard, T. J., Fletcher, L., & Steyn, H. (2018). Linking trust and collaboration in project teams to project management success. *International Journal of Managing Projects in Business*, 11(2), 432-457. <https://doi.org/10.1108/IJMPB-06-2017-0068>
- Breuer, C., Hüffmeier, J., & Hertel, G. (2016). Does trust matter more in virtual teams? A meta-analysis of trust and team effectiveness considering virtuality and documentation as moderators. *Journal of Applied Psychology*, 101(8), 1151-1177. <https://doi.org/10.1037/apl0000113>
- Burke, S., Stagl, K. C., Klein, C., Halpin, S. M., & Goodwin, G. F. (2006). What type of leader behaviors are functional in teams? A meta-analysis. *The Leadership Quarterly*, 17(3), 288-307. <https://doi.org/10.1016/j.leaqua.2006.02.007>
- Burns, J. M. (1978). *Leadership*. New York: Harper & Row.
- Carmel, E., & Agarwal, R. K. (2001). Tactical approaches for alleviating distance in global software development. *IEEE Software*, 18(2), 22-29. <https://doi.org/10.1109/52.914734>
- Carson, J. B., Tesluk, P. E., & Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal*, 50, 1217-1234. doi:10.2307/20159921
- Carte, T. A., Chidambaram, L., & Becker, A. (2006). Emergent leadership in self-managed virtual teams. *Group Decision and Negotiation*, 15(4), 323-343. <https://doi.org/10.1007/s10726-006-9045-7>
- Castellano, S., Chandavimol, K., Khelladi, I., & Orhan, M. A. (2021). Impact of self-leadership and shared leadership on the performance of virtual R&D teams. *Journal of Business Research*, 128, 578-586. <https://doi.org/10.1016/j.jbusres.2020.12.030>

- Chen W and Zhang J-H (2022) Does shared leadership always work? A state-of-the-art review and future prospects. *Journal of Work-Applied Management* 15(1): 51–66. <https://doi.org/10.1108/JWAM-09-2022-0063>
- Chen, W., Zhang, J.-H., & Zhang, Y.-L. (2022). How shared leadership affects team performance: Examining sequential mediation model using MASEM. *Journal of Managerial Psychology*, 37(2). <https://doi.org/10.1108/JMP-04-2021-0258>
- Chen, Z., Chen, Z., Yu, Y., & Huang, S. (2020). How shared leadership in entrepreneurial teams influences new venture performance: A moderated mediation model. *Journal of Leadership & Organizational Studies*, 27(4), 406–418. <https://doi.org/10.1177/1548051820950>
- Chidambaram, L. (1996). “Relational Development in Computer-Supported Groups,” *MIS Quarterly*, Vol.20, No.2, pp. 143-165. <https://doi.org/10.2307/249476>
- Cho, Y. J., & Poister, T. H. (2014). Managerial practices, trust in leadership, and performance: Case of the Georgia Department of Transportation. *Public Personnel Management*, 43(2), 179–196. <https://doi.org/10.1177/0091026014523136>
- Clemmensen, T., Khryashcheva, M., & Podshibikhina, O. (2008). Combining bases of trust development in virtual teams. *International Journal of Networking and Virtual Organisations*, 5(1), 17–34. <https://doi.org/10.1504/IJNVO.2008.015999>
- Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management*, 23(3), 239–290. <https://doi.org/10.1177/014920639702300303>
- Cohen, S. G., & Gibson, C. B. (2003). In the beginning: Introduction and framework. In C. B. Gibson, & S. G. Cohen (Eds.), *Virtual teams that work: Creating conditions for virtual team effectiveness* (pp. 1–13). San Francisco, CA: Jossey-Bass.
- Colquitt, J. A., Scott, B. A., & LePine, J. A. (2007). Trust, trustworthiness, and trust propensity: A meta-analytic test of their unique relationships with risk taking and job performance. *Journal of Applied Psychology*, 92(4), 909–927. <https://doi.org/10.1037/0021-9010.92.4.909>
- Conger, J. A., & Pearce, C. L. (2003). A landscape of opportunities: Future research on shared leadership. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp.285–304). Thousand Oaks, CA: Sage. doi:10.4135/9781452229539.n14
- Cox, J. F., Pearce, C. L., & Perry, M. L. (2003). Toward a model of shared leadership and distributed influence in the innovation process: How shared leadership can enhance new product development team dynamics and effectiveness. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 48-76). Sage Publications. <https://doi.org/10.4135/9781452229539.n3>
- Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science*, 12(3), 346-371. <https://doi.org/10.1287/orsc.12.3.346.10098>
- Crawford, E. R., & LePine, J. A. 2013. A configural theory of team processes: Accounting for the structure of task-work and teamwork. *Academy of Management Review*, 38: 32-48. <http://dx.doi.org/10.5465/amr.2011.0206>
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334. <https://doi.org/10.1007/BF02310555>

- Cruz, M. G., Henningsen, D. D., & Smith, B. A. (1999). The impact of directive leadership on group information sampling, decisions and perceptions of the leader. *Communication Research*, 26(3), 349–369. <https://doi.org/10.1177/009365099026003004>
- Costa, A. C., & Anderson, N. R. (2011). Measuring trust in teams: Development and validation of a multifaceted measure of formative and reflective indicators of team trust. *European Journal of Work and Organizational Psychology*, 20(1), 119–154. <https://doi.org/10.1080/13594320903272083>
- Cummings, L. L., & Bromiley, P. (1996). The Organizational Trust Inventory (OTI): Development and validation. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations: Frontiers of theory and research* (pp. 302–330). Sage Publications, Inc. <https://doi.org/10.4135/9781452243610.n15>
- Day, D. V., Gronn, P., & Salas, E. (2004). Leadership capacity in teams. *The Leadership Quarterly*, 15(6), 857–880. <https://doi.org/10.1016/j.leaqua.2004.09.001>
- De Jong, B. A., & Elfring, T. (2010). How does trust affect the performance of ongoing teams? The mediating role of reflexivity, monitoring, and effort. *Academy of Management Journal*, 53(3), 535–549. <https://doi.org/10.5465/amj.2010.51468649>
- Denison, D. R., Hooijberg, R., & Quinn, R. E. (1995). Paradox and performance: Toward a theory of behavioral complexity in managerial leadership. *Organization Science*, 6(5), 524–540. <https://doi.org/10.1287/orsc.6.5.524>
- DeOrtentiis, P. S., Summers, J. K., Ammeter, A. P., Douglas, C., & Ferris, G. R. (2013). Cohesion and satisfaction as mediators of the team trust—Team effectiveness relationship: An interdependence theory perspective. *The Career Development International*, 18(5), 521–543. <https://doi.org/10.1108/CDI-03-2013-0035>
- DeRue, D. S. (2011). Adaptive leadership theory: Leading and following as a complex adaptive process. *Research in Organizational Behavior*, 31, 125–150. <https://doi.org/10.1016/j.riob.2011.10.002>
- DeSanctis, G., & Monge, P. (1999). Introduction to the special issue: Communication processes for virtual organizations. *Organization Science*, 10(6), 693–703. <https://doi.org/10.1287/orsc.10.6.693>
- D'Innocenzo, L., Mathieu, J. E., & Kukenberger, M. R. (2016). A meta-analysis of different forms of shared leadership–team performance relations. *Journal of Management*, 42(7), 1964–1991. <https://doi.org/10.1177/0149206314525205>
- Dirks, K. T. (1999). The effects of interpersonal trust on work group performance. *Journal of applied psychology*, 84(3), 445–455. doi:10.1037/0021-9010.84.3.445
- Drescher, G., & Garbers, Y. (2016). Shared leadership and commonality: A policy-capturing study. *The Leadership Quarterly*, 27(2), 200–217. <https://doi.org/10.1016/j.leaqua.2016.02.002>
- Drescher, M. A., Korsgaard, M. A., Welpe, I. M., Picot, A., & Wigand, R. T. (2014). The dynamics of shared leadership: Building trust and enhancing performance. *Journal of Applied Psychology*, 99(5), 771–783. <https://doi.org/10.1037/a0036474>
- Drouin, N., Bourgault, M., & Gervais, C. (2010). Effects of organizational support on components of virtual project teams. *International Journal of Managing Projects in Business*, 3(4), 625–641. <https://doi.org/10.1108/17538371011076082>
- Duarte, D. L., & Snyder, N. T. (2001). *Mastering virtual teams*. San Francisco, CA: Jossey-Bass

- Ebrahim Ullah, U. S. M., & Park, D. S. (2013). Shared leadership and team effectiveness: Moderating effects of task interdependence. *African Journal of Business Management*, 7(40), 4206-4220. <https://doi.org/10.5897/AJBM2013.1636>
- Edelmann, C. M., Boen, F., Stouten, J., Vande Broek, G., & Franssen, K. (2023). The advantages and disadvantages of different implementations of shared leadership in organizations: A qualitative study. *Leadership*, 19(6), 467–507. <https://doi.org/10.1177/17427150231200033>
- Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, 21(10-11), 1105-1121. [https://doi.org/10.1002/1097-0266\(200010/11\)21:10/11](https://doi.org/10.1002/1097-0266(200010/11)21:10/11)
- Erkutlu, H. (2012). The impact of organizational culture on the relationship between shared leadership and team proactivity. *Team Performance Management*, 18(1/2), 102–119. <https://doi.org/10.1108/13527591211207734>
- Eseryel, U. Y., Crowston, K., & Heckman, R. (2021). Functional and visionary leadership in self-managing virtual teams. *Group & Organization Management*, 46(2), 424-460. <https://doi.org/10.1177/1059601120955034>
- Evans, C. R., & Dion, K. L. (1991). Group cohesion and performance: A meta-analysis. *Small Group Research*, 22(2), 175-186. <https://doi.org/10.1177/1046496491222002>
- Fausang, M. S., Jeppesen, H. J., Jønsson, T. S., & Bligh, M. C. (2013). Moderators of shared leadership: Work function and team autonomy. *Team Performance Management*, 19(5/6). <https://doi.org/10.1108/TPM-11-2012-0038>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50. <https://doi.org/10.1177/002224378101800104>
- Friedrich, T. L., Vessey, W. B., Schuelke, M. J., Ruark, G. A., & Mumford, M. D. (2009). A framework for understanding collective leadership: The selective utilization of leader and team expertise within networks. *The Leadership Quarterly*, 20(6), 933–958. <https://doi.org/10.1016/j.leaqua.2009.09.008>
- Fulmer, C. A., & Dirks, K. T. (2018). Multilevel trust: A theoretical and practical imperative. *Journal of Trust Research*, 8(2), 137–141. <https://doi.org/10.1080/21515581.2018.1531657>
- Furst, S. A., Reeves, M., Rosen, B., & Blackburn, R. S. (2004). Managing the life cycle of virtual teams. *Academy of Management Perspectives*, 18(2), 6–20. <https://doi.org/10.5465/ame.2004.13837468>
- Gaude, A., Hamilton-Bogart, B., Marsh, S., & Robinson, H. (2007). A framework for constructing effective virtual teams. *The Journal of E-working*, 1, 83-97.
- Gassmann, O., & von Zedtwitz, M. (2003). Trends and determinants of managing virtual R&D teams. *R&D Management*, 33(3), 243-262. <https://doi.org/10.1111/1467-9310.00296>
- Gibson, C. B., & Cohen, S. G. (2003). Virtual teams that work: Creating conditions for virtual team effectiveness. New York, NY: John Wiley and Sons.
- Gilson, L. L., Maynard, M. T., Young, N. C. J., Vartiainen, M., & Hakonen, M. (2015). Virtual teams research: 10 years, 10 themes, and 10 opportunities. *Journal of Management*, 41(5), 1313–1337. <https://doi.org/10.1177/0149206314559946>

- Gillespie, N. A., & Mann, L. (2004). Transformational leadership and shared values: The building blocks of trust. *Journal of Managerial Psychology*, 19(6), 588–607. <https://doi.org/10.1108/02683940410551507>
- Gilson, L. L., Costa, P., O'Neill, T. A., & Maynard, M. T. (2021). Putting the “TEAM” back into virtual teams. *Organizational Dynamics*, 50(1), 100847. <https://doi.org/10.1016/j.orgdyn.2021.100847>
- Graen, G. B., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of leader-member exchange (LMX) theory of leadership over 25 years: Applying a multi-level multidomain perspective. *The Leadership Quarterly*, 6(2), 219-247. [https://doi.org/10.1016/1048-9843\(95\)90036-5](https://doi.org/10.1016/1048-9843(95)90036-5)
- Griffith, T. L., Sawyer, J. E., & Neale, M. A. (2003). Virtualness and knowledge in teams: Managing the love triangle of organizations, individuals, and information technology. *MIS Quarterly*, 27(2), 265-287. <https://doi.org/10.2307/30036531>
- Hackman, M. Z., & Johnson, C. E. (2013). *Leadership: A communication perspective* (6th ed.). Long Grove, IL: Waveland Press.
- Hadi, N. U., & Chaudhary, A. (2021). Impact of shared leadership on team performance through team reflexivity: Examining the moderating role of task complexity. *Team Performance Management: An International Journal*, 27(5/6), 391-405. <https://doi.org/10.1108/tpm-10-2020-0085>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate Data Analysis* (8th ed.). Cengage Learning.
- Handke, L., Costa, P., & O'Neill, T. A. (2024). Virtual teams: Taking stock and moving forward. *Small Group Research*, 1-9. <https://doi.org/10.1177/10464964241274129>
- Handke, L., Costa, P., & Feitosa, J. (2024). *How virtual are we? Introducing the team perceived virtuality scale*. *Journal of Business and Psychology*. <https://doi.org/10.1007/s10869-024-09966-3>
- Han, J., Yoon, J., Choi, W., & Hong, G. (2021). The effects of shared leadership on team performance. *Leadership & Organization Development Journal*. Advance online publication. <https://doi.org/10.1108/LODJ-01-2021-0001>
- Hambley, L. A., O'Neill, T. A., & Kline, T. J. B. (2007). Virtual team leadership: The effects of leadership style and communication medium on team interaction styles and outcomes. *Organizational Behavior and Human Decision Processes*, 103(1), 1-20. <https://doi.org/10.1016/j.obhdp.2006.09.004>
- Han, S. J., & Hazard, N. (2022). Shared leadership in virtual teams at work: Practical strategies and research suggestions for human resource development. *Human Resource Development Review*, 21(3), 300-323. <https://doi.org/10.1177/15344843221093376>
- Hardin, A. M., Fuller, M. A., & Davison, R. M. (2007). I Know I Can, But Can We?: Culture and Efficacy Beliefs in Global Virtual Teams. *Small Group Research*, 38(1), 130–155. <https://doi.org/10.1177/1046496406297041>
- Harman, H. H. (1976). *Modern Factor Analysis* (3rd ed.). University of Chicago Press.
- Henningsen, D. D., Henningsen, M. L. M., Jakobsen, L., & Borton, I. (2004). It's good to be leader: The influence of randomly and systematically selected leaders on decision-making groups. *Group Dynamics: Theory, Research, and Practice*, 8(1), 62–76. <https://doi.org/10.1037/1089-2699.8.1.62>

- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.
- Hersey, P., & Blanchard, K. H. (1969). Management of organizational behavior: Utilizing human resources. *Englewood Cliffs, NJ: Prentice-Hall*.
- Hertel, G., Geister, S., & Konradt, U. (2005). Managing virtual teams: A review of current empirical research. *Human Resource Management Review*, 15(1), 69-95. <https://doi.org/10.1016/j.hrmr.2005.01.002>
- Hiller, N. J. (2002). Understanding and measuring shared leadership in work teams. The Pennsylvania State University. <https://doi.org/10.1037/e518712013-413>
- Hill, N. S. (2015). Leading together, working together: The role of team shared leadership in building collaborative capital in virtual teams. In *Collaborative Capital: Creating Intangible Value* (pp. 183-209). [http://dx.doi.org/10.1016/S1572-0977\(05\)11007-3](http://dx.doi.org/10.1016/S1572-0977(05)11007-3)
- Hinds, P. J., & Mortensen, M. (2005). Understanding conflict in geographically distributed teams: The moderating effects of shared identity, shared context, and spontaneous communication. *Organization Science*, 16(3), 290–307. <https://doi.org/10.1287/orsc.1050.0122>
- Hoch, J. E., & Dulebohn, J. H. (2013). Shared leadership in enterprise resource planning and human resource management system implementation. *Human Resource Management Review*, 23, 114 –125. doi:10.1016/j.hrmr.2012.06.007
- Hoch, J. E., Pearce, C. L., & Welzel, L. (2010). Is the most effective team leadership shared? The impact of shared leadership, age diversity, and coordination on team performance. *Journal of Personnel Psychology*, 9(3), 105–116. <https://doi.org/10.1027/1866-5888/a000020>
- Hoch, J. E. (2014). Shared leadership, diversity, and information sharing in teams. *Journal of Managerial Psychology*, 29(5), 541-564. <https://doi.org/10.1108/JMP-02-2012-0053>
- Hoch, J. E. (2013). Shared leadership and innovation: The role of vertical leadership and employee integrity. *Journal of Business and Psychology*, 28, 159–174. <http://doi.org/bfsd>
- Hoch, J. E., & Kozlowski, S. W. J. (2014). Leading virtual teams: Hierarchical leadership, structural supports, and shared team leadership. *Journal of Applied Psychology*, 99(3), 390–403. <https://doi.org/10.1037/a0030264>
- Hollingshead, A. B. (1993). *Group task performance and communication technology: A longitudinal study of computer-mediated versus face-to-face work groups*. *Small Group Research*, 24(3), 307–333. <https://doi.org/10.1177/1046496493243003>
- Holton, J. (2001). Building trust and collaboration in a virtual team. *Team Performance Management*, 7(3/4), 36–47. <https://doi.org/10.1108/13527590110395621>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55. <https://doi.org/10.1080/10705519909540118>
- Imam, H., & Zaheer, M. K. (2021). Shared leadership and project success: The roles of knowledge sharing, cohesion and trust in the team. *International Journal of Project Management*, 39(5), 463-473. <https://doi.org/10.1016/j.ijproman.2021.02.006>
- Ipe, M. (2003). Knowledge sharing in organizations: A conceptual framework. *Human Resource Development Review*, 2(4), 337-359. <https://doi.org/10.1177/1534484303257985>

- Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. (1998). Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems*, 14(4), 29–64. <https://doi.org/10.1080/07421222.1998.11518185>
- Jarvenpaa, S. L., & Leidner, D. E. (1999). Communication and trust in global virtual teams. *Organization Science*, 10(6), 791–815. <https://doi.org/10.1287/orsc.10.6.791>
- Jeoung, S., Han, C., Lee, Y., Beyerlein, M., & Kolb, J. A. (2017). Shared leadership in teams: The role of coordination, goal commitment, and knowledge sharing on perceived team performance. *Team Performance Management*, 24(3), 401–412. <https://doi.org/10.1108/TPM-11-2016-0050>
- Ji, H. (2018), “Uncovering the dark side of shared leadership: a perspective of hierarchical functionalism”, Doctoral dissertation, Zhejiang University, Hangzhou
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31–36. <https://doi.org/10.1007/BF02291575>
- Kanawattanachai, P., & Yoo, Y. (2007). The impact of knowledge coordination on virtual team performance over time. *MIS Quarterly*, 31(4), 783–808. <https://doi.org/10.2307/25148820>
- Karau, S. J., & Hart, J. W. (1998). Group cohesiveness and social loafing: Effects of a social interaction manipulation on individual motivation within groups. *Group Dynamics*, 2(3), 185–191. <https://doi.org/10.1037/1089-2699.2.3.185>
- Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations*. Wiley.
- Kirkman, B. L., Rosen, B., Tesluk, P. E., & Gibson, C. B. (2004). The impact of team empowerment on virtual team performance: The moderating role of face-to-face interaction. *Academy of Management Journal*, 47(2), 175–192. <https://doi.org/10.2307/20159573>
- Kirkman, B. L., & Mathieu, J. E. (2005). The dimensions and antecedents of team virtuality. *Journal of Management*, 31(5), 1–27. <https://doi.org/10.1177/0149206305279113>
- Klein, K. J., Ziegert, J. C., Knight, A. P., & Xiao, Y. (2006). Dynamic delegation: Shared, hierarchical, and deindividualized leadership in extreme action teams. *Administrative Science Quarterly*, 51(4), 590–621. <https://doi.org/10.2189/asqu.51.4.590>
- Langfred, C. W. (2004). Too Much of a Good Thing? Negative Effects of High Trust and Individual Autonomy in Self-Managing Teams. *Academy of Management Journal*, 47(3), 385–399. <https://doi.org/10.2307/20159588>
- Leenders, R. T. A. J., van Engelen, J. M. L., & Kratzer, J. (2003). Virtuality, communication, and new product team creativity: A social network perspective. *Journal of Engineering and Technology Management*, 20(1), 69–92. [https://doi.org/10.1016/S0923-4748\(03\)00005-5](https://doi.org/10.1016/S0923-4748(03)00005-5)
- Levin, D. Z., Cross, R., Abrams, L. C., & Lesser, E. (2004). Trust and knowledge sharing: A critical combination. In M. Ackerman, V. Pipek, & V. Wulf (Eds.), *Sharing expertise: Beyond knowledge management* (pp. 36–41). MIT Press. <https://doi.org/10.1093/0195165128.003.0003>
- Liao, C. (2017). Leadership in virtual teams: A multilevel perspective. *Human Resource Management Review*, 27(4), 1–14. <https://doi.org/10.1016/j.hrmr.2016.12.010>
- Lin, C., Standing, C., & Liu, Y.-C. (2008). A model to develop effective virtual teams. *Decision Support Systems*, 45(4), 1031–1045. <https://doi.org/10.1016/j.dss.2008.04.002>
- Lin, T.-C., & Huang, C.-C. (2010). Withholding effort in knowledge contribution: The role of social exchange and social cognitive on project teams. *Information & Management*, 47(3), 188–196. <https://doi.org/10.1016/j.im.2010.02.001>

- Lipnack, J., & Stamps, J. (1997). *Virtual teams: Reaching across space, time, and organizations with technology*. John Wiley & Sons, Inc.
- Liu, S., Hu, J., Li, Y., Wang, Z., & Lin, X. (2014). Examining the cross-level relationship between shared leadership and learning in teams: Evidence from China. *The Leadership Quarterly*, 25(2), 282–295. <https://doi.org/10.1016/j.leaqua.2013.08.006>
- Lu, L. (2015). Building trust and cohesion in virtual teams: The developmental approach. *Journal of Organizational Effectiveness: People and Performance*, 2(1), 55–72. <https://doi.org/10.1108/JOEPP-11-2014-0068>
- Lurey, J. S., & Raisingshani, M. S. (2001). An empirical study of best practices in virtual teams. *Information & Management*, 38(8), 523–544. [https://doi.org/10.1016/S0378-7206\(01\)00074-X](https://doi.org/10.1016/S0378-7206(01)00074-X)
- Mach, M., & Baruch, Y. (2015). Team performance in cross cultural project teams: The moderated mediation role of consensus, heterogeneity, faultlines and trust. *Cross Cultural Management*, 22(3), 464–486. <https://doi.org/10.1108/CCM-10-2014-0114>
- MacNeil, C. M. (2003). Line managers: Facilitators of knowledge sharing in teams. *Employee Relations*, 25(3), [page numbers if available]. <https://doi.org/10.1108/01425450310475874>
- Malhotra, A., Majchrzak, A., & Rosen, B. (2007). Leading virtual teams. *Academy of Management Perspectives*, 21(1), 60–70. <https://doi.org/10.5465/AMP.2007.24286164>
- Maruping, L. M., & Agarwal, R. (2004). Managing team interpersonal processes through technology: A task-technology fit perspective. *Journal of Applied Psychology*, 89(6), 975–990. <https://doi.org/10.1037/0021-9010.89.6.975>
- Mathieu, J. E., Kukenberger, M. R., D’Innocenzo, L., & Reilly, G. (2015). Modeling reciprocal team cohesion-performance relationships, as impacted by shared leadership and members' competence. *Journal of Applied Psychology*, 100(3), 713–734. <https://doi.org/10.1037/a0038898>
- Mathieu, J., Maynard, M. T., Rapp, T., & Gilson, L. 2008. Team effectiveness 1997–2007: A review of recent advancements and a glimpse into the future. *Journal of Management*, 34: 410–476. <https://doi.org/10.1177/01492063083160>
- Martins, L. L., Gilson, L. L., & Maynard, M. T. (2004). Virtual teams: What do we know and where do we go from here? *Journal of Management*, 30(6), 805–835. <https://doi.org/10.1016/j.jm.2004.05.002>
- Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *The Academy of Management Review*, 20(3), 709–734. <https://doi.org/10.2307/258792>
- Maznevski, M.L. and Chudoba, K.M. (2000) Bridging Space over Time: Global Virtual Team Dynamics and Effectiveness. *Organization Science*, 11, 473–492. <https://doi.org/10.1287/orsc.11.5.473.15200>
- McAllister, D. J. (1995). Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal*, 38(1), 24–59. <https://doi.org/10.2307/256727>
- McEvily, B., Perrone, V., & Zaheer, A. (2003). Trust as an organizing principle. *Organization Science*, 14(1), 91–103. <https://doi.org/10.1287/orsc.14.1.91.12814>

- Mehra, A., Smith, B. R., Dixon, A. L., & Robertson, B. (2006). Distributed leadership in teams: The network of leadership perceptions and team effectiveness. *The Leadership Quarterly*, 17(3), 232–245. <https://doi.org/10.1016/j.leaqua.2006.02.001>
- Mehta, S., & Sharma, S. (2019). Shared leadership in teams and its impact on team effectiveness: Moderating effects of variables. *IPE International*, 9(1), 68-84.
- Mesmer-Magnus, J. R., & Dechurch, L. A. (2009). Information sharing and team performance: A meta-analysis. *Journal of Applied Psychology*, 94, 535–546. <http://dx.doi.org/10.1037/a0013773>
- Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2010). Leadership in teams: A functional approach to understanding leadership structures and processes. *The Journal of Social Psychology*, 150(4), 432-445. <https://doi.org/10.1080/00224540903365339>
- Morgan, L., Paucar-Caceres, A., & Wright, G. (2014). Leading effective global virtual teams: The consequences of methods of communication. *Systems Practice and Action Research*, 27(6), 607–624. <https://doi.org/10.1007/s11213-014-9315-2>
- Morrison-Smith, S., & Ruiz, J. (2020). Challenges and barriers in virtual teams: A literature review. *SN Applied Sciences*, 2, 1096. <https://doi.org/10.1007/s42452-020-2801-5>
- Mortensen, M., & Hinds, P. J. (2001). Conflict and shared identity in geographically distributed teams. *International Journal of Conflict Management*, 12(3), 212-238. <https://doi.org/10.1108/eb022856>
- Muethel, M., Gehrlein, S., & Hoegl, M. (2012). Socio-demographic factors and shared leadership behaviors in dispersed teams: Implications for human resource management. *Human Resource Management*, 51(4), 525–548. <https://doi.org/10.1002/hrm.21488>
- Müller, E., Pintor, S., & Wegge, J. (2018). Shared leadership effectiveness: Perceived task complexity as moderator. *Team Performance Management: An International Journal*. <https://doi.org/10.1108/TPM-09-2017-0048>
- Munkvold, B. E., & Zigurs, I. (2007). Process and technology challenges in swift-starting virtual teams. *Information & Management*, 44(3), 287-299. <https://doi.org/10.1016/j.im.2007.01.002>
- Mysirlaki, S., & Paraskeva, F. (2019). Virtual team effectiveness: Insights from the virtual world teams of massively multiplayer online games. *Journal of Leadership Studies*, 13(1), 36–55. <https://doi.org/10.1002/jls.21608>
- Nicolaides, V. C., LaPort, K. A., Chen, T. R., Tomassetti, A. J., Weis, E. J., Zaccaro, S. J., & Cortina, J. M. (2014). The shared leadership of teams: A meta-analysis of proximal, distal, and moderating relationships. *Leadership Quarterly*, 25(5), 923-942. <https://doi.org/10.1016/j.leaqua.2014.06.006>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.
- Ortiz de Guinea, A., Webster, J., & Staples, D. S. (2012). A meta-analysis of the consequences of virtualness on team functioning. *Information & Management*, 49(6), 301–308. <https://doi.org/10.1016/j.im.2012.08.003>
- Pace, R. C. (1990). Personalized and depersonalized conflict in small group discussions: An examination of differentiation. *Small Group Research*, 21(1), 79–96. <https://doi.org/10.1177/1046496490211006>

- Pangil, F., & Chan, J. M. (2014). The mediating effect of knowledge sharing on the relationship between trust and virtual team effectiveness. *Journal of Knowledge Management*, 18(1), 92-106. <https://doi.org/10.1108/JKM-09-2013-0341>
- Pastor, J. C., & Mayo, M. (2002). Shared leadership in work teams: A social network approach. In *The Sage Handbook of Leadership* (pp. 161-174). Sage Publications. <https://doi.org/10.4135/9781452229539.n9>
- Paul, R., Drake, J. R., & Liang, H. (2016). Global virtual team performance: The effect of coordination effectiveness, trust, and team cohesion. *IEEE Transactions on Professional Communication*, 59(3), 186–202. <https://doi.org/10.1109/TPC.2016.2583319>
- Paul, S., Seetharaman, P., Samarah, I., & Mykytyn, P. P. (2004). Impact of heterogeneity and collaborative conflict management style on the performance of synchronous global virtual teams. *Information & Management*, 41(3), 303-321. [https://doi.org/10.1016/S0378-7206\(03\)00076-4](https://doi.org/10.1016/S0378-7206(03)00076-4)
- Pazos, P., & Beruvides, M. G. (2011). Performance patterns in face-to-face and computer-supported teams. *Team Performance Management: An International Journal*, 17(1/2), 83-101. <https://doi.org/10.1108/13527591111114729>
- Pearce, C. L., & Conger, J. A. (2003b). All those years ago: The historical underpinnings of shared leadership. In C. L. Pearce, & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 1–18). Thousand Oaks, CA: Sage. <https://doi.org/10.4135/9781452229539.n1>
- Pearce, C., & Conger, J. A. (Eds.). (2003). *Shared leadership: Reframing the hows and whys of leadership*. Sage Publications. <https://doi.org/10.4135/9781452229539>
- Pearce, C. L. (2004). The future of leadership: Combining vertical and shared leadership to transform knowledge work. *Academy of Management Perspectives*, 18 (1), 47–57. <https://doi.org/10.5465/AME.2004.12690298>
- Pearce, C. L., & Ensley, M. D. (2004). A reciprocal and longitudinal investigation of the innovation process: The central role of shared vision in product and process innovation teams. *Journal of Organizational Behavior*, 25, 259–278. <https://doi.org/10.1002/job.235>
- Pearce, C. L., & Sims, H. P. Jr. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group Dynamics: Theory, Research, and Practice*, 6(2), 172–197. <https://doi.org/10.1037/1089-2699.6.2.172>
- Pearce, C., & Sims, H. P. (2001). Shared leadership: Toward a multi-level theory of leadership. *Advances in Interdisciplinary Studies of Work Teams*, 7, 115-139. [https://doi.org/10.1016/S1572-0977\(00\)07008-4](https://doi.org/10.1016/S1572-0977(00)07008-4)
- Pearce, C. L., Yoo, Y., & Alavi, M. (2004). Leadership, social work, and virtual teams: The relative influence of vertical versus shared leadership in the nonprofit sector. In R. E. Riggio & S. S. Orr (Eds.), *Improving leadership in nonprofit organizations* (pp. 180–203). Jossey-Bass.
- Pearson, K. (1895). *Note on regression and inheritance in the case of two parents*. Proceedings of the Royal Society of London, 58, 240–242.
- Perry, M. L., Pearce, C. L., & Sims, H. P. (1999). Empowered Selling Teams: How Shared Leadership Can Contribute to Selling Team Outcomes. *Journal of Personal Selling & Sales Management*, 19(3), 35–51. <https://doi.org/10.1080/08853134.1999.10754180>

- Peters, L. M., & Manz, C. C. (2007). Identifying antecedents of virtual team collaboration. *Team Performance Management*, 13(3-4), 117–129. <https://doi.org/10.1108/13527590710759865>
- Pinjani, P., & Palvia, P. (2013). Trust and knowledge sharing in diverse global virtual teams. *Information & Management*, 50(4), 144–153. <https://doi.org/10.1016/j.im.2012.10.002>
- Powell, A., Piccoli, G., & Ives, B. (2004). Virtual teams: A review of current literature and directions for future research. *DATA BASE for Advances in Information Systems*, 35(1), 6–36. <https://doi.org/10.1145/968464.968465>
- Ren, Y. (2018). Learning in virtual teams. In L. Argote & J. M. Levine (Eds.), *The Oxford handbook of group and organizational learning*. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780190263362.013.36>
- Robert, L., Jr., Dennis, A. R., & Hung, Y.-T. C. (2009). Individual swift trust and knowledge-based trust in face-to-face and virtual team members. *Journal of Management Information Systems*, 26(2) <https://doi.org/10.2753/MIS0742-1222260210>
- Robert, L. P. (2013). A multi-level analysis of the impact of shared leadership in diverse virtual teams. In Proceedings of the 2013 conference on Computer supported cooperative work (pp. 363–374). Association for Computing Machinery. <https://doi.org/10.1145/2441776.2441818>
- Robert, L. P., & You, S. (2018). Are you satisfied yet? Shared leadership, individual trust, autonomy, and satisfaction in virtual teams. *Journal of the Association for Information Science and Technology*, 69(4), 503–513. <https://doi.org/10.1002/asi.23983>
- Roberson, Q. M., & Colquitt, J. A. (2005). Shared and configural justice: A social network model of justice in teams. *Academy of Management Review*, 30(3), 595–607. <https://doi.org/10.5465/amr.2005.17293715>
- Rutten, W., Blaas-Franken, J., & Martin, H. (2016). The impact of (low) trust on knowledge sharing. *Journal of Knowledge Management*, 20(2), 199–214. <https://doi.org/10.1108/JKM-10-2015-0391>
- Sarker, S., & Sahay, S. (2002). Information systems development by US-Norwegian virtual teams: Implications of time and space. In *Proceedings of the 35th Annual Hawaii International Conference on System Sciences* (pp. 1–10). IEEE. <https://doi.org/10.1109/HICSS.2002.993875>
- Schober, P., Boer, C., & Schwarte, L. A. (2018). *Correlation coefficients: Appropriate use and interpretation*. *Anesthesia & Analgesia*, 126(5), 1763–1768. <https://doi.org/10.1213/ANE.0000000000002864>
- Sproull, L., & Kiesler, S. (1986). Reducing social context cues: Electronic mail in organizational communication. *Management Science*, 32(11), 1492–1512. <https://doi.org/10.1287/mnsc.32.11.1492>
- Sun, M., He, K., & Wen, T. (2023). The impact of shared leadership on team creativity in innovation teams—A chain mediating effect model. *Sustainability*, 15(2), 1212. <https://doi.org/10.3390/su15021212>
- Tan, C. K., Ramayah, T., Teoh, A. P., & Cheah, J.-H. (2019). Factors influencing virtual team performance in Malaysia. *Kybernetes*, 48(5), 1–24. <https://doi.org/10.1108/K-01-2018-0031>

- Teece, D. J. (2007). Explicating dynamic capabilities: The nature and micro foundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319-1350. <https://doi.org/10.1002/smj.640>
- Tekleab, A. G., Quigley, N. R., & Tesluk, P. E. (2009). A longitudinal study of team conflict, conflict management, cohesion, and team effectiveness. *Group & Organization Management*, 34(2), 170–205. <https://doi.org/10.1177/1059601108331218>
- Townsend, A. M., DeMarie, S. M., & Hendrickson, A. R. (1998). Virtual teams: Technology and the workplace of the future. *Academy of Management Perspectives*, 12(3), 17-29. <https://doi.org/10.5465/ame.1998.1109047>
- Tran, T. B. H., & Vu, A. D. (2021). Transformational leadership versus shared leadership for team effectiveness. *Asian Academy of Management Journal*, 26(2), 143–171. <https://doi.org/10.21315/aamj2021.26.2.7>
- Salas, E., Vessey, W. B., & Estrada, A. X. (Eds.). (2015). *Team cohesion: Advances in psychological theory, methods and practice* (Vol. 17). Emerald Group Publishing Limited. <https://doi.org/10.1108/S1534-0856201517>
- Schaubroeck, J. M., & Yu, A. (2017). When does virtuality help or hinder teams? Core team characteristics as contingency factors. *Human Resource Management Review*, 27(4), 635–647. <https://doi.org/10.1016/j.hrmr.2016.12.009>
- Srivastava, A., Bartol, K. M., & Locke, E. A. (2006). Empowering leadership in management teams: Effects on knowledge sharing, efficacy, and performance. *Academy of Management Journal*, 49(6), 1239–1251. <https://doi.org/10.5465/AMJ.2006.23478718>
- Staples, D. S., & Zhao, L. (2006). The Effects of Cultural Diversity in Virtual Teams Versus Face-to-Face Teams. *Group Decision and Negotiation*, 15(4), 389–406. <https://doi.org/10.1007/s10726-006-9042-x>
- Stogdill, R. M. (1948). Personal factors associated with leadership: A survey of the literature. *Journal of Psychology*, 25(1), 35-71. <https://doi.org/10.1080/00223980.1948.9917362>
- Ul Hadi, N., & Chaudhary, A. (2021). Impact of shared leadership on team performance through team reflexivity: Examining the moderating role of task complexity. *Team Performance Management, ahead-of-print*. <https://doi.org/10.1108/TPM-10-2020-0085>
- Ullah, S. M. E., & Park, D. S. (2013). Shared leadership and team effectiveness: Moderating effects of task interdependence. *African Journal of Business Management*, 7(40), 4206-4220. <https://doi.org/10.5897/AJBM2013.1636>
- Wageman, R. (1995). Interdependence and group effectiveness. *Administrative Science Quarterly*, 40, 145–180. <https://doi.org/10.2307/2393703>
- Wang, H., & Peng, Q. (2022). Is shared leadership really as perfect as we thought? Positive and negative outcomes of shared leadership on employee creativity. *The Journal of Creative Behavior*. Advance online publication. <https://doi.org/10.1002/jocb.532>
- Wang, D., Waldman, D. A., & Zhang, Z. (2014). A meta-analysis of shared leadership and team effectiveness. *Journal of Applied Psychology*, 99, 181–198. <http://doi.org/bfsg>
- Wiewiora, A., Murphy, G. D., Trigunarsyah, B., & Brown, K. A. (2014). Interactions between organizational culture, trustworthiness, and mechanisms for inter-project knowledge sharing. *Project Management Journal*, 45(2). <https://doi.org/10.1002/pmj.21407>
- Wood, M. (2005). Determinants of shared leadership in management teams. *International Journal of Leadership Studies*, 1(1), 64-85.

- Wood, M. S., & Fields, D. (2007). Exploring the impact of shared leadership on management team member job outcomes. *Baltic Journal of Management*, 2(3), 251–272.
- Xiao, Y., & Jin, Y. (2010). The hierarchical linear modeling of shared mental model on virtual team effectiveness. *Kybernetes*, 39(8), 1322-1329. <https://doi.org/10.1108/03684921011063619>
- Yoo, Y., & Alavi, M. (2001). Media and group cohesion: Relative influences on social presence, task participation, and group consensus. *Management Information Systems Quarterly*, 25(3), 371–390. <https://doi.org/10.2307/3250922>
- Yu, C., Tsai, Y.-F., & Chin, Y.-C. (2013). Knowledge sharing, organizational climate, and innovative behavior: A cross-level analysis of effects. *Social Behavior and Personality: An International Journal*, 41(1), 143-156. <https://doi.org/10.2224/sbp.2013.41.1.143>
- Yukl, G. (1994). Leadership in organizations (3rd ed.). Prentice Hall.
- Yukl, G. A. (2005). Leadership in organizations (6th ed.). Prentice Hall.
- Yukl, G. (2008). How leaders influence organizational effectiveness. *The Leadership Quarterly*, 19(6), 708–722. <https://doi.org/10.1016/j.leaqua.2008.09.008>
- Zaccaro, S. J., Rittman, A. L., & Marks, M. A. (2001). Team leadership. *The Leadership Quarterly*, 12(4), 451–483. [https://doi.org/10.1016/S1048-9843\(01\)00093-5](https://doi.org/10.1016/S1048-9843(01)00093-5)
- Zhu, J., Liao, Z., Yam, K. C., & Johnson, R. E. (2018). Shared leadership: A state-of-the-art review and future research agenda. *Journal of Organizational Behavior*, 39(7), 834–852. <https://doi.org/10.1002/job.2296>
- Zhao, T. (2013), “A study on the influence of shared leadership on knowledge hiding”, Doctoral dissertation, Jinan university, Guangzhou.
- Zhu, X., & Lee, K. S. (2017). Global virtual team performance, shared leadership, and trust: Proposing a conceptual framework. *The Business and Management Review*, 8(4), 31.

Appendix 1: Virtual Team Shared Leadership Effectiveness Survey

Virtual Team Shared Leadership Effectiveness Survey

Dear Sir/Madam,

We greatly appreciate your cooperation in taking the time to assist us with this scientific research. This questionnaire is designed to investigate the effectiveness of shared leadership in virtual teams. The survey is anonymous, and the responses will be kept entirely confidential, used solely for academic research purposes. Your invaluable insights will significantly contribute to the accuracy and completeness of our research data. Please respond based on your actual experiences. Thank you for your collaboration!

Contact Information

If you have any questions or doubts regarding this survey, please contact me through wzona@iscite-iul.pt for follow-up:

Virtual Team: A team whose members are geographically, temporally, or organizationally dispersed and that relies heavily on electronic communication technologies to collaborate and achieve common goals.

Shared Leadership: An emerging phenomenon within teams that based on the team's tasks and the team members' individual knowledge, skills, and abilities, the members of the team alternate leadership roles through social interaction process to achieve collective goals.

Instructions: Based on your experiences within your team, please select the option that best reflects your view on each statement.

Participation Agreement

1. Do you agree to participate in this survey?
A. Yes B. No
2. What's the percentage of your work time spend collaborating virtually with your team?

Consider your perceptions of your team's behaviors and impacts

3. My team colleagues provide a clear vision of whom and what our team is.
A. Strongly Disagree
B. Disagree
C. Neutral

- D. Agree
 - E. Strongly Agree
4. My team colleagues are driven by higher purposes or ideals.
- A. Strongly Disagree
 - B. Disagree
 - C. Neutral
 - D. Agree
 - E. Strongly Agree
5. My team colleagues show enthusiasm for my efforts.
- A. Strongly Disagree
 - B. Disagree
 - C. Neutral
 - D. Agree
 - E. Strongly Agree
6. My team colleagues encourage me to rethink ideas which had never been questioned before.
- A. Strongly Disagree
 - B. Disagree
 - C. Neutral
 - D. Agree
 - E. Strongly Agree
7. My team colleagues seek a broad range of perspectives when solving problems.
- A. Strongly Disagree
 - B. Disagree
 - C. Neutral
 - D. Agree
 - E. Strongly Agree
8. My team colleagues encourage me to perform beyond what is normally expected (e.g., extra effort)
- A. Strongly Disagree
 - B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

9. My team colleagues and I have clear agreements and stick to those when we work together.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

10. If I perform well, my team colleagues will recommend more compensation.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

11. My team colleagues give me positive feedback when I perform well.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

12. My team colleagues give me special recognition when my work performance is especially good.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

13. My team colleagues decide on my performance goals together with me.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

14. My team colleagues and I work together to decide what my performance goals should be.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

15. My team colleagues and I sit down together and reach agreement on my performance goals.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

16. My team colleagues work with me to develop my performance goals.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

17. My team colleagues encourage me to search for solutions to my problems without supervision.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

18. My team colleagues urge me to assume responsibilities on my own.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

19. My team colleagues encourage me to learn new things.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

20. My team colleagues encourage me to give myself a pat on the back when I meet a new challenge.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

21. My team colleagues encourage me to work together with other individuals who are part of the team.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

22. My team colleagues advise me to coordinate my efforts with other individuals who are part of the team.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

23. My team colleagues urge me to work as a team with other individuals who are part of the team.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

24. My team colleagues try to influence me through threat and intimidation. (R)

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

25. My team colleagues can be quite intimidating.(R)

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

26. When my work is not up to par, my team colleagues point it out to me. (R)

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

Consider how each statement below resonates with your experiences within your team

27. In my team, we feel detached from each other.

A. Strongly Disagree

- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

28. In my team, we feel that our relationship is cold.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

29. In my team, we feel like we are far away from each other.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

30. In my team, we feel estranged from each other.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

31. In my team, we feel like we cannot get through to each other.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

Consider when information exchange in your team ...

32. ...the ways in which we can express ourselves are limited.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

33. ...it's hard to convey the actual meaning of what we are saying.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

34. ...it's difficult to understand if we are on the same page or not.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral

E. Slightly Agree

F. Agree

G. Strongly Agree

35. ...we are unable to convey the necessary information in its entirety.

A. Strongly Disagree

B. Disagree

C. Slightly Disagree

D. Neutral

E. Slightly Agree

F. Agree

G. Strongly Agree

36. ...we don't know whether everyone has had access to the same information.

A. Strongly Disagree

B. Disagree

C. Slightly Disagree

D. Neutral

E. Slightly Agree

F. Agree

G. Strongly Agree

Consider how well your team worked together and supported each other throughout the project

37. My group was a very cohesive unit.

A. Strongly Disagree

B. Disagree

C. Slightly Disagree

D. Neutral

E. Slightly Agree

F. Agree

G. Strongly Agree

38. My group members get together as a group during the period of the project.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

39. I feel my group members worked together well during the period of the project.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

Consider how openly ideas and insights flow within your team

40. People in this team keep their best ideas to themselves (R).

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree
- F. Agree
- G. Strongly Agree

41. People in this team are willing to share knowledge/ideas with others.

- A. Strongly Disagree
- B. Disagree
- C. Slightly Disagree
- D. Neutral
- E. Slightly Agree

F. Agree

G. Strongly Agree

42. People in this team share their ideas openly.

A. Strongly Disagree

B. Disagree

C. Slightly Disagree

D. Neutral

E. Slightly Agree

F. Agree

G. Strongly Agree

43. People in this team with expert knowledge are willing to help others in this team.

A. Strongly Disagree

B. Disagree

C. Slightly Disagree

D. Neutral

E. Slightly Agree

F. Agree

G. Strongly Agree

Consider how much confidence you have in your team members to support each other and keep their commitments

44. My team members had a high degree of trust between each other.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

45. My team members believed that others in the team will follow through their commitments.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

46. My team members always did what they said.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

47. My team members trusted each other to contributed worthwhile ideas.

A. Strongly Disagree

B. Disagree

C. Neutral

D. Agree

E. Strongly Agree

Demographic Information

48. What is your gender?

A. Male B. Female. C. Other

49. What is your age?

50. What is your educational background?

A. Associate Degree. B. Bachelor's Degree. C. Master's Degree. D. Doctorate or Higher

51. What is your current job position?

A. General Employee. B. Frontline Manager. C. Middle Manager. D. Senior Manager

52. What is the size of your team?

Please confirm that all items are filled in accurately, thank you!