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ADAPTIVE LEADERSHIP AND PERFORMANCE IN DISTRIBUTED TEAMS: ADDRESSING 'WICKED' ENVIRONMENTS

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ABSRACT

Distributed teams face high degrees of complexity and ambiguity, making them a common example of the 'wicked' problem environments that challenge modern organizations. Adaptive leadership promises a solution for such wicked environments. This study examined how adaptive leadership influenced performance in distributed teams. Structural equation modeling of data from 556 distributed team members in 29 countries revealed that adaptive leadership is positively related to performance through the mediating mechanisms of team trust, enhanced collaboration, and higher individual agency. Implications for future research and practice are discussed.

Keywords: adaptive leadership, wicked environments, distributed teams, performance

INTRODUCTION

Ambiguity, uncertainty and equivocal pathways have been described as 'wicked problems' (Grint, 2005). According to Grint (2005), wicked problems are characterized by high levels of complexity and cannot be resolved via familiar solutions or tactics. Current, high visibility examples of wicked problems include the task of improving the national health system and of dealing with international terrorism. Wicked problems, however, are not limited to public policy. As global business environments are becoming increasingly complex and decentralized, they are reflecting many of the attributes of 'wicked' problems. Accordingly, scholars have stressed that adaptation and the ability to deal with complexity and ambiguity are an essential component of organizational survival (Allen, Stelzner, & Wielkiewicz, 1999; DeGenring, 2005;

Glover, Jones, & Friedman, 2002; Heifetz & Laurie, 1997; Heifetz, Grashow, & Linsky, 2009a; Kouzes & Posner, 2002).

In response to the growing need for adaptive performance in organizations, studies have investigated antecedents such as cognitive ability, goal-orientation, personality factors, team climate, and perceptions of leadership (Allworth & Hesketh, 1999; Charbonnier-Voirin, Akremi, & Vandenberghe, 2010; Han & Williams, 2008; Lane & Klenke, 2004: Pulakos, Arad, Donovan, & Plamondon, 2000). As a result, there is an emerging consensus about the factors that can contribute to adaptive behavior. In contrast, we have only assumed that adaptive action is essential for performance in wicked environments. While there is good theoretical reason to believe that adaptive behavior will contribute to performance in wicked environments, this has not yet been confirmed. Moreover, it remains to be determined what mechanisms would drive this relationship. In fact, as we describe below, there are competing predictions concerning potential mechanisms. This paper addresses these uncertainties by examining the relationship between adaptive leadership and performance in wicked environments, and by describing the mechanisms associated with that relationship.

Distributed Teams as 'Wicked' Leadership Environments

Distributed or virtual teams have members in multiple locations and they utilize information communication technology (ICT) to aid the exchange of information and the coordination of individual inputs (Jarvenpaa & Ives, 1994; Lipnack & Stamps, 1997; Peters & Manz, 2007). Distributed teams are attractive for their potential flexibility and responsiveness in turbulent global business environments (Bell & Kozlowski, 2002; Miles & Snow, 1986; Mowshowitz, 1997; Snow, Snell, & Davidson 1996; Townsend, DeMarie, & Hendrickson, 1998). Relative to their collocated counterparts, distributed teams can potentially create larger

knowledge pools (Sanders, 2000), provide quicker feedback to team members and management (Opper & Fersko-Weiss, 1992), and incur lower travel costs. Due to the increasing prevalence and need for remote collaboration, distributed teams have become an operational necessity in many organizations (Gassman & Zedtwitz, 2003).

Notwithstanding the potential advantages of distributed teams, their implementation remains problematic because remoteness may hinder a team's progress in numerous ways. Challenges commonly faced by distributed teams include: difficulties in establishing interpersonal bonds (Kiesler & Cummings, 2002), difficulties in knowledge sharing (Breu and Hemingway, 2004), problems in identifying and managing conflict (Hinds & Bailey, 2003; Mortensen & Hinds, 2001), and slower processes (Weisband, 1992). Left unaddressed, such problems can result in lower employee satisfaction, issues of role ambiguity or overload, and higher social loafing and absenteeism among team members (Butler, Aasheim, & Williams, 2007; Dimitrova, 2003; O'Hara-Devereaux & Johansen, 1994). While many of these challenges are faced by collocated teams as well, they become more pronounced in distributed settings (Cummings, Espinosa, & Pickering, 2009; O'Leary & Cummings, 2007; Solomon, 1995). As a result, despite much growth in the availability and functionality of ICT, the lingering effects of spatial and temporal distance can reduce the quality of distributed teams' work (Cumming et al., 2009; Handy, 1995; Maznevski & Chudoba, 2000; Montoya-Weiss, Massey, & Song, 2001; O'Leary & Cummings, 2007; Olson & Olson, 2000). Moreover, the typical challenges faced by collocated teams (e.g., conflict, misunderstandings, etc.) are also faced by distributed teams but with greater frequency and more severe consequences (Walden & Turban, 2000).

Effective distributed teams are characterized by a precarious balance of chaos and control that is difficult to achieve by traditional methods, but is also optimal for adaptation and the

invention of innovative repertoires (Boal & Schultz, 2007; Marion & Uhl-Bien, 2001; McAdam, 2004). Leadership has been recognized as vital for the effectiveness of distributed teams (Blackburn, Furst, & Rosen, 2003), but leading distributed teams involves unique challenges compared to those associated with collocated teams (Fujita, Henderson, Eng, Trope, & Liberman, 2006). For example, ICT-mediated interactions often fail to capture the paraverbal cues, somatic gestures, and other sensory-rich information that are important for effective leadership (Glitter, Black, & Goldman, 1975; Kiesler & Sproull, 1992; Masters et al., 1986; Warkentin, Sayeed, & Hightower, 1997). Thus, many leadership functions that rely on non-verbal delivery—such as charisma and authenticity—are often severely constrained in distributed settings. Research suggests that leadership behaviors that are effective in collocated teams can be ineffective in distributed settings (Balthazard, Potter, & Warren, 2004; Hooijberg, Hunt, & Dodge, 1997; Hoyt & Blascovich, 2003). As such, distributed work teams represent a 'wicked' environment for leadership, and are thus an ideal context, both theoretically and practically, to study the role of adaptive leadership in wicked environments.

LITERATURE REVIEW AND HYPOTHESES

Adaptive Leadership in Distributed Teams

Adaptive leadership approaches are characterized by several key distinctions. First, they view leadership as socially constructed. Second, they focus on 'leadership' between parties, as distinct from 'leader'-centric and 'leader-follower' approaches. And, finally, they are by nature highly process-based, emphasizing the underlying dynamics of issue selection, language and 'roads not taken' as worthwhile elements of the ultimate action taken. Adaptive approaches stress the distinction between *technical problems* and *adaptive challenges* (Burke, Stagl, Salas, Pierce, & Kendall, 2006; Heifetz et al., 2009a; Heifetz, Kania & Kramer, 2004; Heifetz & Laurie,

1997). While technical problems may be complicated and critically important, they can be resolved through the application of expert knowledge and existing procedures. By contrast, solutions to adaptive challenges require changes in people's priorities, values, loyalties, and behavior (Billington & Billington, 2010; Heifetz et al., 2009a; Heifetz & Laurie, 1997). Bridging a persistent gap between aspirations and reality, resolving competing commitments, and redesigning previously successful practices that have become inadequate are examples of adaptive challenges. To be effective, leaders confronting technical problems must provide solutions, protect followers from external threats, and maintain order; whereas leaders facing adaptive challenges must frame key issues, disclose external threats, and allow conflict to emerge to gradually reorient roles and challenge existing norms (Heifetz et al., 2009a). Through engaging in collective diagnoses and robust conversations, team members must leverage each other's knowledge, perspectives and competencies as resources to discover novel and effective solutions to adaptive challenges (Carmeli et al., 2010; Glover, Jones, Rainwater, & Friedman, 2002; Heifetz et al., 2009a; Heifetz & Laurie, 1997). In short, it has been argued that adaptive challenges require adaptive solutions, which depend upon facilitation by adaptive leadership (Heifetz, Grashow & Linsky, 2009a; 2009b).

Although leadership and performance in distributed teams is well-researched, they nonetheless remain a persistent challenge (Avolio, Kahai, & Dodge, 2000; Joshi, Lazarova, & Liao, 2009; Kiesler & Cummings, 2002). The difficulties faced by distributed teams consist of more than just technical problems that can be resolved through the application of expertise and known solutions. As we described earlier, many of the obstacles blocking distributed team performance are adaptive challenges and thus require adaptive leadership. As such, we hypothesize that adaptive leadership will benefit distributed team performance.

Hypothesis 1: Adaptive leadership is positively associated with team performance

Mediating Factors

Given the unique challenges facing distributed teams, there are at least three potential mechanisms by which adaptive leadership affects team performance: collaboration, trust and actor agency. Adaptive leaders help the team develop a more collaborative team culture. Collaboration is a richer process than mere communication or straightforward allocation of responsibilities among members, as it leverages individual competencies to create outputs greater than the sum of the individuals' capacities (Cohen and Bailey, 1997). Collaboration leads to more productive and innovative team output (Sawyer, 2007; Schrage, 1990). Adaptive leadership is important for collaboration and innovation because in order for collaboration to occur, team members must maintain an open mind and deal with conflict productively (Liedtka, 1996; Peters & Manz, 2007). Both of these outcomes are primary goals of adaptive leadership (Billington & Billington, 2010; Heifetz et al., 2009a; Heifetz & Laurie, 2003; Heifetz & Laurie, 2007).

Hypothesis 2: Collaborative culture mediates the relationship between adaptive leadership and team performance, such that adaptive leadership increases collaboration and collaboration increases performance.

The second mechanism by which adaptive leadership influences team performance is trust. Trust formation is touted by many researchers as essential to the success of distributed teams, as well as one of their greatest challenges (Gibson & Manuel, 2003; Jarvenpaa & Leidner, 1999; Meyerson, Weick, & Kramer, 1996). Since distributed teams work amidst geographical dispersion and high uncertainty, trust serves as a crucial mechanism for coordinating actions and performs the pivotal function of reducing psychological distance between members (Jarvenpaa,

Knoll, & Leidner, 1998). Furthermore, in highly complex systems, trust acts as a substitute for control (Knights, Noble, Vurdubakis, & Willmott, 2001; Leifer & Mills, 1996). This importance led O'Hara-Devereaux and Johansen (1994) to describe team trust as "the glue of the global workspace" (p. 243), and Peters and Karren (2009) found that trust was positively associated with team performance. We predict that adaptive leadership evokes higher levels of team trust by guiding team members to clarify problems and goals, stimulating active engagement, and enabling team members to address sensitive issues and competing views without negative connotations, and this increased trust will in turn positively influence team performance.

Hypothesis 3: Team trust mediates the relationship between adaptive leadership and team performance, such that adaptive leadership increases trust and trust increases performance.

Finally, we contend that adaptive leaders in distributed teams encourage members to exercise more agency in managing their interfaces with teammates. The most important aspect of actor agency for distributed teams is the degree of freedom team members can exercise regarding when, how much, and which communication technologies they utilize (Boudreau, 2005; Cousins & Robey, 2005; Emirbayer & Mische, 1998; Kolb, 2008). Ubiquitous connectivity can be problematic when workers are expected to remain perpetually connected through communication media, and may lead to communication overload or hyper-connectivity (Harper, Rodden, Rogers, & Sellen, 2008; Kolb, Collins, Lind, 2008). Low levels of actor agency can also cause burnout and deterioration of work/life balance (Golden, Veiga, & Simsek, 2006; Greenhill & Wilson, 2006). Adaptive leadership not only offers individual agency, but fundamentally relies on team members taking responsibility for their actions and exercising

personal choice. In the context of this study, we contend that adaptive leaders enable higher levels of agency (choice), which is in turn, expected to enhance performance.

Hypothesis 4: Actor agency mediates the relationship between adaptive leadership and team performance, such that adaptive leadership increases agency and agency increases performance.

METHODS

Data and Sample

The data reported here were drawn from an ongoing, large-scale study of distributed work teams. The sample used here consisted of survey responses from 556 individuals, representing 191 distributed project teams in 109 firms. Responses came from 29 countries, including Australia, Brazil, Canada, Chile, China, India, Indonesia, Ireland, Japan, Malaysia, New Zealand, Peru, Scotland, Singapore, South Africa, Spain, Sweden, United Kingdom and the United States. Three-quarters of the respondents (74%) were male, and the modal age was 30-39 years of age. Participants had an average of seven years of experience working in distributed teams (S.D. = 7.60), which was spent working on an average of 10 different distributed projects (S.D. = 16.50). On average, they had been with their company for seven years (S.D. = 7.05) and had spent 14.4 months (S.D. = 16.88) on the project they described, to which they devoted 64% of their time (S.D. = 34.73).

This sample provides an excellent context as a 'wicked' leadership environment. All of the participants' distributed work was geographically dispersed and time-fragmented, factors that exponentially complicate coordination and contribute to communication gaps. Moreover, this dispersion required ICT use, with all of the leadership challenges that entails. As well, the

international composition of the project teams provided the challenge of coordinating across cultural diversity.

Measures

Team performance. Measuring performance can be challenging (Campbell, McCloy, Oppler & Sager, 1993), because in most contexts "good" performance is multidimensional (Fletcher, 2001; Motowidlo & Scotter, 1994) and potentially political (Marshall & Wood, 2000; Sims, Gioia, & Longenecker, 1987). However, in the context of distributed projects teams, a key performance metric is the team's ability to produce outputs that satisfy project goals; as such, quality, cost, and meeting deadlines have been used to measure team performance (Lee-Kelley, 2002). We adopted the distributed team performance measure developed by Collins and Hull (2006), which asks respondents to report how well their team is doing relative to goals in quality, features, innovativeness, serviceability, costs, time (schedule), manufacturability, and margins, using a five-point scale (1 = much worse than target to 5 = much better than target).

Adaptive leadership. As no survey measure had been developed for adaptive leadership, we used a scale developed for this study. The six items were developed through a review of the literature, and refined using input from a panel of academic and professional leadership experts (Hinkin, 1998). The items asked respondents to indicate how often their team leader engaged in the following adaptive leadership behaviors: "Invites challenges and critique of his/her ideas," "Is willing to follow others when they have a great idea or solution," "Invites and welcomes different angles, perspectives on problems," "Explores issues/problems to reveal their complexity," "Recognizes and helps us manage the tough conversations," and "Resists making decisions fast just to reduce ambiguity." Responses were given on a five-point scale of frequency, ranging from 1 = rarely (0-19% of the time) to 5 = nearly always (80-100%).

Mediator variables. *Collaborative culture* (3 items) and *team trust* (3 items) were measured using scales taken from Collins and Kolb (2012). Sample items include "Our team has a strong collaborative culture" (collaborative culture) and "People in our project trust each other" (team trust). *Actor agency* was measured using the 4-item *connectivity choice* scale, which was developed to assess how much agency distributed team members have about their level of connection to other team members (Collins & Kolb, 2012). Sample item: "I can choose when and how I am in contact with others." All items were rated using the five-point frequency scale that was used for adaptive leadership.

***Control variables*.** Because many factors could influence the performance of distributed teams, we considered multiple control variables such as gender, team size, time devoted to the project, number of current projects, job tenure, project team tenure, distributed team experience (years and number of projects), extent of team distribution, formal training in distributed work, project duration, and degree of project completion. Based on preliminary analysis, we include three control variables in our statistical models: team size, time devoted to the project and the number of teams the individual was working on.

Analytic Technique

Maximum likelihood structural equation modeling (SEM) was used to assess the measurement properties of the scales and to test all hypotheses, based on Hu and Bentler's (1999) criteria for model selection. Convergent and discriminant validities of the final scales were further confirmed by assessing the average variances extracted (AVE), maximum shared variances (MSV), average shared variances (ASV), and composite reliability scores (Bagozzi & Yi, 1988; Hair, Black, Babin, & Anderson, 2010; Koufteros, 1999). Before conducting these analyses, we used multiple imputation to address missing values (mean = 18%, S.D. = 6.08).

Our decision to treat missing values using multiple imputation (Schafer & Olsen, 1998; Schafer, 1999) is based on research showing that deletion or mean substitution often generates more biased and inefficient estimates (Little & Rubin, 1987; Wothke, Little, Schnabel, & Baumert, 2000).

RESULTS

Descriptive statistics, as well as correlations among variables, are presented in Table 1. A confirmatory factor analysis supported the measurement properties of the scales. Our baseline measurement model had an acceptable fit with the data (χ^2 = 743.08, *df* = 199; SRMR = .06, RMSEA = .07; CFI = .92) and all alternative measurement models had significantly worse fits (see Models 2 to 7 in Table 2).

Insert Tables 1 & 2 about here

Table 3 provides further evidence of measurement adequacy. All of the composite reliability (CR) scores were well above the threshold value of .70, which indicated that the scales had good reliability (Hair et al., 2010). For each construct, the average variance extracted (AVE) was larger than the threshold value of .50, but did not exceed the CR, indicating good convergent validity (Hair, et al., 2010). As well, with the exception of team trust, the AVE exceeded both the average (ASV) and maximum (MSV) shared variances, which suggested good discriminant validity among all but one of the constructs (Hair et al., 2010). For team trust, the AVE (.55) exceeded the ASV (.34), but was lower than the MSV (.72). Coupled with the high correlation between team trust and collaborative culture (r = .71; p < .01), this raises some concern about discriminant validity between the two constructs. Nonetheless, the alternative measurement model that combined team trust and collaborative culture had a significantly worse fit with the data than model separating them, so our analysis treated them as distinct factors.

Insert Table 3 about here

To test the hypotheses, we constructed a structural model reflecting our predictions (Model 8 in Table 2), and compared it to two alternative models. The first alternative model included an unmediated path from adaptive leadership to team performance; this inclusion significantly improved the fit (Model 9). In addition, adding a path from team trust to collaborative culture (Model 10) further improved the fit, and so was adopted as our initial solution (see Figure 1). Although the control variables are not included in Figure 1, the coefficients shown reflect their influence.

Insert Figure 1 about here

While adaptive leadership was, on balance, positively associated with team performance, this net positive effect included an unmediated negative relationship that we did not predict (β = -.18, $p < .05$). The observation that adaptive leadership simultaneously had positive and negative effects on performance suggested the possibility of nonlinear relationships, and we examined this possibility in four post hoc structural models: the first three models tested for curvilinear relationships between adaptive leadership and each mediator variable (collaborative culture, team trust, and actor agency), whereas the final model tested the curvilinearity of the unmediated relationship. All models were tested using the squared term single-indicator technique described by Ping (1995). Only the final model, with a curvilinear relationship between adaptive leadership and team performance, had a significant nonlinear path and significantly improved the fit with the data (χ^2 = 876.93, df = 263; SRMR = .06, RMSEA = .07; CFI = .91). This model, as shown in Figure 2, was adopted as our final solution. As implied by the significant and positive path coefficient from the squared term to team performance (β = .13, $p < .05$), the unmediated

impacts of adaptive leadership on team performance were found to be in the shape of a positive U-curve.

Insert Figure 2 about here

The results provided qualified support for H1, which predicted that adaptive leadership would be positively associated with team performance. Although the sum of adaptive leadership's relationships with team performance was positive, this net positive result included a non-monotonic path. Thus, while adaptive leadership is, on balance, positively associated with performance, this is not an exclusively positive relationship. Our findings did not support H2, the prediction that collaborative culture mediated the relationship between adaptive leadership and team performance. Although collaborative culture was positively associated with performance (β = .36, p < .05), there was no consistent relationship between adaptive leadership and collaborative culture (p = .53). It should be noted, however, that collaborative culture was revealed as a partial mediator of the relationship between trust and performance (see Figure 2). H3 predicted team trust as a mediator and was supported: adaptive leadership was related to team trust (β = .55, p < .05) and team trust was related to performance (β = .15, p < .05). The results also provided support for H4, the prediction that actor agency would mediate the relationship between adaptive leadership and team performance: adaptive leadership significantly predicted agency (β = .33, p < .05), and agency predicted performance (β = .12, p < .05).

DISCUSSION

The emergence of novel and complex problems has provoked new thinking about leadership and the role of ambiguity, debate and dissent within teams. Adaptive leadership theory suggests that the 'wicked' problem environments facing contemporary leaders require a different approach. To explore this possibility, we used survey data to examine the connections

between adaptive leadership and team performance in distributed teams. Our findings suggested that adaptive leadership can contribute to performance, and does so through a range of mechanisms. One set of findings is confirmatory of existing patterns in the literature and the other two develop our theoretical understanding of the role of agency in distributed teams and the nature of adaptive leadership's impact on team performance.

Consistent with the literature on distributed teams, adaptive leaders make their most significant impact, not directly on team performance, but on the team processes that are normally associated with some of the team performance, including team trust, which is a perennial building block of distributed team performance. Team trust then contributes to a collaborative culture. Why adaptive leadership is not directly associated with collaborative culture in our study remains unclear. More novel among our findings is adaptive leadership's impact on actor agency and the role that agency (choice) plays in team performance. Adaptive leadership's direct impact on team performance defies the expectation of a linear relationship, but the U-shaped relationship is, in our opinion, consistent with the very nature of adaptive leadership. These points will be further expanded below.

The results provided significant support for the mediating role of actor agency on adaptive leadership and team performance. This suggests that adaptive leadership practices indeed enable individuals to exercise more choice regarding their connectivity with distributed team members, which in turn enhances team performance. This finding supports the theoretical links between actor agency and performance (Cousins and Robey, 2005) and connectivity and team performance (Kolb, Collins and Lind, 2008). A practical implication that can be drawn from this finding is that distributed teams need to promote sufficient levels of agency in order to be successful. Also, given the fact that the performance measures of this study included

"innovativeness," the finding is consistent with the notion that high levels of actor agency lead to more innovative outputs (Collins and Kolb, 2012).

Support was also found for the positive mediation of team trust. This finding is consistent with the proposition that trust is associated with distributed team effectiveness (Handy, 1995; Jarvenpaa et al., 1998; Jarvenpaa & Leidner, 1999; Lu, Watson-Manheim, Chudoba, & Wynn, 2006; Peters & Manz, 2007). The findings of our study raise an alternative explanation for how to build trust in distributed teams. Without going into the extensive literature on team trust, it has been suggested that action, i.e., doing what you say you will do, leads to trust in mediated work environments (for example, Cummings et al., 2009). While that may be the case, adaptive leadership encourages, if not non-action, at least tempered intervention on the part of leaders with the end result of trust. We also suggest that adaptive behaviors promote norms of open communication and direct speech that allow team members to comfortably broach any perceived gaps between aspirations and reality. Despite the initial tensions they may create, signs that the leader is aware of (and willing to articulate) problems may communicate integrity, enhance shared understandings within the team, and thus evoke more interpersonal trust.

We also found support for a significant positive effect of team trust on collaborative culture, which in turn, positively impacts performance. This means that collaboration can be considered a partial and distal mediator of the relationship between adaptive leadership and team trust, which is not surprising. This supports the proposition by Peters & Manz (2007) that trust is one of the main antecedents of distributed team collaboration. Moreover, this finding is also consistent with the more general view that trust is a key component for any successful collaboration (Herzog, 2001).

Our post-hoc analysis shows that adaptive leadership has a direct, U-curvilinear impact on team performance. Adaptive work requires leaders to orchestrate conflict and raise the level of disequilibrium within a group until the tension reaches a productive zone (Heifetz et al., 2009a). Thus, we argue that adaptive leadership practices can initially be disorienting and disruptive to team members who are used to turning to their leaders for immediate answers and clarity. Subsequently, in any setting, adaptive practices may stimulate resistance and work avoidance from team members as a reactionary response to the increased disequilibrium and thus, create negative impacts on team performance. Moreover, resistance and/or backlash in distributed work may silently and invisibly undermine performance. Therefore, as our findings suggest, a small amount of adaptive leadership behavior may be treated with skepticism until the pay-offs for increased tension (and stress) are demonstrated. Of course, this lack of familiarity will be exasperated by differing cultural orientations to authority, power and calls from team members for more directive forms of leadership. The low point of the U-shaped curve could be seen as the middle of the 'swamp' wherein the going is tough and the performance rewards are shrouded by uncertainty. In this murky middle ground, the leader does not rush to resolve issues and members must grapple with asking the right question, getting up on the balcony and continually reframing the questions and answers that appear to be a 'way out of the swamp.' While this type of process is challenging in face-to-face environments, their 'wickedness' increases exponentially in mediated settings. The work of virtual and distributed teams has to date been focused on clarity and certainty, but where there is a lot at risk, adaptive leadership eschews expert certainty for provocative uncertainty, seeking more robust performance in the long run.

Overall, the combination of positive and curvilinear associations identified in this study suggests that in distributed teams, adaptive leadership is most effective when practiced extensively. It appears that when inconsistently applied (say, if the leader "invites multiple perspectives" only half of the time as opposed to nearly always or very rarely), adaptive leadership reduces team performance. Such a mottled approach could be seen as dis-ingenuous or untrustworthy, especially when debate and dissent are welcomed, then disregarded. The results of this study support the theoretical notion that successful adaptive work requires leaders to orchestrate a significant level of conflict (Heifetz et al., 2009). Proponents of adaptive leadership may be encouraged to find that both effectiveness *and* efficiency can benefit from adaptive techniques, which suggests that asking the right question can be as important as finding a speedy answer. Interestingly, our data do not support the argument that too much adaptive behavior may create excessive levels of disequilibrium and thus hinder productivity and adaptive capacities, as suggested by Heifetz and colleagues (2009a). We agree with its theoretical protagonists in asserting that adaptive leadership is not for the faint of heart, but we have found that with frequent and consistent adaptive behavior, team members learn to adapt to high levels of disequilibrium and thus performance improves (as do trust, collaboration, and agency within the team).

Although more research is needed to determine the contingencies associated with adaptive leadership, our findings suggest that adaptive practices contribute to desirable outcomes in distributed work environments and therefore may be extended beyond collocated settings. In summary, while we do not propose adaptive leadership as the be-all/end-all solution to the challenge of working through wicked problems, we do view adaptive leadership as a critically important approach in such settings.

Limitations and Research Implications

As one of the first empirical tests of the impact of adaptive leadership on distributed team performance, it is essential that follow-up studies further validate our adaptive leadership scale. We have exercised measurement parsimony, and acknowledge that our measures of adaptive leadership might be extended in future research to capture other important behaviors, attitudes and skills associated with adaptive leadership. And, although we have taken elaborate steps to ensure confirmatory fit among the latent constructs, the significance of the relationships may have been inflated due to common-source bias. Finally, our post hoc analysis of the curvilinear association needs to be replicated to provide greater support for the U-shaped association identified in this study.

To further our understanding of adaptive leadership effectiveness it would be useful to employ longitudinal studies that track the changes in team members' reactions toward varying levels of disequilibrium and adaptive work. Qualitative data, such as responses during structured or unstructured interviews, may also be useful in capturing further insight on the question of "how much and what kinds of adaptive leadership behavior are optimal for team performance?" Future studies could also consider analyzing the relationships between adaptive leadership and the various sub-constructs of the variables analyzed in this study (such as employee empowerment, cognitive vs. relational trust, perceptions of connectivity, task vs. contextual performance, and so on). Finally, hypotheses tests of adaptive leadership effectiveness in contexts other than that of distributed teams (e.g., cross-cultural collocated teams) may contribute to our understanding of the generalizability of adaptive leadership theories.

We hope others will join us in further exploring adaptive leadership as a means to address the complexity of leading global distributed teams. We have described such teams as 'wicked'

environments because we believe their complexity cannot be overstated or successfully addressed using conventional command-and-control leadership models and/or leader-centric approaches. Leading distributed teams requires the most advanced forms of leadership we can imagine. Adaptive leadership calls upon not just the 'leader,' but the whole complex adaptive system to raise awareness of its own perceptual traps, co-create future possibilities and then to act, while constantly asking the difficult questions of each member within the system. Since complexity and mediated environments are likely to become the rule rather than the exception in the future, we are pleased to have made a small step in understanding how adaptive leadership may help us navigate and succeed in such 'wicked' environments.

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Table 1

Descriptive Statistics and Correlations

Variable	M	S.D.	Alpha	1	2	3	4	5	6	7
1. Adaptive Leadership	3.95	.93	.91							
2. Team Performance	3.37	.79	.83	.10*						
3. Collaborative Culture	4.09	.86	.90	.43**	.34**					
4. Team Trust	4.22	.73	.77	.51**	.32**	.71**				
5. Actor Agency	3.17	1.03	.84	.29**	.14**	.20**	.30**			
6. Time Devoted to Project (%)	64.36	34.73		-.04	.08*	-.01	-.01	-.06		
7. Current Team Memberships	2.26	2.43		.06	.13**	.03	.07	.08	-.28**	
8. Team Size	32.41	81.63		-.09	-.05*	.01	-.04	-.16*	.26**	-.14

* Correlation is significant at the .05 level (2-tailed)
** Correlation is significant at the .01 level (2-tailed).

Table 2

Model Comparisons Fit Statistics

Measurement Models	$\chi^2(df)$	$\Delta\chi^2(df)$*	**SRMR**	**CFI**	**RMSEA**
Model 1	743.08		.06	.92	.07
Measurement Model	(199)				
Model 2	2151.40	1407.32	.11	.76	.12
Adaptive Leadership and Collaborative Culture combined	(246)	(47)			
Model 3	1637.77	894.69	.09	.82	.10
Adaptive Leadership and Team Trust combined	(246)	(47)			
Model 4	1883.28	1140.20	.10	.79	.11
Adaptive Leadership and Actor Agency combined	(246)	(47)			
Model 5	1695.78	952.70	.13	.82	.10
Collaborative Culture and Team Trust combined	(247)	(48)			
Model 6	1988.00	1244.92	.10	.78	.11
All mediators combined	(249)	(50)			
Model 7	3065.09	2322.01	.12	.64	.14
Adaptive Leadership and all mediators combined	(251)	(52)			
Structural Models					
Model 8	1143.87	266.94	.09	.87	.08
Consistent with all of the hypotheses	(243)	(-20)			
Model 9	1090.25	213.32	.09	.87	.08
Inclusion of an unmediated path from Adaptive Leadership to Team Performance	(242)	(-21)			
Model 10	805.68	-71.25	.06	.91	.07
Additional inclusion of a path from Team Trust to Collaborative Culture	(241)	(-22)			
Model 11 (Final Model)	876.93		.06	.91	.07
Specification of a curvilinear, unmediated association between Adaptive Leadership and Team Performance	(263)				

* Models 2 through 7 are compared to Model 1. Models 8 through 10 are compared to Model 11. All $\Delta\chi^2$ significant at the .05 level

Table 3

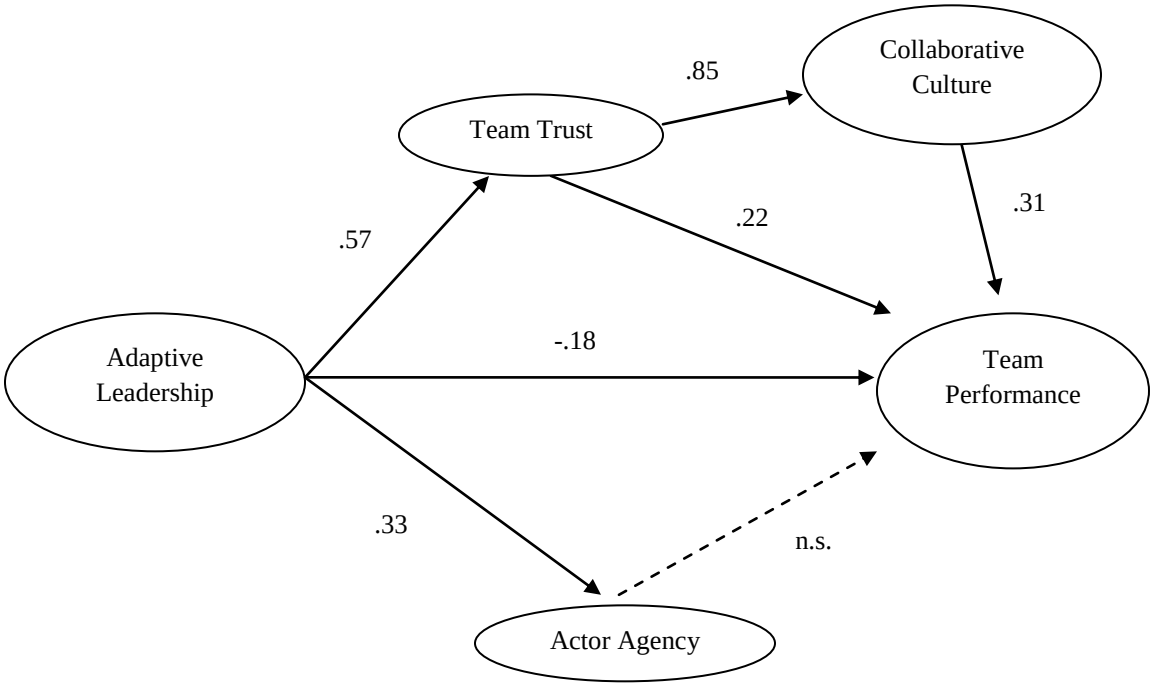
Validities and Reliabilities

Construct	CR	AVE	MSV	ASV
Adaptive Leadership	.92	.65	.31	.17
Team Performance	.85	.51	.20	.11
Collaborative Culture	.89	.74	.72	.31
Team Trust	.78	.55	.72	.34
Actor Agency	.83	.56	.14	.09

Notes: CR = composite reliability, AVE = average variance explained, MSV = maximum shared variance, ASV = average shared variance

Figure 1

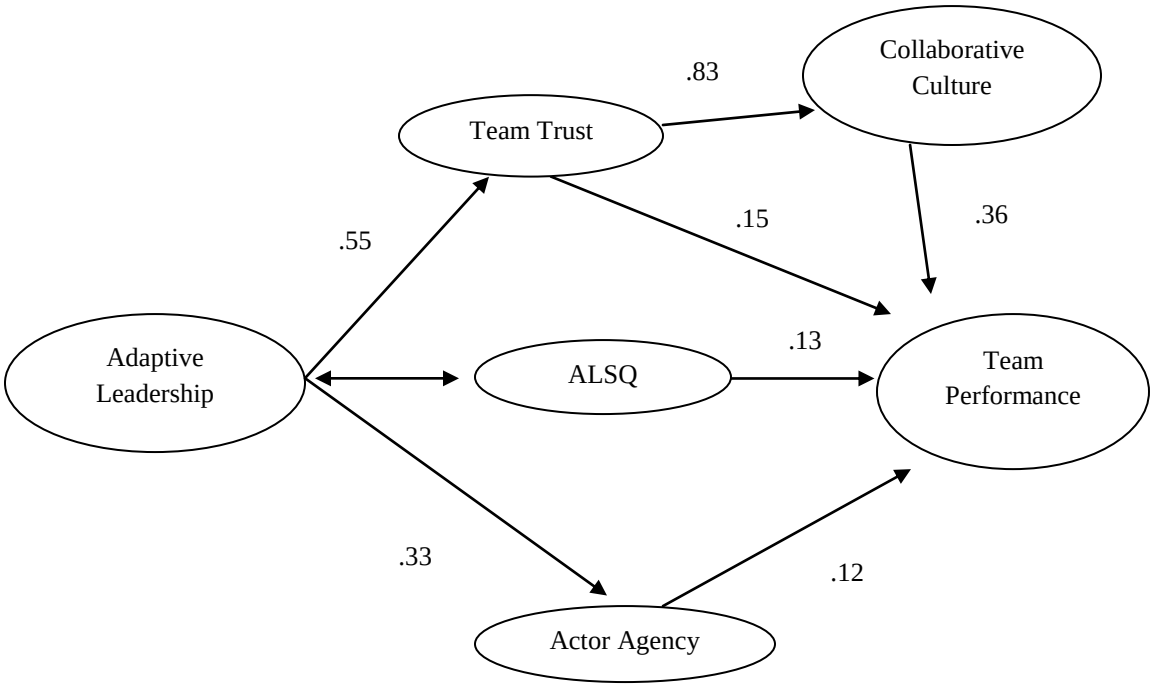
Path Coefficients and Significances—Initial Model



Note: All path coefficients are significant at the .05 level

Figure 2

Standardized Path Coefficients—Final Model



Notes: ALSQ=Adaptive Leadership-Squared

Although control variables are not included in this figure, the coefficients shown reflect their influence

All path coefficients are significant at the .05 level