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# The Impact of Virtuality and Shared Leadership on Virtual Team Performance

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## Abstract

*Previous studies show divergent views of shared leadership in the team performance of virtual teams. In this study, we seek to understand the mediating and moderating roles of trust, commitment, and virtuality among virtual team members on performance within the context of shared leadership. We conducted a questionnaire-based survey to gather perspectives on shared leadership and performance and analysed responses through structural equation modelling. We find that there is a significant positive effect between the two and that virtuality plays a significant moderating role for virtual team performance. In addition, we find that when virtuality increases, the mediating effect of trust and commitment is not significant, which challenges previous findings.*

**Keywords:** virtual teams, shared leadership, trust, virtuality, team performance, commitment

## 1. Introduction

A virtual team (distributed team) refers to a group of individuals interacting in interdependent tasks, with a common purpose, and working across different geographies and time zones (Martins et al., 2004). Virtual teams eliminate the need for employees to travel between locations and provide employees with time flexibility that reduces time, money, and stressful expenses (Ackerman, 2000). Frequent and deep interactive communication and the development of shared identities can increase cognitive salience and improve relationship quality (Schulze and Krumm, 2017). Over the past 30 years, virtual teams have become increasingly popular, and businesses around the world are increasingly willing to leverage the power of virtual teams to collaborate globally, especially because oftentimes virtual teams are cost efficient, facilitate quick information and knowledge exchange and permit flexible scheduling and work habits (Adamovic, 2018; Oshri et al., 2015).

While virtual teams are increasing in number and importance, implementation issues remain challenging. In particular, effective leadership of this type of team remains difficult for many virtual teams (Zaharie, 2021). House and Aditya (1997) proposed that shared leadership behaviors developed by most or all members of a team are more predictive of team performance than traditional, focused leadership behaviours, and that shared leadership approaches are better suited to capture the dynamic nature of contemporary organizations. Additionally, Prester et al. (2020) proposed that shared leadership has important implications for new forms of digital work, leadership in digital spaces, and leadership in virtual organizations more generally. To date however, only few studies (Zhou et al., 2018; Castellano et al., 2021) empirically examined the influence of shared leadership, with the mainstream virtual team literature focusing on the impact of direct leadership on virtual teams (Hoch & Dulebohn, 2017). In addition, some studies have focused on the role of trust, commitment and virtuality towards exploring the relationship between shared leadership and virtual team performance (Hoch & Kozlowski, 2014; Castellano et al., 2021; Moore et al., 2019). However, there is still much to be learned about shared leadership and its impact on virtual teams.

In response to a need for more research into shared leadership (Singh et al., 2019), the main aim of this study is to ascertain the impact of shared leadership on virtual team performance (Hoch & Kozlowski, 2014). We focus specifically on exploring the role of commitment and trust among virtual team members on shared leadership and whether virtuality influences these relationships. The paper is structured as follows. We first present our literature review on shared leadership and then provide an overview of our methods. This is followed by the presentation of our findings, and we conclude the paper with a discussion of our findings and our study's limitations.

## **2. Literature Review**

The idea of virtual teams has been discussed for at least three decades (Frost & Duan, 2020). Companies are rapidly resorting to decentralised and globalised workflows as information and communication technology advances, with many organisations accelerating the incorporation of virtual teams into their operations. After COVID-19, working remotely in virtual teams has become the new normal (Frost & Duan, 2020). More than 80% of global businesses transitioned to fully virtual or hybrid

employment, while more and more people prefer to work online and people have begun adapting their work and communication patterns as part of virtual team work (Brynjolfsson et al., 2020; Culturewizard, 2020; Hoch & Dulebohn, 2017).

While research on virtual teams and aspects of satisfaction, communication, collaboration, leadership, and creativity has followed that of co-located face-to-face teams, there are still strong challenges to the forced transformation of businesses (Frost & Duan, 2020). For example, geographic and temporal disparities make it difficult for virtual team members to collaborate effectively, share information, manage their time effectively, and make decisions in synchronization (Gazor, 2012), but we know little about leadership in virtual teams during such a challenging new environment.

### **2.1. Shared Leadership in Virtual Teams**

The majority of leadership theories throughout history have tended to see the leader as a single, dominant individual who typically holds a formally designated leadership role within a organisation, where leadership is often considered the main determinant of team success (Jarvenpaa, 1998). Research on virtual teams has so far explored leaderless teams, teams with a single leader, and shared leadership teams, where the leadership responsibilities are spread among the team members (Misiolek & Heckman, 2005). Following a process based viewpoint, Bass and Avolio (1997) "omni-directional" leadership, where leadership is a full system and a development process. The idea of leadership as a system implies that people can share and swap out leadership responsibilities, and that leadership itself becomes a distributed team effort. Further to this, it has been argued that leadership positions vary among virtual teams because broad leadership roles must be filled as the team completes tasks that are unlikely to be performed by a single team member (Zigurs, 2003). In relation to this, virtual team members might take on the position of the 'leader' or 'follower' as tasks change.

Misiolek and Hackman (2005) argued that virtual teams are better suited to be managed in a different way than traditional teams. Building a virtual team takes a fair amount of energy and effort, and it places high demands on leadership (White, 2014). According to Manz et al. (2013), shared leadership can be more effective for virtual teams, possibly because as a leadership model, it emerges out of the complicated, multifaceted issues organisations face, and which require teams to mobilise their

collectively resources and skills (Maloney et al., 2016). Shared leadership is considered a communal leadership approach: leadership is performed by every member of the entire team, not just one designated individual, it is a dynamic, interactive process of influence among individuals in the group with the goal of leading mutually each other to achieve team and organisational purposes (Pearce & Conger, 2002; Hoch & Dulebohn, 2017; Ensley, 2006). In relation to this, Chamakiotis and Panteli (2017) have found evidence of both emergent and shared leadership within the same virtual team, whereby leadership may shift across difference phases.

Theoretically, shared leadership can improve team performance by increasing members' commitment, autonomy in decision-making, depth of information exchange within the group, and shared satisfaction in accomplishments (Hoch & Dulebohn, 2013). Yet, there are three divergent views regarding the relationship between shared leadership and virtual team performance. The first perspective is that virtual team performance benefits from shared leadership. The main reasons are as follows: vertical leadership of virtual teams is often difficult to monitor and leads to poor communication among members, while shared leadership can function as an mechanism that promotes information exchange on team goals, tasks and processes, stimulates members' initiative and enthusiasm and improves team performance (Muethel & Hoegl, 2010; Bell & Kozlowski, 2002; Hoegl & Muethel, 2007). Generally, shared leadership is higher in high-performing virtual teams than in low-performing ones, and certain shared leadership behaviours (such as monitoring role behaviours) are more closely associated with team performance in the early stages of the team than in the later stages (Siewiorek et al., 2013). The second perspective suggests that shared leadership has little impact on how effectively a virtual team performs (Balthazard et al., 2004). The third viewpoint argues that shared leadership has a negative impact on the effectiveness of virtual teams. Roberto (2013) argues that shared leadership leads to multiple leaders, thus resulting in slower decision-making speed and in ambiguity of responsibilities, which in turn reduces efficiency overall, e.g., in resource allocation. This is because virtual members will focus more on relationship building and ignore performance. In addition, shared leadership can lead to conflict, especially when power positions change and competition among members increases (Sinha et al., 2021). Against this background, the trend of not sharing

leadership may also jeopardise performance (Hoegl and Muethel, 2016) and we therefore hypothesise:

*H1: Shared leadership has a positive influence on virtual team performance.*

## **2.2. Trust and Virtual Teams**

Virtual teams typically communicate online and for this to be successful, team members need to be confident regarding the behaviour of their peers (Palvia, 2009) and trust is essential for virtual teams (Castellano et al., 2021). It encourages virtual team interactions, leading to improved efficiency, collaboration, and information sharing while minimising the disadvantages of team knowledge suppression (Pangil & Chan, 2014). Digital and virtual tools can promote proximity in virtual teams, but a lack of social engagement can result in distrust amongst them due to the inherent geographic limitations, time constraints, language hurdles, and cultural differences (Thomas, 2014; Pinjani & Palvia, 2013). This is one of the reasons why trust is difficult to measure and manage in virtual teams. While intuitively, establishing trust seems positive for performance, several studies have found that trust has little to no impact on performance (e.g., Kanawattanachai & Yoo, 2002).

Shared leadership, as people move from leader to follower roles and vice versa, can foster better social interactions among group members (Aime et al., 2013). While power dynamics may shift, followers can raise the value of connections by sharing resources (e.g., effort), which increases the dependence of leaders on them. The shifts can then provide equilibrium and increase team members' trust, and as more members take up a leadership role, a stronger bond develops among them. In other words, through such shifts and interactions, virtual team members have more opportunities to show their peers that they are both reliable and receptive to their inputs (Vandewaerde et al., 2011).

Yet the exact relationship between shared leadership and trust is contested. Some studies argue that trust is a prerequisite for shared leadership (Carson et al., 2007), while others posit that shared leadership leads to trust (Drescher et al., 2014). Whichever the case, both viewpoints agree that trust promotes team performance (Clark et al., 2019) and other scholars have examined trust as a mediator, whereby leaders can help their virtual team to overcome the obstacles of virtualisation by encouraging quality and social orientated communication to support trust formation among the team (Larson and DeChurch, 2020). On this basis:

*H2: Trust mediates the effect of shared leadership on virtual team performance.*

### **2.3. Commitment and Virtual Teams**

The concept of commitment expresses a sense of obligation to act in a particular way (Hanna & Richards, 2018). Studies have found many types of commitment in the workplace, with diverse degrees of commitment ranging from individual commitment to group commitment (Zhang et al., 2004). According to Dunin-Keplicz and Yerbrugge (1999), collective commitment is the most effective motivation for collaboration since it encourages a person's social behaviour for the welfare of the group to which they belong. Task-based commitment, team-based individual commitment, and team-based collective commitment are the three categories into which commitment in collaboration can be separated. A team-based personal commitment, on the other hand, expresses a long-term desire to maintain a valuable partnership with one or more member of the entire team; this desire goes beyond designated tasks. Task-based commitment refers to a commitment to oneself to complete a common mission regardless of who is involved. Collective commitment based on a team symbolises society's desire to be a part of a group.

Building the commitment of team members depends on the enthusiasm and vigour of the team leader (Singh, 2008). Virtual teams can therefore benefit from increased team commitment and improved performance from all team members (Yahaya & Ebrahim, 2016). In virtual environments, commitment and shared leadership have been shown to be relevant given the complexity of virtual teams (Manz et al., 2013). However, the emergence of shared leadership models has resulted in commitments that cannot be confirmed by individual leaders. For virtual teams with shared leadership, the effect of commitment on performance has rarely been studied. According to George (2000), commitment is necessary for shared leadership to emerge, and members of a team who are individually committed and have common goals are more likely to be open to sharing leadership responsibilities. As such:

*H3: Commitment mediates the effect of shared leadership on virtual team performance.*

### **2.4. Virtual Teams and Virtuality**

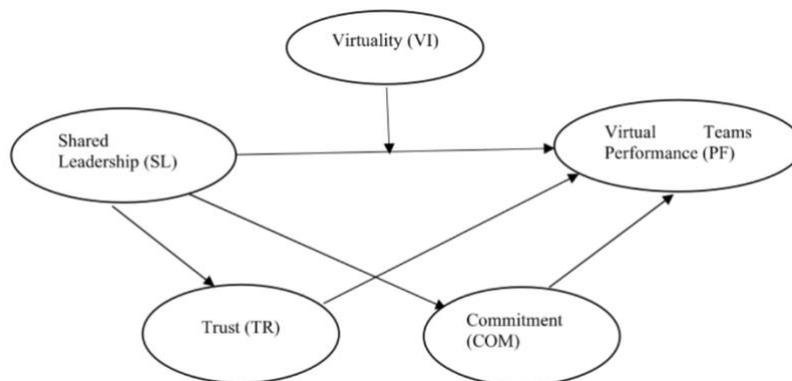
Early studies on virtual teams frequently saw "virtuality" as a binary variable, categorising it as either face-to-face or computer mediated (without physical

interaction). Today, the degree of virtuality has received greater prominence, whereby virtuality may be described by the amount of team members' separation (distance), the percentage of members working online (configuration), and the percentage of time they typically spend apart (Cramton & Webber, 2005).

Earlier research on the links between virtuality and virtual team performance has yielded conflicting results. Cramton (2001) finds a negative correlation between geographic dispersion and workflow, which partly explains why there is a negative correlation between geographic dispersion and team performance. Workflows include communication, coordination, and performance. People working from dispersed locations may face difficulties in coming to a common understanding, even when technologies help collaboration and communication. Yet, De Guinea et al. (2012) find that the effects of virtuality are not necessarily all negative for different types of teams, and that the detrimental impacts of virtuality on short-lived teams tend to diminish in long-lived teams. Further, Moore et al. (2019) found that virtuality has no impact on team performance. Therefore it is important to understand whether there is a link between virtuality and performance and whether it is negative or positive:

*H4: Virtuality moderates the effect of shared leadership on virtual team performance*

Our conceptual model is shown in Figure 1.



**Figure 1. Hypothesised Model**

### 3. Methods

We examined the above hypotheses within the context of a questionnaire based survey. We surveyed research participants who could freely provide informed consent and who have worked (or still work) in virtual teams, without posing any restrictions regarding the degree of virtuality, the size of the organisation or the industry. We

distributed the questionnaire online through WeChat, and received 196 responses overall. After examination of the completed questionnaires, we discarded 18 of them as respondents indicated that they had no experience in virtual teams. As such, our overall sample totals 178 responses. Table 1 shows the characteristics of our sample.

Gender	Female	56.20%
	Male	43.30%
	Prefer not to answer	0.60%
Age	18-25 years old	18.00%
	25-34 years old	71.30%
	35-44 years old	7.90%
	45+ years old	2.20%
	Prefer not to answer	0.60%
Education	High School	1.10%
	Bachelor's Degree	47.80%
	Master's Degree	46.60%
	Ph.D. or higher	2.80%
	Prefer not to say	1.70%
Sector	Agriculture, food and natural resources	2.20%
	Architecture and construction	5.10%
	Arts, audio/video technology	2.20%
	Computer science and engineering	28.10%
	Education	5.60%
	Finance	9.60%
	Government and public administration	7.30%
	Health Science	3.40%
	Manufacturing	8.40%
	Marketing, sales and services	7.30%
	Other	20.80%
	Agriculture, food and natural resources	2.20%
Role	Member	89.90%
	Leader	10.10%

**Table 1. Sample characteristics (n = 178)**

We adapted our data collection instrument (questionnaire) on the basis of previously trialled and tested questionnaire items. These are shown in Table 2. All items were measured on a 5-point Likert scale, with 1 indicating ‘strongly disagree’ and 5 indicating ‘strongly agree’. We used the Team Performance construct as a proxy to assess high and low performing teams. We followed a 2-step approach, first evaluating the measurement model and then the structural model. Mediation and moderation were conducted using the SPSS Process macro (Hayes, 2012).

<b>Factor</b>	<b>Item</b>	<b>Question</b>	<b>Reference</b>
Trust (TR)	TR1	Overall. I feel that I can trust my team members completely.	Staples & Webster, 2008
	TR2	If possible I would not give the other team members any influence over	
	TR3	I feel comfortable depending on my team members for the completion of	
	TR4	I am comfortable letting other team members take responsibility for tasks	
	TR5	feel that I will not be able to count on my team member to help me	
	TR6	wish I could oversee the work of the other team members (*reverse	
Commitment (COM)	COM1	I feel strong sense of belonging	Sharma & Sinh, 2022
	COM2	I feel personally attached to my work team	
	COM3	I am proud to tell other I work in my team	
	COM4	Working in my team has great deal of personal meaning to me	
	COM5	I direct my efforts toward the success of this virtual team.	Meyer et al., 1997
	COM6	I actively contribute to this virtual workout team.	
Shared Leadership (SL)	SL1	My team has a shared vision with agreed-upon goals	Avolio et al., 2003
	SL2	The formal leaders in my team are willing to delegate some control to	
	SL3	My team members trust each other to work effectively and get the job	
	SL4	When major decisions must be made, team members are involved in the	
	SL5	Each team member's unique expertise is valued and utilized	
	SL6	I feel confident taking on leadership responsibilities in this team	
	SL7	I know what strengths and skills each of the other team members	
	SLS	In addition to the team's formally designated leaders, I can identify at least	
	SL9	The leadership role available in my group result from the needs arising	
	SL10	I feel that every other team member has a capacity for leadership	
Virtuality (VI)	VI1	The distribution of members at your virtual team	Chudoba et al., 2005
	VI2	The years of distributed employment of team members	
Team Performance (PF)	PF1	The quantity or amount of work produced	Staples & Webster, 2008
	PF2	The number of innovations or new ideas introduced by the team	
	PF3	Reputation for work excellence	

	PF4	Attainment of team production or service goals	
	PFS	The quality or accuracy of work	
	PF6	Efficiency of team operations	
	PF7	Morale of team personnel	
	PF8	Adherence to schedule and budget	

**Table 2. Questionnaire Items**

### 3.1. Measurement model

We ran a Confirmatory Factor Analysis (CFA) to assess our instrument. In the process, we had to remove certain questionnaire items that did not perform well in CFA (SL1, SL6, TR1, TR3, TR4, COM4) and for the purpose of achieving a better fit. The fit results are shown in Table 3 and Table 3 shows the results for the measurement model. As shown, some variables score a higher than acceptable AVE – considering however the exploratory nature of our work, we decided to maintain the relevant variables in our model. We calculated Cronbach’s alpha (CA), composite reliability (CR) and extracted mean variance (AVE) to examine for reliability. All CA values are above the 0.7 threshold (Fornell & Larcker, 1981), ranging from 0.725 to 0.931 which shows high degree of reliability, and CR is above 0.80 for all variables (Table 4).

<b>CMIN/DF</b>	<b>RMSEA (&lt;0.08)</b>	<b>GFI (&lt;0.8)</b>	<b>CFI (&gt;0.9)</b>	<b>TLI (&gt;0.9)</b>
1.534	0.055	0.849	0.944	0.937

*Notes: number in brackets indicate the threshold value*

**Table 3. Measurement Model Fit**

<b>Factor</b>	<b>Factor loadings</b>	<b>CR (0.80)</b>	<b>AVE (&lt;0.50)</b>	<b>CA (&gt;0.7)</b>
<b>Trust (TR)</b>				
TR2←TR	0.667	0.8634	0.4189	0.725
TR5←TR	0.664			
TR6←TR	0.609			
<b>Commitment (COM)</b>				
COM1←COM	0.696	0.8094	0.5169	0.812
COM2←COM	0.773			
COM3←COM	0.773			
COM5←COM	0.623			
<b>Shared Leadership (SL)</b>				
SL2←SL	0.571	0.8697	0.4565	0.875
SL3←SL	0.656			
SL4←SL	0.68			
SL5←SL	0.642			
SL7←SL	0.719			
SL8←SL	0.749			
SL9←SL	0.727			

SL10←SL	0.644			
<b>Performance (PF)</b>				
PF1←PF	0.752	0.9021	0.5357	0.903
PF2←PF	0.73			
PF3←PF	0.732			
PF4←PF	0.768			
PF5←PF	0.757			
PF6←PF	0.738			
PF7←PF	0.709			
PF8←PF	0.664			
<b>Virtuality (VI)</b>				
VI1←VI	0.79	0.8015	0.6691	0.931
VI2←VI	0.845			

**Table 4. Measurement model evaluation**

We also examined our model for discriminant validity by calculating the square root of AVE and comparing that to cross-correlations. In most cases, the AVE square root is above or only slightly below cross-correlations (Table 5), meaning that our model shows adequate discriminant validity.

Measurement	Mean	Std. Dev.	TR	COM	SL	PF	VI
<b>Trust (TR)</b>	3.893	0.705	<b>0.647</b>				
<b>Commitment (COM)</b>	4.022	0.612	0.408**	<b>0.719</b>			
<b>Shared Leadership (SL)</b>	3.964	0.578	0.442**	0.774**	<b>0.676</b>		
<b>Performance (PF)</b>	4.011	0.619	0.426**	0.651 **	0.609**	<b>0.732</b>	
<b>Virtuality (VI)</b>	1.904	0.728	0.177*	0.276**	0.352**	0.302**	<b>0.818</b>

Notes: \*\* Correlation is significant at the 0.01 level (2-tailed); \* Correlation is significant at the 0.05 level (2-tailed); Square Root of AVE shown in bold along the diagonal; Values outside the diagonal correspond to correlations

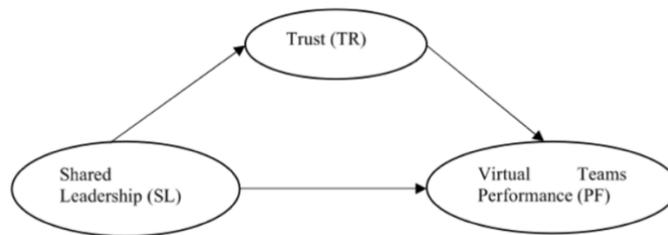
**Table 3. Correlation Matrix**

We ran a Confirmatory Factor Analysis (CFA) to assess our instrument. In the process, we had to remove certain questionnaire items that did not perform well in CFA (SL1, SL6, TR1, TR3, TR4, COM4) and for the purpose of achieving a better fit. The fit results are shown in Table 4 and convergent validity is shown in Table 5. As shown in Table 5, some variables score a higher than acceptable AVE – considering however the exploratory nature of our work, we decided to maintain the relevant variables in our model.

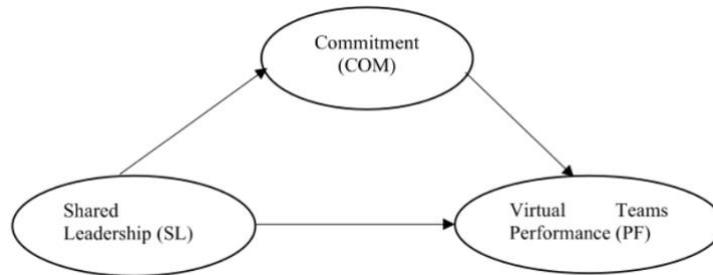
### 3.2. Hypothesis Testing

For hypothesis testing, we examined our conceptual model in steps, i.e., for each hypothesis, we separately examined for moderation, mediation and overall effects. We

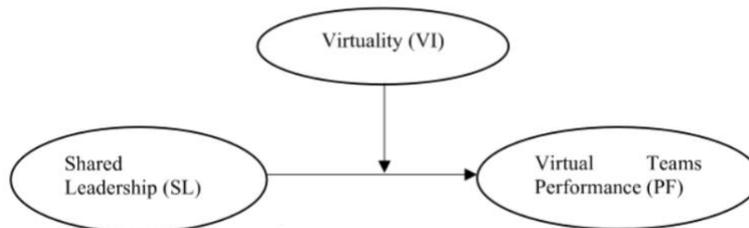
first examined TR and COM as mediators of the relationship between SL and PF. We set 5,000 bootstrap samples and tested for estimated indirect effects. We set SL as the independent variable, PF as the dependent and TR as the mediating one (Figure 2, model 1). The total effect of SL on PF is significant ( $\beta=0.737$ ,  $SE=0.056$ , 95% CI [0.630, 0.849]), as is the direct effect ( $\beta=0.562$ ,  $SE=0.092$ , 95% CI [0.384, 0.744]). The mediation analysis also shows that there is a substantial mediated effect of SL on PF via TR ( $\beta=0.175$ ,  $SE=0.068$ , 95% CI [0.045, 0.3 L]). In other words, SL has a greater positive influence on PF when TR increases. SL as the independent variable, PF as the dependent variable and COM as the mediator (Figure 2, model 2). The total effect of SL on PF is significant ( $\beta=0.737$ ,  $SE=0.054$ , 95% CI [0.635, 0.849]), and the direct effect is  $\beta=0.222$ ,  $SE=0.074$ , 95% CI [0.082, 0.372]), ie COM partially mediates the relationship between SL and PF, whereby COM increases as SL increases and this results in increased PF, as well.



Model 1: Trust as mediator



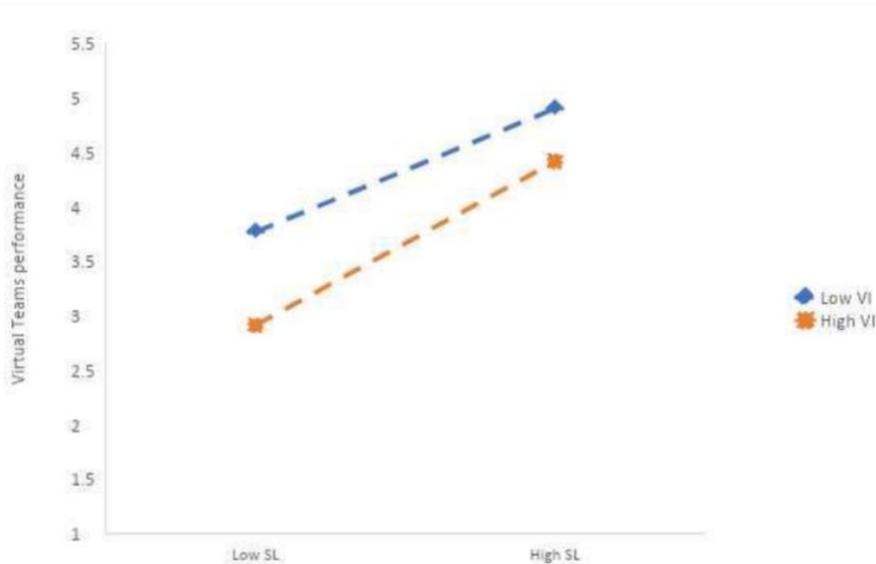
Model 2: Commitment as mediator



Model 3: Virtuality as moderator

**Figure 2. Examined models**

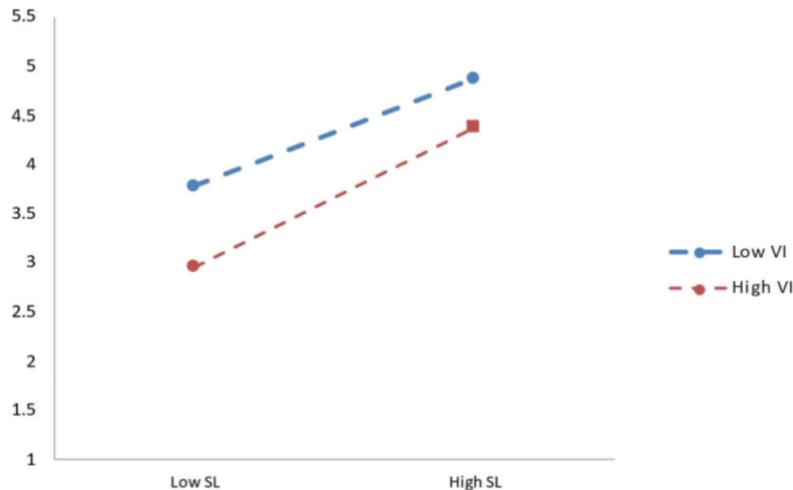
We then conducted a moderation analysis to establish whether VI moderates the effect of SL on PF (Figure 2, model 3). The PROCESS (5,000 bootstrapped samples) show that the relationship between SL, VI and PF are significant and that VI and PF are negatively correlated ( $\beta = -0.335$ ,  $t = -18.923$ ,  $p < 0.01$ ), while PF is significantly influenced by the interaction of SL and VI ( $\beta = 0.093$ ,  $t = 2.989$ ,  $p = 0.01$ ). We further examined this by plotting the simple slope analysis to determine the nature of the relationship. As shown in Figure 3, the increase of SL leads to PF increases, and the slope of low VI is smaller than that of high VI. In other words, as VI increases the influence of SL on PF also increases, meaning that under high VI, SL has a greater effect on PF, compared to low VI.



**Figure 3. VI moderation result**

Finally, we examined whether PF is indirectly affected by SL through TR and COM and whether any such effects are moderated by VI, through a moderation mediation analysis. While the main effect of SL on PF is still significant ( $\beta = 0.633$ , 95% CI = 0.052 to 0.712,  $p < 0.01$ ) as is the moderating effect of VI ( $\beta = -0.33$ , 95% CI = -0.363 to -0.290), the mediating effect of TR is not ( $\beta = -0.049$ , 95% CI = -0.192 to 0.094,  $p = 0.43$ ), and neither is the mediating effect of COM ( $\beta = 0.0113$ , 95% CI = -0.036 to 0.261,  $p = 0.125$ ). In other words the relationship between SL and PF is positively moderated by VI, where under high VI, SL has a greater effect on PF than when VI is low. As such, H1 and H4 are supported, whereas H2 and H3 are not. Figure 4 shows the slope in relation to VI, where it is illustrated that the relationship

between SL and PF is moderated by VI. The trend of low VI and high VI remains unchanged when SL and PF both increase. There is a reduced slope for VI, suggesting that as VI increases, so does the influence of SL on PF.



**Figure 4. Moderated mediation result**

#### **4. Discussion**

In this study, we examined the impact of shared leadership on the performance of a virtual team, exploring the mediating and moderating roles of trust, commitment, and virtuality. We find that shared leadership is positively correlated with performance and that the degree of virtuality moderates the relationship between shared leadership and virtual team performance, where the impact of shared leadership on performance is greater when the degree of virtuality increases.

There are conflicting views in earlier studies regarding the effects of shared leadership on performance. Our analysis challenges earlier findings that indicated that shared leadership will have no effect on performance or negative effects (Roberto, 2013; Balthazard et al. 2004). Our findings support the view that shared leadership positively influences performance (Hoch & Kozlowski, 2014; Hoegl & Muethel, 2016) and we posit that this might be because under shared leadership conditions, team members may feel motivated to take initiative, pick up new skills, actively cooperate and collaborate with others and lead to an overall sense of equality among them.

We also find that trust can partially mediate the relationship between shared leadership and performance, but this result is statistically not significant in the presence of virtuality as moderator. This is in line with earlier findings (Pangil and Chan, 2004). Virtual team members tend to heavily rely on one another to execute tasks and undertake duties or projects as assigned to them, like in traditional teams. Virtual teams however rarely get together in person, making it impossible to directly oversee one another's work. Working in such setting necessitates a high level of trust. Therefore, regular contact among virtual team members is necessary to increase their interactions and foster the development of personality-based trust among virtual team members.

Concerning the mediating effect of commitment, in the absence of virtuality's moderating presence, commitment moderates the relationship between shared leadership and performance. Earlier studies support this finding (Yahaya & Ebrahi, 2016; Hanna & Richards, 2018), although Castellano et al. (2021) found no mediation effects. As far as our study is concerned, we posit that commitment can make people feel a sense of belonging, and therefore be willing to share their leadership responsibilities, support others' personal development and overall be more willing to contribute to the team, which in the aggregate increases the team's performance.

As earlier discussed, previous findings provide conflicting results regarding the link between virtuality and performance (De Guinea et al., 2012; Moore et al., 2019). Our findings challenge the perspective that virtuality has no impact (Moore et al., 2019). Rather, we find that, regardless of whether the moderating role of virtuality in shared leadership and team performance is studied alone, or in the presence of the mediating factors of trust and commitment, when virtuality increases, the positive influence of shared leadership on performance also increases.

## **5. Conclusions**

Although virtual teams are increasingly the norm in most organizations (Brynjolfsson et al., 2020; Culturewizard, 2020; Hoch & Dulebohn, 2017), the impact of shared leadership on team performance is still a topic of significant research. Previous studies on the effect of shared leadership on team performance have yielded conflicting results (Muethel & Hoegl, 2010; Balthazard et al., 2004; Roberto, 2013). In this study, we examined the linkage of shared leadership to virtual team performance in the

presence of both mediating and moderating factors, and found that shared leadership does indeed positively influence virtual team performance.

Our work can offer significant insights to practitioners: when more team members enjoy shared leadership, they are willing to lead and follow according to the situation, so as to work for the common goal of the virtual team, which improves performance. In addition, shared leadership raises the degree of commitment and trust among virtual team members supporting the team's ability to complete tasks. This can be translated into the need for creating a culture of shared responsibility where team members are encouraged to take more responsibility and share more duties and roles with others.

Our study has certain limitations. First of all, we chose to focus only on trust and commitment as possible mediating factors. We chose this so that we could examine several different configurations, but we do acknowledge that there are other team-level factors, such as team empowerment, shared mental models and team mindfulness that could be relevant (Zamani and Pouloudi, 2021; Yu and Zellmer-Bruhn, 2018). We thus propose that these could be assessed in the future and that they could be further complemented by focusing on the boundaries of shared leadership in relation to conflict. and see how these affect or mitigate the shared leadership force that affects virtual team performance. The boundaries of shared leadership and team performance connections can also be investigated using numerous factors, such as task and process conflict. Another limitation is that we used self-reported data for measuring our variables. While we made an effort to request for subjective information (e.g., for virtuality and performance), we appreciate that more likely than not, these are governed by individual perceptions. As such, we consider that future studies could replicate our work and extend by collecting subjective data and from multiple resources (e.g., KPIs for virtual teams). Finally, we consider that it is very important future studies focus on the underlying process through which members part with and receive leadership roles. Under shared leadership conditions, there will have to be several leaders and it would be interesting to investigate when members prefer to be followers, when leaders and how they oscillate between the two. Addressing this will help understand in greater detail the shared leadership phenomenon.

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