

## Cohesion and performance in global virtual teams: the moderating role of technical skills

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### **Abstract:**

This study assesses the extent to which cohesion affects performance in global virtual teams (GVTs) and whether this effect depends on team members' technical skills. Results indicate that the interaction between team cohesion and team members' technical skill explain additional variance in team performance over and above the main effects of team cohesion and team members' technical skill alone. Specifically, team cohesion is positively and significantly related to team performance when team members' skills are high, but is not significantly related to team performance when team members' skills are low. Based on the empirical results, the influence of cohesion on team performance should be predicated on the team type and characteristics. This study suggests the existence of boundary conditions to the cohesion-performance relationship and proposes the use of the concept of 'expeditious cohesion' in GVTs and managerial practice.

**Keywords:** global virtual teams | cohesion | team performance | technical skills | x-culture

### **Article:**

## **1 Introduction**

Research on groups and teams has long recognised the importance of within-team relationships and in-sync actions of team members devoted to the accomplishment of a common goal (Man and Lam, 2003). Two closely-related constructs that capture these team relationships and actions are 'cohesion', defined as the dynamic process reflected in the tendency of team members to work together in pursuit of task-related work and social unity objectives (Stahl and Maznevski, 2021), and 'cohesiveness', the manifestation of cohesion in the form of resistance of the team to disruption (Stahl et al., 2010). Embedded in this research is the assumption that teams cannot perform well in the absence of cohesion, and especially so when there is high cultural diversity in teams (Sargent and Sue-Chan, 2001). This is especially evident in the emerging literature of global virtual teams (henceforth GVTs), defined as electronically connected workgroups of geographically dispersed team members in multinational settings (Taras et al., 2021), where home country differences

produce country-of-origin effects and peer evaluations biases (Tavoletti et al., 2022) that are harmful to motivation and team productivity (Tavoletti et al., 2019).

Nevertheless, literature research in this area has not steered clear of ambiguities, manifested in the form of some confusion, inconsistency and equivocal results (Carron and Bradley, 2012), with unrealistic expectations about the role of cohesion in generating team performance.

A source of these ambiguities and, at times, conflicting research findings may be the inclination to overlook both enablers and limitations of the cohesion-performance relationship (Webber and Donahue, 2001). Specifically, cohesion does not boost team performance for every team and under any circumstance. For instance, Carron and Bradley (2012) suggested that socially-triggered cohesion that is less-anchored in accomplishing the team's work-related goals can be detrimental to team performance. That is, in teams that do not prioritise teamwork goals or where members come together mainly for social benefits, team performance may suffer. However, past meta-analyses on the relationship between cohesion and performance show a positive correlation (Chiochio and Essiembre, 2009), which more recent studies specifically confirm for GVTs (Paul et al., 2016).

However, teams do not emerge and develop in the same manner and may have different characteristics. Some teams have access to a plethora of resources, while for other teams, resources may be scarce or affected by shortages. In particular, GVTs may suffer from less social integration and resort to cultural intelligence (Li et al., 2017) to pursue social integration and improve performance (Richter et al., 2021). Just like any other type of team, GVTs perform better to the degree to which team members work well together, have good interpersonal relationships and are affectively committed to the team and other team members (Taras et al., 2019). The 'chemistry' created by effective interactions between team members supplements the contributions brought to the team by each member and closely resembles cohesion. This is manifested in the form of behaviours that facilitate the interaction and collaboration between team members, such as mutual performance monitoring and awareness of individual and team progress toward the achievement of team goals (Jimenez et al., 2017). It also entails backup behaviour and mutual task-related support, as well as continuous adaptation of team efforts to changing demands of team activities (Salas et al., 2005). Cohesion within teams produces trust, mutual understanding and appreciation, and reduces conflicts; the presence of conflicts is associated with lower intrateam trust, which in turn may influence team structure by (1) reducing individual autonomy and (2) loosening task interdependencies in teams (Langfred, 2007).

Meanwhile, GVTs face more challenges than face-to-face or co-located teams because of significant differences between team members and geographic dispersion that requires virtual communication (Chudoba et al., 2005). On the one hand, differences among team members in such characteristics as network positions and knowledge access create opportunities for virtual teams to combine varied resources and perform better than co-located teams. On the other hand, interactions between team members, understanding each other and building cohesion, manifested in the form of within-team attraction, understanding, empathy and harmony, tend to be more challenging. These teams may experience clarity and consensus hindrances that can create communication, trust and coordination barriers (Gibbs, 2009).

Most likely, the concept of cohesion can emerge as a state nurturing a high level of commitment to the team, and team unity captures interactions, relationships and affective commitment of team members. Cohesive teams stand united and, accordingly, may perform better

than other teams, while incohesive teams may experience more division and accordingly, fail more often. While a strong body of research literature supports the direct and positive impact of cohesion on performance, the nature of the cohesion performance relationship in GVTs may be more nuanced and deserves more attention (Stahl and Maznevski, 2021).

This manuscript focuses on the effects of cohesion on team performance and the nature of the cohesion-performance relationship in GVTs. We also investigate the potential role of team members' technical skills in the relationship between cohesion and team performance. Our research question centres on the degree to which the relationship between cohesion and team performance is influenced by the team members' level of technical skills. Specifically, we investigate if team members' level of technical skills can enhance or diminish the strength of the relationship between the cohesion and performance of the team, adding to the literature that focuses on other moderating influences, such as the team members' cultural intelligence (Presbitero, 2020a, 2020b; Rosenauer et al., 2016).

In terms of the outline of this manuscript, first, we review the literature and draft our hypotheses as emerging from it: we look at the determinants of performance in teams that go above and beyond the simple sum of the individual contributions of team members, paying special attention to team cohesion; we explore the possible relationship between team members' technical skills and team performance. Then, we analyse a research model designed to determine whether the relationship between cohesion and performance differs according to the level of members' technical skills. Lastly, we discuss our research findings and propose an extended view of the cohesion construct. We develop our working hypotheses and test them using X-Culture data, an experiential global virtual teamwork exercise, in which participants from all over the world work in teams to address specific business problems experienced by actual international businesses (Taras et al., 2013).

## **2 Theoretical background and research hypotheses**

In the following sections, we review the most relevant literature on cohesion and performance in GVTs, including the most relevant factors influencing the relationship. We conclude with three main hypotheses that emerge from the literature.

### ***2.1 Categorisation-elaboration model***

The emergence of cohesion in GVTs is likely to be laborious and time-consuming. Attenuating individual differences and synchronising efforts may require more time spent together by the GVT members. In support of this view, faultline theory (Van Knippenberg et al., 2010) suggests that faultlines divide team members based on deep-level differences, such as cultural values. Faultline theory underscores the restricting effect of deep-level differences (Stahl et al., 2010), such as cultural values and attitudes disparities on interpersonal collaboration within teams.

Furthermore, other cultural differences, such as linguistic impediments (Zakaria, 2017) and physical separation (Taras et al., 2019), can affect communication and information exchange in GVTs. The development of cohesion and collaboration may be further deterred due to obstacles to the exchange and integration of information between individual team members with distinctive values and attitudes. Extrapolated to the GVT level, individual level dissimilarity may reduce the quality and quantity of viewpoints and opinions that are shared by all team members (Richter et al., 2021) and reduce team performance (Van Knippenberg et al., 2010). All these potential

developments can diminish team collaboration, reduce the interpersonal attachment component of social cohesion (Friedkin, 2004), and subdue team performance.

Another theoretical perspective, the categorisation-elaboration model (Van Knippenberg et al., 2004), holds that cultural differences between team members give room to intergroup bias flowing from social categorisation processes and information elaboration processes. This model defines social categorisation in terms of the individual team member's tendency to categorise similar others into in-group and dissimilar others into out-group, whereas intergroup bias refers to more favourable responses toward ingroup than out-group. Information elaboration is defined as the exchange, individual level process, discussion and integration of information and perspectives. According to this model, individual differences weaken social integration, well-being and performance through intergroup biases that are associated with negative affective-evaluative reactions to dissimilar others but enhance performance through information elaboration (Van Knippenberg et al., 2004).

While the categorisation-elaboration model supports the suggestions made by faultline theory that cohesion is difficult to build in GVTs, it diverges from the theory, hinting that GVTs' performance may still be enhanced, even without strong cohesion. The path toward enhanced performance passes through advanced information elaboration. However, advanced information elaboration can likely occur only to the degree to which individual team members have the technical skills that equip them to benefit from understanding and analysing a richer portfolio of ideas and problem-solving approaches. Technical skill is defined as the 'understanding of, and proficiency in, a specific kind of activity, particularly one involving methods, processes, procedures or techniques' (Katz, 1955, p.34).

## ***2.2 Individual and team performance***

Teams need skilled and high-performing members to meet their goals, deliver the products or services that they are tasked with and perform well. Individual work performance is emphasised in the performance management research (Sonnetag and Frese, 2002) as a function of three factors: (1) what the individual knows and can do (i.e., knowledge and abilities); (2) what the individual is willing to do (i.e., motivational constructs) and (3) how factors outside the individual's control impact that individual work performance, positively or negatively (i.e., situational opportunities or constraints). In multiple studies (Van Iddekinge et al., 2017), motivation and different types of abilities, such as cognitive abilities, are consistently linked to performance.

Teams are work units, with at least two members, characterised by: dynamic social interaction with meaningful interdependencies; shared and valued goals; clearly assigned roles and responsibilities; distributed expertise and discrete lifespan (Salas et al., 2007). Teamwork performance is influenced, to a large extent, by the team members' motivation, knowledge and abilities (Tjosvold and Yu, 2004), but can also be influenced by other team-relevant factors that are not directly related to individual performance (Troost et al., 2016). One of these factors is the degree to which teams act as one, in consonance, that is, the degree to which team members agree with each other, pursue compatible ideas, and act in unison. Under favourable circumstances, when team effort, and team members' efforts result in a level of performance that is greater than the sum of individual team members' performances (Stashevsky and Koslowsky, 2006). On the opposite, team performance lower than the sum of individual team members' performances can occur when team members do not act in consonance.

Virtual teams are self-managed knowledge work teams with distributed expertise that develop to solve a specific problem or address a common objective (Kristof et al., 1995). In virtual teams, individual members work across space, time and cultures on interdependent tasks, using information and communication technologies and collaborate online to achieve a common goal (Maznevski and Chudoba, 2000). Accordingly, team members may have limited communication and rely on technological mediation to interact, achieve goals and increase team performance. Technology interacts with the team task to make the impact on team interactions and outcomes less straightforward (Driskell et al., 2003). Unlike co-located team members, virtual team members can overcome time and space constraints, but have limited social context and less social rapport, facing obstacles in coordinating team effort. They also miss para-verbal cues (e.g., tone and voice volume, inflexion) and non-verbal cues (e.g., eye movement, facial expression hand gestures) that help clarify communication, especially in cross-cultural encounters. The impact of these factors on virtual team performance can be more nuanced, given that the coordination tends to be delayed and communication between virtual team members tends to be prolonged, fragmented and less rich than they are in co-located teams (Cox and Tung, 1997). Virtual team performance may also be influenced by the ability and the willingness of team members to use information and communication technologies. Virtual team members cannot duplicate the normal give and- take of face-to-face discussions, especially when team members have not personally met. Accordingly, it is difficult to identify compatibilities between team members, reach consensus and act in consonance in virtual teams. Most likely, it is more challenging for virtual team members to act as one entity and build the level of cohesion that enables consonance-acting.

The current research into the performance management of virtual teams is scarce, fragmented and gives limited managerial advice (Al Sakkaf and Stilley, 2019). Accordingly, shedding more light on the true relationship between work performance and its determinants in GVTs has the potential to form a more accurate, coherent, and comprehensive image of the performance determinants and contribute to a better understanding of the design and leadership of global virtual teamwork.

### ***2.3 Cohesion and team performance***

The widely accepted definition of group cohesiveness accounts for ‘the resultant forces acting on the members to stay in a group’ (Festinger, 1950, p.274). The construct of cohesion is defined as the shared bond/attraction that drives team members to stay together and to want to work together (Casey-Campbell and Martens, 2009). This construct captures the idea of union within the team or ‘togetherness’ and is viewed as a necessary antecedent for high-performing teams.

Tekleab et al. (2009) and Man and Lam (2003) defined cohesion as the degree to which members of a team are attracted to each other, motivated to work together and develop strong emotional bonds to the team. Unlike in cohesive teams, in incohesive teams, members are less motivated and less likely to participate in the ‘teaming’ behaviours that enable a multitude of positive team outcomes. The dynamic process, reflected in the tendency for team members to stick together and remain united in the pursuit of the team’s instrumental objectives and satisfaction of members’ affective needs, is referred to as cohesion by Carron et al. (1998).

In this study, we focus on determinants of the relationship between GVTs’ performance and cohesion. If virtual teams are to perform well, they have to possess task-relevant knowledge and abilities, as well as technical abilities that would allow them to rely on using information and

communication technologies. Moreover, these teams' performance also depends on team members' motivation, which goes beyond the team members' individual motivations, to include the team motivation described as the desire to work together as one entity.

Arguably, cohesion can be seen as a good proxy for team members' desire to work together in a team. While teams differ in their cohesion, team members can be motivated to work together for many different reasons. Some teams are cohesive because the members have spent a great deal of time together, or the team's small size facilitates higher interaction, or the group has experienced external threats that have brought members closer together. Examining reasons why team members enjoy working together, Stashevsky and Koslowsky (2006) and Driskell et al. (2003) mentioned interpersonal attraction, bonding, shared understanding, task commitment, trust, group pride, and positive reciprocity toward and loyalty to fellow team members. All of these reasons can be interpreted as components of cohesion that can account for team performance. The starting premise of our study is that team cohesion and team performance are directly and positively related.

Relational emergent states, like cohesion that emerge over time as team members interact, are considered critical for team performance (Marks et al., 2001). Yet, their dynamic characteristics do not make interpreting the true nature of their impact on performance easy. Given these intricacies, the cohesion-performance relationship can be better understood while considering other intervening variables and by teasing out the conditions under which the expected positive or negative outcome is derived. It is not clear that cohesion, by itself, is an essential antecedent of team performance. It is reasonable to explore other factors that may uniquely influence performance and the relationship between cohesion and team performance. Moreover, it may be that, under certain circumstances, cohesion may misdirect team members' efforts, potentially leading to poorer performance of a cohesive team when compared to incohesive teams. Taking this argument to an extreme, it makes sense to inquire if cohesion can vilify team performance. With this possibility in mind, we seek to disentangle the performance impact of other variables and clarify processes that could muddle or confound the relationship between team cohesion and team performance.

In support of this line of thought, previous research studies (Gammage et al., 2001; Mullen and Copper, 1994) investigate the relationship between cohesion and performance and find that the cohesion-performance relationship depends on performance-related norms established by each team. The more cohesive the team, the more its members will follow its goals. According to this research, if performance-related norms, such as quality work and honest collaboration, are high, a cohesive team will perform better than a less cohesive one (Gammage et al., 2001). However, if cohesion is high and performance norms are low, performance will be worse than in the case of high performance-related norms and high cohesion. Gammage et al.'s (2001) researched findings further suggest that if cohesion is low and performance norms are high, performance increases, but less than in the high-cohesion and high-norms situation. Where cohesion and performance-related norms are both low, there will be no significant effect on performance. It is also important to clarify whether the third variable that influences the cohesion-performance relationship intervenes (i.e., mediates) the relationship or influences the magnitude of that relationship (Muller et al., 2005).

Nonetheless, other research findings suggest the existence of a positive feedback loop or virtuous cycle in the cohesion-performance relationship during the early stages of team development. Specifically, Braun et al. (2020) revealed that cohesion and performance have a reciprocal relationship, such that cohesion leads to increased performance, which then predicts subsequent cohesion. These findings that suggest the existence of such a positive reciprocal

relationship between cohesion and performance are consistent with the results of a meta-analysis performed by Mathieu et al. (2015). These meta-analysis results suggest that the cohesion-performance relationship grows stronger over time and is significantly higher than the performance-cohesion relationship that remains fairly consistent over time. Furthermore, Mathieu et al. (2015) found that the average team members' academic competencies are related positively to team performance but are unrelated to cohesion. Conversely, shared leadership is related positively to cohesion, but not directly related to team performance.

Current research suggests the existence of a relationship between team cohesion and its performance, as well as explanatory mechanisms that can account for this relationship. The results of a meta-analysis led by Beal et al. (2003) focused on the task explanatory mechanism, revealing that cohesion enhances responsiveness and interpersonal cooperation and increases the frequency of communication, which facilitates the understanding of roles and tasks. Accordingly, members of cohesive teams tend to be more committed to their team and more motivated to complete collective tasks. Meanwhile, Rosh et al. (2012) explained the relationship between cohesion and performance through social explanatory mechanisms, described by the social attraction between cohesive team members that helps develop collective pride and leads to high team efficacy. Therefore, we make the following first hypothesis:

H1: Team cohesion will positively influence team performance.

Other research findings do not show the reciprocal relationship between cohesion and performance but highlight variables that interact with cohesion and shape its impact on team performance. How social and task cohesion influence team processes are predicated on the role of the team members' differences with regard to the personality and goal orientation on cohesion (Acton et al., 2020). Looking at the impact of cohesion from a different standpoint, Paul et al. (2016) suggested that team cohesion mediates the impact of coordination effectiveness, specifically coordination of knowledge, on the performance of GVTs. Furthermore, they find support for a reciprocal trust-cohesion relationship, suggesting that effective coordination in GVTs can create a positive feedback loop with trust and cohesion, which improves overall performance.

Paralleling different and, at times, incongruous research findings regarding the impact of cohesion on performance, prior empirical evidence of the effects of cohesion is both mixed and somewhat idyllic. That is, cohesion is not always portrayed as conducive to high performance, while the size, direction and nature of the cohesion-performance relationship is somehow inconsistent. Cohesion is at times a direct predecessor of team performance, an indirect influencer of team performance at other times and even a consequence of team performance some other times, opening the door to different interpretations. In an attempt to address these inconsistencies, we explore boundary conditions of the cohesion-performance relationship to identify constructs and influences on which this relationship is contingent.

#### ***2.4 The moderators of the relationship between cohesion and team performance***

As we discuss above, cohesion and performance relationships can depend on many other factors, albeit related or unrelated to each other. In other words, if we can depict a picture of that relationship, it will resemble a bumpy road. Most presumably, there will be some external or internal influences at the personal, task-level, or organisational levels; however, their nature might be. According to AlRawi (2008), cohesion is such a construct that, to be effective, it has to be

explored in light of certain requirements, including but not limited to team member intelligence and skills, team conflict, participation propensity, cooperative behaviours, leadership skills, value and performance commitment. In fact, in his study, where he explores the role of team cohesion on team performance with team samples from public sector organisations, AlRawi (2008) found that the influence of cohesion is predicated on a multi-component structure that particularly involves intelligence and skills. In a recent study by Lvina et al. (2018), team political skill has a determining influence over both subjective and objective team performance through cohesion. This construct incorporates certain soft skills (social astuteness, interpersonal influence, networking ability and apparent sincerity) (Ferris et al., 2008), which are very conducive to the social environment of teams. In their study, team political skill significantly impacts objective task performance through group task cohesion. Here, the important thing to note is that team political skill is defined as the team-specific capability, which is usually inimitable and leads to effective use of some other team resources such as technical skills and/or mental ability.

In their meta-analysis study, which looks at the reciprocal team cohesion performance relationships as impacted by shared leadership and members' competence, Mathieu et al. (2015) found the significant role of academic competence over team performance, but not so much on team cohesion.

The relationship between cohesion and performance is also examined in light of some contextual variables such as the type of task and the team setting. In a meta-analytic study that reviews certain disparities between project teams, production teams, and service teams, Chiochio and Essiembre (2009) come up with interesting results on significant influences of team types such as project teams that have imperative outcomes for team cohesion and performance relationship. The authors argue that project teams entail less monotonous and more complex aspects of work, such as planning and dealing with uncertainty that require a rich pool of knowledge, skills, and abilities.

Overall, it seems so far to be evident that a cohesive team cultivates an environment that is conducive to the exchange of ideas, constructive debate and learning that leads to thoughtful decisions. Wong (2004) argued that team cohesion enhances team learning 'by increasing the motivation, trust and cognitive familiarity for productive inquiry' (p.647). In the same vein, Bossche et al. (2006) suggested the existence of a positive relationship between the two constructs. Subsequently, team learning constitutes the process through which team performance is achieved. In cohesive teams, members are more likely to seek feedback and discuss errors. In support of this idea, Zellmer-Bruhn and Gibson (2006) found that team learning increases task performance and the quality of interpersonal relationships.

Several studies show that technical skills are relevant for increased team performance. Liu and Cross (2016) suggested a comprehensive model of project team technical performance in which the skills of the team members are especially influential over the innovation as a technical performance outcome. Concerning project management-related skills, Larsson et al. (2018) found significant associations between hard project management practices such as careful planning, information sharing and tight control and process performance, albeit through significant involvement of team motivation, as a separate variable.

Addressing these inconsistencies, in this study, we search to identify how cohesion leads to higher performance and explore whether technical skills play a moderator role in the relationship between cohesion and performance. We propose that team cohesion will be positively related to team performance, but the strength of this relationship will be increased when the levels of technical skills of the team members are higher and decreased when they are lower.



As for technical skills (Katz, 1955), the most overarching point of view related to how technical skills influence performance comes from the famous job characteristics model of Hackman et al. (1980), which involves a list of tasks and individual characteristics that should render a job more motivating for individuals. According to the model, for a job to be fulfilling and highly motivating, the task needs to be significant, meaning it has to incorporate a type of work that is somewhat indispensable for the organisation as a whole; it also needs to provide a sense of identity by leading the individual to take ownership of the task from start to finish, and it has to lead the individual to be able to use his/her skill in a variety of ways by providing enough challenge/difficulty. In addition, it has to be meaningful, and the employees should be able to derive some type of feedback through what they do and achieve as part of their work outcome. Since the cohesion and performance relationship is discussed along the lines of several factors that we outline above, it might already be evident that some task characteristics such as skill variety could be one of those factors that might increase work motivation and, therefore, performance. Accordingly, we make the following second hypothesis:

H2: Team members' technical skills will positively influence team performance.

Some studies point to the direction of the possible influence of 'team skills' over cohesion, performance, or over the relationship of both variables. Understandably, these are studies with conflicting and uncertain quality, which lend themselves heavily to the perplexities of study designs, contexts and variables. In fact, in a report that outlines the results of a meta-analytic integration, Mullen and Copper (1994) demonstrated that the relationship between cohesion and performance is more evident in correlational studies, but not so much in experimental studies. Commitment to the task is a stronger variable that explains the relationship between cohesion and performance compared to interpersonal attraction. These all help us move towards the consideration of the 'skills' component in the cohesion performance relationship in GVTs. Then, we make the following third hypothesis:

H3: Team members' technical skills will moderate the relationship between team cohesion and team performance, such that this relationship will be stronger for teams composed of individuals with a high level of technical skills than teams composed of individuals with a low level of technical skills.

### **3 Research design and methodology**

#### ***3.1 Sample***

The data are collected from individuals who participate in global virtual teamwork as part of the X-Culture project. This project is a large-scale international experiential learning activity that includes business students working in international teams with peers from around the world to solve business problems presented by actual multinational companies. The total number of participants in the first semester of 2016, the one we use for this study, is 3001 individuals working in 679 GVTs. Since our hypotheses are related to teams and team performance, we eliminate teams with fewer than three members, missing or incomplete data, particularly in variables related to the participants' preparation for participating (i.e., readiness score), team cohesion, and team performance. Ultimately, the sample of this study consists of 1989 participants working in 463

teams. Table 1 shows frequencies and percentages of gender, age, level of studies, work experience and top countries in the sample. The age ranges from 18 to 50 years (see Table 1).

Table 1 Sample characteristics

	Variable	%
Gender	Male	44.1
	Female	55.9
Age	18–21	7.8
	22–24	52.4
	25–30	20.8
	31–40	12.2
	41–50	1.7
Work experience	Never had a job	17.4
	Less than 1 year	16.2
	1–3 years	34.6
	4–10 years	26.9
	10+ years	4.8
Level of studies	Undergraduate	47.4
	Master's	20.1
	EMBA	1.8
	Working professional	0.4
Home Country (Top 10)	USA	35.5
	Colombia	10.7
	Brazil	8.2
	Malaysia	6.2
	Pakistan	5.0
	Italy	4.7
	Peru	4.4
	China	2.6
	Oman	1.7
	South Korea	1.6

Note: N=1989.

### 3.2 Measures

Team performance: We use the report evaluation score as indicative of team performance. The reports are related to a final project about producing a real-life solution to different real-life business challenges presented by the project's corporate clients. The business problems include preparing a business plan, conducting market research and developing a strategy associated with an actual organisation. The reports are graded by four to seven independent experts such as business professors and company representatives. The evaluation criteria include the economic feasibility of the recommendations, originality, arguments, style and presentation. A total of 24 questions evaluate teams' overall performance. Some of the evaluative items are: 'Economic feasibility of the ideas', 'Novelty/Creativity of the ideas', 'Quality of the product design section',

‘Readability and Formatting’ or ‘Overall quality’(see Appendix 1 for all items). An average score across all these criteria is calculated on a seven-point scale (1= worst, 7= best).

Team members’ skills: We use participants’ readiness test scores as a measure of team members’ language and technical skills. The readiness test includes questions related to the following specific knowledge, skills and abilities: knowledge of the procedures and the Culture X project content, planning skills, analytical skills, project management skills, foresight/proactivity and felt responsible for teamwork and outcomes. These skills are measured at the individual level, and many studies listed above also use similar units of measurement. Higher scores indicate a higher level of skills, with a maximum score of 1. A minimum of 45 items out of 56 items (80% of them) correctly answered is the required criteria to be selected in the project. Some of the items are: ‘What is the best tool to have one place for the entire project, a place where all the files, discussions and other project materials are stored and are accessible to all project members?’, ‘Where can you find the due dates schedule for the project?’, ‘How the final team reports should be submitted?’ and ‘What happens if the team has members who are not actively participating in X-Culture?’(see Appendix 1 for all items). A higher score indicates a higher level of skills with a maximum score of 1.

Team cohesion: The challenge of measuring cohesion has a long history, and Mudrack (1989) highlighted that one possible explanation of the inconclusive findings that characterise this literature is that no two studies he reviews operationalise cohesion in the same way. We measure cohesion using an average score of peer evaluation on several indicators, including effort, intellectual contributions, writing abilities, coordination and communication of each team member, during the entire project, on a five-point Likert scale from 1 (low identification and commitment) to 5 (high identification and commitment). Some of the items are ‘How closely have you worked with this person during the project?’, ‘Intellectual contribution, quality of the ideas’, ‘Effort, helpfulness’, ‘Nice, friendly, positive?’ or ‘Help with writing the report during the entire project’ (see Appendix 1 for all items). The six items are measured with a fivepoint Likert scale from 1 (low identification and commitment) to 5 (high identification and commitment). The use of average on the team level for team cohesion is supported by Richter et al. (2021), and Appendix 1 reports details about the adopted survey.

Control variables: Following recommendations by Nielsen and Raswant (2018), team size and gender diversity are controlled in the current study. First, we control the team size of GVTs because this variable may affect team functioning (Martins et al., 2004). Because team diversity is shown to influence team functioning, thus affecting team performance (Taras et al., 2019; Jaiswal and Dyaram, 2019), finally, we use gender diversity as a control variable. The gender diversity index is calculated as 1.0 minus the absolute distance from a gender ratio of 0.50. The scores would thus range from 0.50 to 1.0, with 0.50 indicating perfect homogeneity (100% male or female) and 1.0 indicating perfect heterogeneity (50–50% male-female).

## 4 Results

The mean values, standard deviations and correlations between variables are shown in Table 2. Zero-order correlations yield interesting results. For example, while team members’ technical skill is significantly correlated to team performance ( $r = 0.27$ ,  $p < 0.01$ ), team cohesion is not significantly related to technical skills ( $r = -0.05$ ,  $p = 0.28$ ) and team performance ( $r = -0.01$ ,  $p = 0.75$ ).

Table 2 Means, standard deviations and correlations

Variable	M	SD	1	2	3	4	5
1. Team size	4.92	0.64	-				
2. Gender diversity	0.71	0.15	-0.05	-			
3. Team cohesion	3.90	0.51	-0.12**	-0.05	-		
4. Technical skills	0.86	0.03	0.14**	0.09	-0.05	-	
5. Team performance	5.01	0.77	0.12	-0.05	-0.01	0.27**	-

Note: \* $p < 0.05$ . \*\* $p < 0.01$ .

We use hierarchical regression analysis to evaluate the hypotheses (see Table 3). Before testing the moderation, all variables are standardised to make subsequent interpretations simpler and to avoid multicollinearity (Aguinis and Gottfredson, 2010). The interaction term is created by multiplying the independent variable (team cohesion) by the moderator variable (team members' skills) and using the product as another independent variable in the regression analysis.

Table 3 Regression analyses for team performance

Variable	Team performance		
	Step 1	Step 2	Step 3
Controls			
Team size	0.09*	0.06	0.06
Gender diversity	-0.06	-0.02	-0.03
Main effects			
Team cohesion		0.06	0.02
Team members' skills		0.20***	0.22***
Interaction			
Team cohesion x Team members' skills			0.08**
R2	0.016	0.085	0.102
Adjusted R2	0.011	0.076	0.091
$\Delta R2$	-	0.069	0.017
$\Delta F$	3.285*	15.458***	6.609**

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

In the first step, we conduct a regression of team performance on the control variables. In this analysis, team size is significantly related to team performance ( $\beta = 0.09$ ,  $p < 0.05$ ). However, gender diversity is not significantly related to team performance.

In the second step, team cohesion and team members' technical skill are introduced. According to the results from Table 3, team cohesion is not significantly related to team performance ( $\beta = 0.06$ ,  $p = 0.87$ ), but team members' skill is significantly related to team performance ( $\beta = 0.20$ ,  $p < 0.001$ ). The second step explains a significant increase in variance in team performance,  $\Delta R2 = 0.069$  ( $\Delta F = 15.458$ ,  $p < 0.001$ ). Thus, H1 is not supported, but H2 is supported.

In the third step, we enter the team cohesion x team members' skill interaction. The interaction is significantly related to team performance ( $\beta = 0.08$ ,  $p < 0.01$ ), indicating 0.017 increase in R2 ( $\Delta F = 6.609$ ,  $p < 0.01$ ). These results provide support for H3, according to which team members' technical skills moderate the relationship between team cohesion and team performance.

To identify the form of interaction, we follow Aiken and West's (1991) recommendations to perform simple slopes tests. In these tests, the slope of the relationship between team cohesion and team performance at high and low levels (one standard deviation above and below the mean) of team members' skills is estimated. The resulting graph is shown in Figure 1. The analyses show that team cohesion is positively and significantly related to team performance when team members' skill is high ( $\beta = 0.09$ ,  $p < 0.05$ ), but is not significantly related to team performance when team members' skill is low ( $\beta = -0.05$ ,  $p = 0.17$ ).

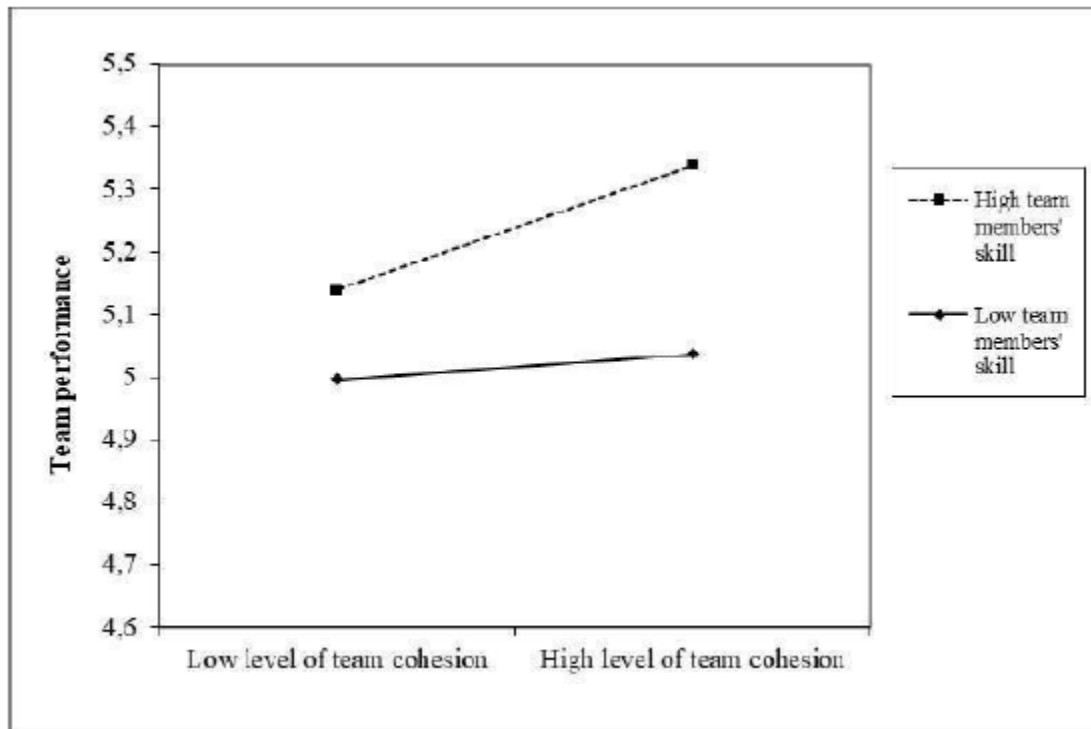


Figure 1 Team members' skills as a moderator of team cohesion and team performance

## 5 Discussion: expeditious cohesion in GVTs

### 5.1 Theoretical implications

In the context of teamwork research, an important objective is to design and implement team-building solutions and integrate cohesive teams. We examine if GVTs' cohesion impacts performance and if their members' technical skills influence the relationship between cohesion and performance. Our research findings suggest that cohesion has a statistically significant impact on team performance only when team members have a high level of technical skills. The impact of cohesion on team performance is not significant when team members have a low level of technical skills. Our interpretation of these empirical results rests on the idea that cohesion, as we know it from team research, is weaker in GVTs, setting the stage for a discussion of limitations of the positive impact of cohesion on team performance. As such, we suggest the existence of a boundary condition for the positive impact of cohesion: to influence team performance positively, team cohesion must either rise above a threshold, or its weaker impact must be compensated by other

performance-enhancing conditions. That is, additional conditions are required to be satisfied when team members interact remotely, and cohesion does not develop as much as it can develop in co-located teams. According to our research findings, a higher level of technical skills can compensate for weaker cohesion to foster performance in GVTs.

A team's cohesion is fundamental to performance. However, cohesion cannot always be a one-size-fits-all solution in that there are boundary conditions that both influence the circumstances that can generate team cohesion and moderate its impact on team performance. The relationship between cohesion and performance depends on characteristics of the cohesion and intervening factors that can enhance or diminish that relationship. There is no single way to account for the impact of cohesion on team performance. To shed more light on the cohesion-performance relationship, we analyse cohesion developed in GVTs and its interaction with team members' technical skills.

Cohesion may not maximise GVTs' performance in each circumstance. While the desire to find an easy approach to increasing team performance is understandable, the one-size-fits-all solution of building cohesion may amount, at times, to an unrealistic expectation. Cohesion and its impact on performance are more nuanced than any dimension or metric. It is neither simply a matter of how cohesive teams are nor is it concerned exclusively with the level of reciprocal understanding of the team members. Cohesion can impact team performance in strikingly different ways. Our empirical findings suggest that the impact of cohesion on team performance is moderated by the team members' technical skills, such that the cohesion-performance relationship is stronger when team members have high-technical skills. The relationship between cohesion and performance is not statistically significant when the technical skill level of the team members is low. Accordingly, we argue that quality cohesion, built upon the collaboration of technically skilled team members, can enhance team performance, while awry cohesion that occurs when team members do not have high technical expertise can derail team performance.

We acknowledge that the process of team development and interactions is more demanding and perilous in a virtual team environment than in co-located teams. Accordingly, developing cohesion in GVTs requires more resources, faces more challenges, is expected inherently to develop faster over a short period, and refers to cohesion developed in these teams as expeditious cohesion. To a certain degree, expeditious cohesion is analogous to the concept of swift trust explored by Meyerson et al. (1996). Just like swift trust involves relatively high levels of trustfulness and fast-developed confidence in the reliability of team members, expeditious cohesion implies relatively low levels of risk-aversion and adherence to precarious team accomplishments that are based on a limited set of interactions and common experiences. Without the benefits of verification, substantiation and constant confirmation over time, expeditious cohesion can unravel. However, in the context of fast-paced, short-lived, and, sometimes, non-acquaintance conditions that characterise many global virtual teamwork experiences, team members may not have the luxury of a long string of interactions, repeated assessments and continuous reassurance that would contribute to the development of a traditional, non-expeditious and form of cohesion. Under such circumstances, virtual team members may engage in as-if cohesive behaviours to facilitate team interactions and outcomes.

An imperfect form of cohesion, this expeditious form may have the greatest effect in weak situations, such as global virtual teamwork, that do not necessarily excel with regard to clarity, consistency and constraints, as described by Cooper and Withey (2009). Unlike in the cases of situational strength that provide clear and unambiguous cues regarding the desirability of behaviours, independent of the individuals' personalities or predispositions, weak situations are

less structured and more ambiguous. Weak situations tend to be less restrictive to the expression of individual differences in terms of actual behaviours (Mischel, 1999). Given the diversity of team members, actual and ideal skills and abilities levels and complexity of communication and collaboration, virtual teamwork involves a myriad of challenges that are less predictable and more provisional. Accordingly, desirable behaviours are described in broader terms, without the specificity and clarity of strong situations. All of these markers of low levels of situational strength set the tone for the development of expeditious cohesion that is exploratory and tentative (Stahl et al., 2010; Stahl and Maznevski, 2021).

*Expeditious cohesion* is also relevant to GVTs, given their short-time horizon. Arguably, if GVTs are tasked to address long-term and continuous challenges, they may eventually become co-located teams, with team members sharing a social context. Most likely, virtual teams tend to be temporary, as they are tasked with special projects that are more transient. As virtual team members are usually not drawn from a common social context, they are likely to accomplish tasks and goals that are unique and non-repetitive and that are more influenced by the individual accomplishments of virtual team members than by common-ground institutional, cultural or organisational contexts. In the context of such transitory teams and once-in-a-lifetime projects, Crockett et al. (2009) suggested that individual performance may influence team performance differently than contextual factors such as organisational oversight and deadline pressure. Specifically, Crockett et al. (2009) find that organisational oversight and deadline pressure have negative effects on team task performance, while individual performance has a positive effect on both team task performance and team cohesion. It may be that the relative free-flow of virtual teamwork as a temporal endeavour that is relatively less consequential than permanent and on-site teamwork can facilitate the development of a factual and one-time-only expeditious cohesion.

A different theoretical rationale for the occurrence of expeditious cohesion is based on research that suggests that people synchronise in different ways during their interactions (Feehly, 2021). According to this research, synchronisation occurs to build trust and similarity and can be observed at the physiological level (e.g., heart rates), demeanour (e.g., postures and gestures) and in-sync actions and behaviours. One of these manifestations, inter-brain neural synchronisation (Feehly, 2021) or inter-brain connectivity, happens between people who share functional links across their brains when they work together and have meaningful interactions. Inter-brain synchrony neurally binds people together and extends their consciousness (Valencia and Froese, 2020). In a team environment, the degree to which team members bind together, share unfolding experiences and consciously make sense of their team task may mirror team cohesion.

Certain characteristics of cohesion, seen as extended consciousness (Valencia and Froese, 2020), are built differently in different teams. In co-located teams, members share the same social context and sense of social connectedness, have access to a broad range of communication messengers, including non-verbal communication and experience engagement and cooperativeness that facilitates the development of conventional cohesion. Meanwhile, in GVTs, members are less likely to share a common social environment, have fewer opportunities to interact and rely on weaker communication channels. Accordingly, global virtual teamwork tends to be more demanding, in the form of delayed, fragmented and poorer communication, ambiguity and coordination obstacles (Cox and Tung, 1997). Because they are geographically dispersed and have members from different cultures and social systems, GVTs may struggle to agree upon accepted norms (Crisp and Jarvenpaa, 2013). As an explanation of cohesion development in these ad-hoc, temporary and non-conventional teams, expeditious cohesion deviates from the usual occurrence and general description of conventional cohesion.

Under these circumstances, expeditious cohesion is a special type of conventional cohesion occurring in temporary, usually short-lived, organisational structures, including GVTs. While it shares some characteristics with conventional cohesion, including its dynamism, affective bond and attraction to the team, expeditious cohesion is usually not described by the longevity that usually underpins conventional cohesion. In fact, workgroup cohesion is very time-dependent. In traditional teams, the length of time teams work together weakens the effects on the cohesion of surface-level (demographic) diversity and strengthens the effect of deep-level (attitudinal) diversity (Harrison et al., 1998). In GVTs working for a limited number of weeks, cohesion manifests itself under severe time and communicative constraints. Specifically, expeditious cohesion is more fast-paced, with interactions triggered by first impressions and short-term objectives rather than established over time in the context of long-term relationships. We explain expeditious cohesion as a collective perception and relating occurring in nonconventional teams and specifically focused on accomplishing specific team tasks. As such, it emphasises task cohesion rather than social cohesion, and it is also motivated by affective, rather than continuance and normative commitment. Team members of expeditiously cohesive teams tend to be less loyal to their teams and are less likely to perceive that they have an obligation to uphold their team membership.

Instead of cohesion being an evidence-driven information process, expeditious cohesion is a presumptive form of cohesion that is created opportunistically and pragmatically from category-driven processes. Given its time constraints, expeditious cohesion tends to be based on a quick categorisation of team members based on ostensive factors. A non-conventional team may perform as if conventional cohesion was present, but then it verifies that it can relate, interact and manage expectations. Expeditious cohesion is conditional and entails reinforcement and calibration by action. It is fragile and can erode with 'deviations from or violations of group norms and presumptions about competent behaviour' (Meyerson et al., 1996, p.190).

## ***5.2 Managerial and practical implications***

In an interview, Hackman (2009) outlined the factors related to why sometimes teams may not work. Although seemingly an effective and efficient way to yield positive organisational outcomes, Hackman (2009) argued that problems with coordination and motivation impede the benefits that could come through team collaboration. Among the critical factors influencing team success, Hackman (2009) suggested that the HR department's focus on the 'right people in the right way' will never be enough unless group processes are considered and improved. He argues in support of the enhanced role of the leaders as well as a team coaching practice rather than individual coaching focus per se. This type of coaching is mainly related to the 'whats and hows' of the task, including, among others, meetings, project milestones, what is working and not working. Hackman (2009) further stressed that team coaching is about fostering better teamwork on the task and not necessarily about improving members' social relationships. In relation to this argument, in the current study, team cohesion is impactful only to the degree to which team members have the technical skills required for the project.

On the other hand, Trent (2003), in a study on planning for effective teamwork, stresses that high-performing teams should rate favourably on a cost-benefit analysis as long as they are properly designed. In this regard, the role of planning, time management, discipline and appropriate team assignments are emphasised. Similarly, a diverse set of skills is found to be an important contributor to team performance in the current study.



In their discussion on team-based learning, team performance and teamwork skills, Van Schaik and O'Brian (2015) argued that team member characteristics such as cognitive ability, expertise and some personality attributes (e.g., agreeableness) usually correlate positively with team performance. Still, their study suggests the existence of significant variations in the impact of these characteristics, which they attribute to differences in team types and tasks. In the current study, the combined effects of both team cohesiveness and team member technical skills to explain team performance could reflect this type of variation.

Krumm et al. (2016) suggested that knowing which type of knowledge, skills, abilities and other attributes (e.g., personality characteristics) will be required both in the long and short term could inform the design and development of recruitment and selection. Concerning human resources practices, our findings shed light on priorities for selecting and recruiting team members from both inside and outside of the organisation. Likewise, they can help identify and predict which types of training and coaching programs should be implemented. Finally, from a performance appraisal perspective, managers should consider that team cohesion alone will not guarantee team performance unless there is a consideration of team member technical skills that are required for the project, which might need consistent monitoring and assessment both for evaluation and intervention purposes.

### ***5.3 Future research paths and limitations***

GVTs are frequently used in international management, their relevance is growing in response to pandemics and international business disruptions (Stahl and Maznevski, 2021), and their effectiveness relies not only on their potential but on their ability to build consensus and act cohesively. We offer a set of boundary conditions for the relationship between cohesion and performance that is contingent on expeditious cohesion and technical skills, suggesting and demonstrating that teams vary in the type of their cohesion and its impact on performance. In doing so, this work suggests new paths to cohesion studies in GVTs by means of the novel concept of expeditious cohesion that we developed. We hope this will spur future research in this area better to explain how cohesion is built and how it influences team performance through other possible moderators and mediators in addition to technical skills. Moreover, it would be important to replicate what we did in this research setting in other research settings because despite X-Culture being a recognised 'lab' in IB for GVTs study (Stahl and Maznevski, 2021), the external validity of our results needs to be tested in other GVTs 'labs'. Therefore, the unicity of the research setting is both a limitation and an opportunity for replication for future scholars. The second limitation is that it is by nature a quantitative-based study at a given point in time. Future ethnographic researchers and case studies might provide finegrained qualitative descriptions and longitudinal observations, opening the way to new ideas and constructs beyond the existing literature on cohesion in GVTs.

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