



Exploring the Role of Perceived Virtuality and Leadership Functions on Intrinsic Motivation and Team Effectiveness: A Moderated-Mediation Analysis

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Abstract

Title: Exploring the role of Perceived Virtuality and Leadership Functions on Intrinsic Motivation and Team Effectiveness: A Moderated-Mediation analysis

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The purpose of this dissertation is to explore how perceived proximity affects team effectiveness through the mediating mechanism of intrinsic motivation and how leadership moderates this process, this dissertation examines the complex dynamics of virtual teams. A moderated mediation analysis was performed using data from 202 questionnaires to investigate the connections between intrinsic motivation, leadership functions, perceived proximity, and team effectiveness. The study sheds light on the complex interactions between these variables, guided by the hypothesis that a team with high virtuality, along with a leader that implements leadership functions, leads to stronger intrinsic motivation among team members, hence impacting overall team effectiveness.

The results show that perceived proximity has a significant impact on team effectiveness and that this link is significantly mediated by intrinsic motivation. It was also discovered that the relationship between perceived proximity and intrinsic motivation by team members was moderated by leadership functions, and hence this increased team effectiveness. Highlighting the significance of leadership functions in teams that operate virtually. By highlighting the critical role that leadership functions play in increasing intrinsic motivation and eventually boosting team effectiveness in virtual environments, this research advances both theoretical understanding and practical applications in managing virtual teams.

Keywords: Perceived virtuality, leadership functions, intrinsic motivation, team effectiveness.

Resumo

Título: Explorando o papel da virtualidade percebida e das funções de liderança na motivação intrínseca e na eficácia da equipe: uma análise de mediação moderada

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O objetivo desta dissertação é explorar como a proximidade percebida afeta a eficácia da equipe através do mecanismo mediador da motivação intrínseca e como a liderança modera esse processo. Esta dissertação examina a dinâmica complexa das equipes virtuais. Uma análise de mediação moderada foi realizada utilizando dados de 202 questionários para investigar as conexões entre motivação intrínseca, funções de liderança, proximidade percebida e eficácia da equipe. O estudo lança luz sobre as complexas interações entre estas variáveis, guiado pela hipótese de que uma equipa com elevada virtualidade, juntamente com um líder que implementa funções de liderança, leva a uma motivação intrínseca mais forte entre os membros da equipa, impactando assim a eficácia global da equipa.

Os resultados mostram que a proximidade percebida tem um impacto significativo na eficácia da equipa e que esta ligação é significativamente mediada pela motivação intrínseca. Descobriu-se também que a relação entre a proximidade percebida e a motivação intrínseca pelos membros da equipa foi moderada pelas funções de liderança e, portanto, aumentou a eficácia da equipa. Destacar a importância das funções de liderança em equipas que operam virtualmente. Ao destacar o papel crítico que as funções de liderança desempenham no aumento da motivação intrínseca e, eventualmente, no aumento da eficácia das equipas em ambientes virtuais, esta investigação avança tanto a compreensão teórica como as aplicações práticas na gestão de equipas virtuais.

Palavras-chave: Virtualidade percebida, funções de liderança, motivação intrínseca, eficácia de equipa.

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Table of Contents

<i>Abstract</i>	2
<i>Resumo</i>	3
<i>Acknowledgments</i>	4
<i>Introduction</i>	7
Research Purpose	7
Significance of the Research	7
Research Questions.....	8
Research Structure	8
<i>Literature Review</i>	10
Perceived virtuality in teams: prevalence and importance.....	10
Virtual team challenges	11
Perceived virtuality in teams.....	12
Impact of perceived virtuality on virtual team effectiveness	13
Self Determination Theory.....	15
Motivation at work	16
Perceived virtuality of teams and intrinsic motivation	17
Leadership functions	19
Virtual teams and leadership functions.....	20
Support the social climate	21
Monitors the team	22
Challenges the team	23
Conclusion	24
<i>Methodology</i>	26
Participants	26
Procedure	27
Measures	27
<i>Research Findings</i>	30
Data Analysis.....	30
Results	31
<i>Discussion</i>	37
Practical Implication	40
Limitations	40
<i>Works Cited</i>	42
<i>Appendices</i>	47

List of Tables

Table 1. - Cronbach's values	29
Table 2. - Descriptive statistics and correlations.....	31
Table 3. - test of the moderated-mediation model	33
Table 4. - Mediated moderation PROCESS (High levels of LF: monitor the team)	35
Table 5. - Mediated moderation PROCESS (low levels of LF: monitor the team)	35
Table 6. - Mediated moderation PROCESS (High levels of LF: challenge the team).....	36
Table 7. - Mediated moderation PROCESS (low levels of LF: challenge the team).....	36
Table 8. - Mediated moderation PROCESS (High levels of leadership functions H1.1-H1.3)	36
Table 9. - Mediated Moderation PROCESS (low levels of leadership functions H1.1-H1.3)	37

List of Figures

Figure 1. - Framework of hypothesizes 1.1, 1.2 and 1.3	24
Figure 2. - Framework of Hypothesis 1	25
Figure 3. – The moderating effect of LF: Support the social climate	32
Figure 4. - The moderating effect of LF: Monitor the team	34
Figure 5. - The moderating effect of LF: Challenges the Team	35

Introduction

Research Purpose

Examining the connections between leadership functions, intrinsic motivation, perceived proximity, and team effectiveness in virtual teams is the main goal of this thesis. In particular, this study aims to comprehend how team members' perceived proximity, influenced by leadership functions, affects their intrinsic motivation and, in turn, affects the effectiveness of the team as a whole. Furthermore, the study intends to investigate if the degree of perceived proximity and leadership functions influences team members' intrinsic motivation, thereby causing team effectiveness. The goal of this study is to create a theoretical understanding of virtual team dynamics and offer insightful recommendations for improving team effectiveness in remote work settings.

Significance of the Research

Physically working together in the office is no longer a requirement for collaboration in current work contexts thanks to virtual teams that operate within digital spaces (Morrison-Smith and Ruiz, 2020). Team members communicate remotely in these distributed environments, frequently across time zones and geographic areas. Team dynamics and performance are significantly influenced by perceived virtuality or the individual's subjective assessment of the virtual environment (Hill et al., 2015). The way that members of a team perceive the virtual environment affects their sense of involvement, commitment, and belonging; these factors then affect the cohesiveness and effectiveness of the team.

In virtual teams, leadership functions are essential. To effectively lead and inspire their team, leaders need to overcome the particular difficulties presented by distant collaboration (Morgeson et al., 2009). Despite the physical distance, effective leadership is giving clear instructions, building trust, and encouraging a positive team culture. Through the mitigation of the effects of perceived virtuality on team dynamics, leaders can improve motivation and the overall effectiveness of the team.

Moreover, a major factor influencing team effectiveness is intrinsic motivation or people's inherent drive and love of their work. Fostering intrinsic motivation becomes even more important in virtual teams, where there may be fewer opportunities for direct supervision and

face-to-face connection. For a team to remain highly engaged and productive, its members must feel competent, independent, and a part of the mission. (Gagné et al., 2010)

This study uses a moderated-mediation analysis to further understanding of virtual teamwork. The goal of the study is to identify the complex dynamics at work in virtual team contexts by investigating how perceived proximity affects the interaction between leadership functions and intrinsic motivation, as well as how these aspects together impact team effectiveness. Both companies and researchers can benefit from the research outcome.

Research Questions

CRQ: "How does perceived proximity by team members, moderated by leadership functions, influence the intrinsic motivation of team members, and subsequently impact overall team effectiveness in teams that work virtually?"

While gathering information in the literature review the following sub-questions arose:

1. How does perceived proximity by team members, moderated by a leader that supports the social climate, influence the intrinsic motivation of team members, and subsequently impact overall team effectiveness in virtual teams?
2. How does perceived proximity by team members, moderated by a leader that challenges the team, influence the intrinsic motivation of team members, and subsequently impact overall team effectiveness in virtual teams?
3. How does perceived proximity by a team, moderated by a leader who monitors the team, influence the intrinsic motivation of team members, and subsequently impact overall team effectiveness in virtual teams?

Research Structure

This dissertation provides a thorough examination of the research question, broken down into multiple sections. To contextualize the study, the section will review the literature and provide theoretical findings and empirical evidence. The methodology chapter will describe the research design, including data collecting and analysis strategies, after the literature review. The research outcomes will then be presented in the section named Findings, which will also provide insights into the connections between intrinsic motivation, leadership

functions, perceived proximity, and team effectiveness. The discussion chapter will summarize the main results, go over their barriers, and suggest further study advancements. This study intends to provide important insights into the dynamics and effectiveness of virtual teams using a well-structured methodology.

Literature Review

Perceived virtuality in teams: prevalence and importance

Studying the influence of perceived virtuality by team members is valuable. Firstly, understanding how perceived virtuality impacts teams is crucial for boosting productivity and cooperation (Morrison-Smith and Ruiz, 2020). When team members are separated by time zones, effective communication and task completion become difficult but necessary skills to learn (Panteli et al., 2019). According to Morrison-Smith, using new communication technology and scheduling tactics can overcome team barriers and provide seamless collaboration.

A higher level of perceived virtuality in teams can better serve global clients by coordinating their work schedules, which will boost client satisfaction and drive market expansion (Mazzucchelli et al., 2021). Furthermore, there are cost savings associated with virtual teams. Businesses can save money by cutting overhead expenditures related to office space and utilities by maximizing work hours when working in virtual teams (Thambusamy and Bekiroğulları, 2020). Understanding the effects of perceived virtuality is essential for encouraging work-life balance among team members, in addition to the financial advantages. Scheduling work hours across time zones can help employees stay well and be satisfied with their jobs by preventing burnout (Morrison-Smith and Ruiz, 2020). This equilibrium therefore boosts team morale and productivity, which benefits the performance of the business as a whole (Reyes et al., 2021)

Virtual teams that have individuals from different time zones contribute a variety of viewpoints to problem-solving and idea generation from the standpoint of creativity. This field of study can shed light on how various perspectives affect the creative processes that drive innovation and strategic thinking in teams that work virtually (Chamakiotis et al., 2020). Additionally, successful risk management depends on difficulties caused by working virtually (Palos Sanchez, 2021). Potential problems with virtual teams include miscommunication, delayed responses, and missing deadlines. Best practices for reducing these risks, guaranteeing the efficiency of virtual teams, and preserving the company's reputation can be found through further research in this field (Palos-Sanchez, 2021). Finally, businesses that can manage their virtual team well have an advantage over their competitors. The results of the research offer practical approaches for enhancing virtual

teams and workflows, allowing businesses to surpass rivals in the rapidly changing world (Davidavičienė et al., 2020). To sustain operational efficiency, foster innovation, reduce expenses, enhance employee welfare, and preserve a competitive advantage in the marketplace, companies need to be aware of leadership skills and how this influences team effectiveness and employee motivation in virtual team dynamics. When businesses can effectively manage these problems, they are better positioned to meet client expectations, respond to market trends, and ensure the overall success of their business operations. (Palos-Sanchez, 2021).

Virtual team challenges

Virtual teams often face significant challenges that impact their collaboration and communication. The obstacles presented by working virtually can hinder successful teamwork, leading to issues such as asynchronous communication, slow response times, missed deadlines, and difficulties in organizing meetings (Vuchkovski et al., 2023). This section explores the challenges of virtual teams and the associated psychological and physiological effects on team members.

Working in virtual teams poses complex challenges, affecting various aspects of teamwork. Asynchronous communication, a direct result of working virtually, complicates real-time collaboration, making it challenging for teams to work seamlessly (Vuchkovski et al., 2023). Virtual teams often encounter hurdles like delayed responses, missed deadlines, and challenges in scheduling meetings. Moreover, the delayed responses from teammates in other time zones can weaken team bonds and lower confidence, underscoring the need for proactive measures to mitigate these challenges.

In response to these challenges, virtual teams employ a range of strategies and best practices. Research by Shaik and Makhecha recommends implementing flexible work schedules to facilitate overlapping work hours. Adopting a rotating schedule for team meetings and ensuring the effective recording of crucial information are additional measures that enhance collaboration. Collaborative project management platforms like Trello and Asana, which support asynchronous communication, enable continuous work irrespective of time zone differences. Regular and explicit communication about job requirements, deadlines, and

response times is essential for minimizing misconceptions arising from time zone variations (Shaik and Makhecha, 2019).

The challenges of virtual teams extend beyond logistical issues and also impact the psychological and physical well-being of team members. Axtell's research highlights the psychological pressures associated with irregular work schedules, including disrupted sleep patterns, social isolation, and challenges in maintaining work-life balance. Furthermore, frequent time zone changes can induce symptoms akin to jet lag, affecting cognitive abilities and overall well-being. Addressing these issues requires organizations to prioritize employee health and well-being by providing tools such as counseling services, fostering a culture of self-care, and encouraging regular breaks and physical activity (Axtell et al., 2022).

In conclusion, addressing the challenges of perceived virtuality by team members requires proactive measures. Organizations can create an environment conducive to a team's success by acknowledging the specific challenges presented by virtual implementing practical mechanisms and recognizing the psychological and physical effects on team members. The sections of this literature review will delve deeper into various aspects related to virtual teamwork, including leadership functions, team effectiveness, and motivation by team members, and aim to discover relationships between these variables.

Perceived virtuality in teams

The use of virtual teams has grown in popularity in today's global work contexts, which calls for a good understanding of the idea of perceived virtuality inside these teams. According to Walter et al., perceived virtuality is the degree to which team members subjectively perceive that their interactions, collaborations, and general team dynamics take place in a virtual environment. Investigating how perceived virtuality affects a team is crucial as long as firms use digital platforms for collaboration.

The Perceived and Structural Virtuality Scale (PSVS), which attempts to capture the subjective and objective dimensions of virtuality within teams, is one of the tools that academics have developed to analyze and measure perceived virtuality (Walter et al., 2008). The PSVS is based on the idea that perceived virtuality includes both the structural features of virtual cooperation and subjective impressions of it. It is essential to appreciate these

aspects to understand how virtuality affects teams. Team members' interpretations of the virtuality of their collaborative experiences comprise the subjective factor of perceived virtuality. Their perceptions of co-presence, interpersonal trust, and the efficiency of communication in online environments are all included in this. Increased feelings of loneliness and decreased team cohesiveness may result from higher perceived virtuality levels. Team members' experiences influence their attitudes and conduct within the framework of the team as they negotiate the difficulties of virtual interactions (Hill et al., 2015).

On the other hand, the physical aspects of the virtual workplace like the frequency of virtual communication, the dependence on digital tools, and the geographical dispersion of team members, are covered by the structural dimension of virtuality. Task performance, coordination, and the general effectiveness of virtual teams are all impacted by structural virtuality. Creating strategies and interventions for virtual teams that work requires an understanding of the structural features of virtuality (Hill et al., 2015).

According to Hill, the PSVS is a comprehensive tool used to assess the perceived and structural virtuality of teams. The scale includes both empirical measures of the virtual work environment and items that reflect team members' subjective perceptions of virtuality. The PSVS offers a comprehensive evaluation of the complex aspects of perceived virtuality in teams by merging these factors. All in all, for companies looking to maximize the efficiency of virtual collaborations, comprehending how teams perceive virtuality is essential. Researchers can evaluate the subjective and objective aspects of virtuality with the use of the Perceived and Structural Virtuality Scale.

Impact of perceived virtuality on virtual team effectiveness

Research by Salas, Sims, and Burke makes a clear distinction between team performance and effectiveness. They explain that team performance focuses on the outcomes of a team's actions, while team effectiveness takes a broader view. It takes into account not only work fulfillment but also the complexities of team interactions and processes. This approach is critical in understanding the aspects that contribute to a team's effectiveness. To maintain high performance in the face of adversities, rules, norms, and processes must be established,

resulting in a good environment for team members and adaptation to quick changes (Zaccaro et al., 2001).

Building on this framework, Hinsz, Tindale, and Vollrath identify two critical components of effective teamwork: individual contributions are acknowledged, and these contributions are integrated into a planned strategy that enables quick problem-solving (Hinsz. et al., 1997). Task and nontask variables are the fundamental elements of team effectiveness. Task factors are associated with job activities and indicate possible difficulties in virtual teams because of the usage of digital means for communication. Because of physical distance and a greater emphasis on tasks, non-task factors, which measure employee motivation, may be jeopardized in virtual teams (Johnson et al., 2009). Research implies that virtual teams can outperform geographically nearby teams, especially when tasks allow for individual work without needing face-to-face communication (Morgeson, DeRue, & Karam, 2010).

The absence of direct observation in virtual teams necessitates a higher quality of leadership by leaders than in traditional teams, making the functioning of the team leader an essential element in virtual team effectiveness (Aubert & Kelsey, 2003). Businesses today are increasingly relying on virtual teams to tap into diverse talent and expertise across various geographical locations, driven by the forces of globalization (Lee, 2021).

Following the work by Costa, Handke, König, M., & Thieme (2023) perceived virtuality will be operationalized as perceived distance. They point out that perceived virtuality refers to individuals' subjective sense of immersion within virtual environments, encompassing aspects of spatial presence, psychological engagement, and sensory involvement. Drawing from this framework, perceived virtuality is operationalized by measuring participants' perceptions of their proximity to the virtual environment they interact with. This approach aligns with Costa et al.'s theoretical perspective, providing a means to explore the relationship between perceived virtuality and other variables of interest (Costa et al., 2023).

The next sections of the literature explore the impact of perceived virtuality by team members on team effectiveness. Aiming to explore and examine the influence of different variables that might mitigate these challenges.

Self Determination Theory

Self-Determination Theory (SDT) provides a framework to explain human motivation and behavior, focusing on three essential psychological needs: autonomy, competence, and relatedness. SDT, developed by Edward Deci and Richard Ryan, asserts that these needs are necessary for generating intrinsic motivation, which is critical for individual well-being and good performance in a variety of contexts, including the workplace (Deci and Ryan, 2000).

The natural need to feel in charge of one's decisions and actions is referred to as autonomy. People who possess a high degree of autonomy are inclined to feel empowered and take pride in their decisions and tasks. Having the flexibility and independence to decide how to approach tasks, make decisions, and arrange one's work is what is meant by autonomy in the workplace. Employees who have a sense of autonomy are more likely to be engaged, innovative, and dedicated to their work because they are driven by their interests and ideals as opposed to outside demands or incentives (Deci and Ryan, 2000). The need to feel capable and effective in one's interactions with the environment is known as competence. It involves gaining expertise, accomplishing objectives, and feeling proud of oneself. Opportunities for learning, growth, and skill development are crucial for promoting competence in the workplace. People are more likely to be driven to take on difficult tasks, exercise initiative, and persevere in the face of setbacks when they feel competent in their professions. Getting feedback and being acknowledged for one's accomplishments is also very important for improving the sense of competence because it validates one's work and contributions (Deci and Ryan, 2000).

The urge for relationships with other people is referred to as relatedness. Since humans are social creatures by nature, having supportive and positive interactions is essential to one's sense of well-being and belonging. Building a culture of relatedness in the workplace entails making sure that staff members have a sense of belonging to their managers, colleagues, their team, and the company. Meeting the demand for relatedness and fostering a positive work environment where people feel appreciated and understood require cooperation, respect, and teamwork (Deci and Ryan, 2000). Motivation is central to Self-Determination Theory (SDT) since it directly connects to the fulfillment of people's intrinsic psychological needs.

According to SDT, autonomy, competence, and relatedness are essential components of human motivation. Motivation drives people's efforts to meet these demands. (Ryan and

Deci, 2017). Therefore, motivation can be seen as an important factor affecting team effectiveness. It is crucial to comprehend the aspect of workplace motivation to cultivate an effective work atmosphere. This part of the literature review looks at intrinsic motivation and broad concepts connected to motivation at work, with an emphasis on findings from the Motivation at Work Scale. (Gagné et al., 2010).

Motivation at work

Workplace motivation is a complex idea that includes a range of internal and external elements that encourage people to participate fully in their professional jobs (Gagné et al., 2010). In organizational contexts, employee attitudes and performance are greatly influenced by the interaction of intrinsic factors. According to Gagné, the Motivation at Work Scale is a useful instrument for evaluating motivation in workplace settings. MAWS assesses both intrinsic and extrinsic motivation and provides an overview of the variables affecting employee engagement. The measure offers a detailed assessment of workplace motivational factors and includes characteristics including task identity, skill variety, task relevance, autonomy, and feedback.

Intrinsic motivation refers to the desire to engage in activities for their satisfaction rather than for external rewards. It involves a profound sense of personal fulfillment stemming from the activity itself. In the workplace, intrinsic motivation is critical for increasing employee engagement, innovation, and job happiness. Individuals who are intrinsically motivated are more likely to be committed to their tasks, resulting in increased productivity and performance (Ryan and Deci, 2017).

Studies that use the Motivation at Work Scale to measure motivation consistently show a favorable correlation between intrinsic motivation and a range of outcomes connected to the workplace. High intrinsic motivation employees typically report improved job performance, higher job satisfaction, and general well-being. Furthermore, genuinely motivated people frequently exhibit better levels of creativity and invention, which benefits the development of organizations (Devloo, et al., 2015). Relating this to the self-determination theory, organizations that recognize and emphasize the psychological demands indicated in SDT can establish a supportive and motivating work environment for employees. Organizations may enable workers to grow and reach their full potential by allowing for autonomy, competence,

and relatedness, resulting in enhanced team performance and corporate success (Ryan and Deci, 2017).

All things considered, employee motivation is a dynamic and important component of workplace environments. The Motivation at Work Scale provides a deeper understanding of the internal forces influencing employee engagement through its explanation of intrinsic motivation. Well-performing and driven employees are likely to come from organizations that place a high priority on creating intrinsic motivation. (Gagné, 2010).

Perceived virtuality of teams and intrinsic motivation

Perceived virtuality of teams and its impact on employee motivation have presented a distinct set of opportunities and concerns with the rise of virtual teams. The purpose of this section is to examine the current literature with a particular focus on how employee motivation is impacted by the perceived virtuality of teams and the influence on team effectiveness.

Employees in virtual teams typically have more autonomy and can more freely arrange their work hours. Greater perceived virtuality of teams' autonomy can boost worker motivation by giving workers a feeling of empowerment and control over their workplace (Simranjeet, 2023). Organizations looking to maximize virtual team dynamics must comprehend the connection between autonomy, time dispersion, and motivation. The communication problems brought on by different working hours and geographic locations are one of the main issues with the virtuality of teams. These difficulties might have an effect on team members' quick response times, which could affect the group's sense of cooperation (Mutha, 2023).

Members of virtual teams often can better manage their work schedules to accommodate personal responsibilities and preferences. This often helps to improve work-life balance, which has been connected to increased levels of job satisfaction and employee engagement. Maintaining employee motivation in the face of enterprises' continued use of virtual work arrangements requires an awareness of how the perceived virtuality of teams affects the balance between work and personal life (Itam et al., 2023). High perceived virtuality in teams may make it more difficult for a team to collaborate effectively, while high task complexity may call for more synchronous work. Studying how leadership, perceived virtuality in teams,

team effectiveness, ness, and employee motivation interact might help design virtual teams with structures that maximize motivation (Abbas et al. 2022).

Research on the dynamic and complex interaction between employee motivation and the perceived virtuality of teams is essential. Virtual teams involve complex interactions due to a combination of factors such as autonomy, task complexity, flexibility, and communication issues. To maximize employee motivation in virtual work settings, organizations need to take these characteristics into account and design methods that take advantage of perceived distance in virtual teams advantages. To fully understand the complexities of this relationship and guide workable strategies for maximizing employee motivation in virtual team environments, more research into this subject is needed.

Leadership functions

The relationship between team leadership and team effectiveness is that when a team is content with their leader, they will be more motivated to work, which will increase the overall effectiveness of the team (Morgeson et al., 2010). Researchers have investigated several aspects of leadership, such as the roles that leaders play in leading their teams. The Leadership Functions Scale, a theoretical framework that classifies these many leadership functions, is introduced in this section of the literature review. (Marks et al., 2001) (Morgeson et al., 2009).

Setting expectations and goals is the first dimension of the Leadership Functions Scale. Creating expectations for the team and defining corporate goals are critical tasks for leaders. A common vision within the organization is empowered by having team members feel valued and directed by clearly defined goals and expectations. Higher levels of staff engagement and performance are a result of leaders who effectively communicate objectives and goals. The second dimension of the Leadership Functions Scale is determined by another leadership function, which tests a leader's feedback. Team members' professional development is enhanced by leaders who offer quality feedback. According to Morgeson, feedback is a valuable instrument for both individual and group performance inside the business. Prioritizing feedback helps leaders to maintain an environment of transparency and responsibility, which improves team interactions. (Morgeson et al., 2009)

How much a leader supports the social climate is determined by another leadership function; this highlights the leader's responsibility for fostering a good work environment. Prioritizing social support among leaders enhances overall well-being, work satisfaction, and team cohesion. Within the team, fostering a positive social climate improves interpersonal connections and encourages collaboration (Morgeson et al., 2009).

The fourth dimension of the Leadership Functions Scale, which is the continuous monitoring of team dynamics, is necessary for effective leadership. Actively monitoring their teams enables leaders to spot problems early on and make necessary course corrections and interventions. Additionally, monitoring helps leaders to acknowledge and celebrate successes, which reinforces smart actions and results. In changing work situations, proactive team monitoring is linked to increased performance and adaptation (Morgeson et al., 2009).

The Leadership Functions Scale also assesses a leader's ability to push his team. Leaders who pose challenges to their staff foster innovation, creativity, and continuous education. Leaders foster both individual and group development by establishing high standards and challenging team members to step beyond their comfort zones. Putting the team through challenges helps them become resilient and adaptable, which will help them succeed in a corporate environment that is changing quickly. (Morgeson et al., 2009).

All things considered; the Leadership Functions Scale offers a thorough framework for comprehending the complex nature of leadership. Organizations may have leaders who can effectively operate in the modern workplace by looking at the aspects of setting objectives and goals, giving feedback, maintaining a positive social climate, and monitoring the team while giving them enough challenges. A greater comprehension of the interactions between various leadership responsibilities will emerge as research in this area progresses, providing insightful information for organizations looking to improve their leadership practices.

Virtual teams and leadership functions

Due to the geographical dispersion, cultural variety, and reliance on digital communication, leading virtual teams sometimes presents problems. The development of motivation, community, and collaboration among team members sometimes located in many locations requires effective leadership functions. This part of the literature review investigates leadership functions and the challenges of leadership in virtual teams.

A change from conventional hierarchical models to more collaborative and empowering ones is necessary for leadership in virtual teams (Mysirlaki, 2020). According to research by Mysirlaki, virtual teams perform particularly well in leadership that emphasizes inspiration, vision, and individual development. A sense of purpose is fostered among team members, support is given, and innovation is encouraged by transformational leaders. Furthermore, adapting a leader's approach to the particular work environment and objectives that the team has can offer support to the specific difficulties experienced by virtual teams. (Mysirlaki, 2020)

For virtual teams to succeed, motivation and a sense of belonging are necessary. The development of these qualities is crucially dependent on leaders (Geister et al., 2021). According to research by Geister, leaders can increase motivation by establishing clear goals,

praising and rewarding accomplishments, and offering chances for skill improvement and career growth. Fostering open communication, supporting team-building exercises, and encouraging social interactions among team members are all part of developing a feeling of community. Virtual team leaders should plan frequent virtual gatherings, casual conversations, and team tasks that build rapport, trust, and a sense of unity. Virtual teams must have a sense of purpose and camaraderie to succeed. In fostering these qualities, leaders who have good leadership functions are important (Geister et al., 2021).

Leaders can increase motivation by establishing specific objectives, praising and awarding success, and offering chances for skill improvement and career growth. To develop a sense of community, it is important to encourage open communication, team-building exercises, and interpersonal connections. Regular virtual meetings, casual chats, and sub-projects can be planned by virtual team leaders to create rapport, trust, and a feeling of connection within the team.

In conclusion, a mix of transformational and situational leadership styles is necessary for effective management and leadership in virtual teams (Mysirlaki, 2020). Stimulating motivation, creating a feeling of belonging, and managing the elements of cross-cultural interactions are three areas where leaders must put their attention. Leaders may build a cohesive and motivated virtual team that crosses geographic barriers by embracing adaptive leadership functions, encouraging open communication, and fostering cultural intelligence. This will maximize each team member's potential and improve team effectiveness. (Mysirlaki, 2020). The next section will dive deeper, aiming to test the moderating effect of three specific leadership functions on the variables discussed before.

Support the social climate

One of the leadership functions mentioned is to support a team's social climate. This is important for creating cohesion, communication, and general well-being. A leader who focuses social aspects of team dynamics helps to create a pleasant workplace defined by trust, collaboration, and a common purpose. This function of leadership goes beyond typical task-oriented approaches, acknowledging the need for human relationships in accomplishing team goals (Morgeson et al., 2009).

The responsibility of a leader in fostering a positive social atmosphere becomes even more important in virtual teams, where technology frequently serves as a medium for communication and physical distances can present difficulties. Morgeson highlights that virtual teams may encounter distinct dynamics, including decreased in-person interactions and possible sentiments of seclusion among team members to close these divides and provide a feeling of belonging in the virtual setting, a leader must actively cultivate a positive social climate. (Martela and Pessi, 2018)

Expanding on this, we put forth the following theory: Research showed that a team with high quality and a leader that actively fosters the social climate would have members who are more intrinsically motivated (Al Harbi et al., 2019). We propose that a team member in member's motivation is influenced by a supportive social environment due to a leader that supports the social climate. As a result, team members are likely to have stronger intrinsic motivation which improves the virtual team's overall effectiveness. (Al Harbi et al., 2019).

Therefore, the first sub-hypothesis will be:

H1.1: Team members that perceive high proximity within their team and that have a leader that supports the social climate, will feel more intrinsic motivation and hence that will impact perceived team effectiveness.

Monitors the team

Another leadership function involves monitoring the team. A leader who takes an active interest in keeping an eye on team activities shows that they are committed to comprehending both individual and group dynamics. This involves more than just watching; it also includes the leader's interaction with the team, monitoring development, seeing obstacles, and giving prompt feedback (Morgeson et al., 2009).

In the case of virtual teams, where face-to-face connection is replaced by digital connectivity, the monitoring role of a leader becomes critical (Morgeson et al., 2009). Communication, coordination, and synergy are common issues for virtual teams. A leader's proactive monitoring can help to limit these obstacles by creating a feeling of accountability, keeping open communication lines, and responding to issues quickly (Mysirlaki, 2020). The relationship between a leader's monitoring function, and team dynamics is likely to influence

individual team member's motivation. A leader who properly monitors the team is in a good position to identify and encourage team members' intrinsic motivation (Gagné, 2010). Intrinsic motivation, which is fueled by internal elements such as personal interest, contentment, and a sense of such, can be a significant variable for team effectiveness (Gagné, 2010).

All in all, because of the research findings above the second sub-hypothesis will be:

H1.2: Team members who perceive high proximity within their team and who have a leader who monitors the team, will feel more intrinsic motivation and hence that will impact perceived team effectiveness.

Challenges the team

Leadership functions create a variety of responsibilities that have a significant impact on team effectiveness. One key factor is the leader's capacity to challenge the team and create an environment that fosters creativity, innovation, and continuous development. Setting high standards, pushing team members beyond their comfort zones, and fostering a learning and growth culture all include this leadership function (Marks et al., 2001).

Distinct difficulties confronted by virtual teams include potential emotions of loneliness and communication breakdowns. In such distributed work contexts, a leader who actively pushes the team becomes essential for success and team effectiveness (Morgeson et al., 2009).

The dynamic is further enhanced by linking this leadership function to the team member motivation. One of the main factors influencing consistent effort and excellent performance is intrinsic motivation, or the inner drive that comes from within individuals (Gagné, 2010). A team's intrinsic drive may be triggered and increased when a leader pushes the group. A more engaged and dedicated team can result from the intrinsic motivation sparked by the pursuit of mastery inherent in difficult activities (Gagné, 2010).

Leaders inspire people to perform to the best of their abilities by establishing high expectations and providing challenges to their team members. Team members push themselves to the limit in an effort these high standards, which fosters personal development and skill enhancement. Furthermore, team members might be more inclined to accept new concepts, try out creative solutions, and work well together when leaders promote direction

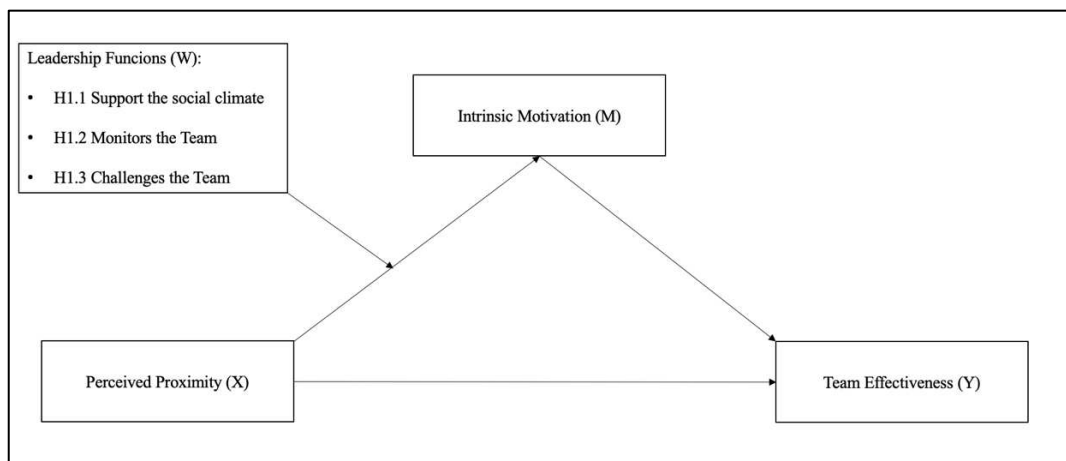
for their team members (Yidong et al., 2013). Leaders show their dedication to accomplishing common objectives and ambitions by challenging the team. Team members' natural drive to succeed is strengthened by this dedication, which gives them a feeling of direction and purpose (Zaccaro et al., 2001). Therefore, it can be the leadership function of challenging the team might not only result in intrinsic motivation by team members but in turn is likely to increase a team's effectiveness.

These findings allow the proposal of the third sub-hypothesis, which is as follows:

H1.3: Team members that perceive high proximity within their team and that have a leader that challenges the team, will feel more intrinsic motivation and hence that will impact perceived team effectiveness.

All in all, the framework below can be made based on H1.1, H1.2, and H1.3:

Figure 1. - Framework of hypothesizes 1.1, 1.2 and 1.3



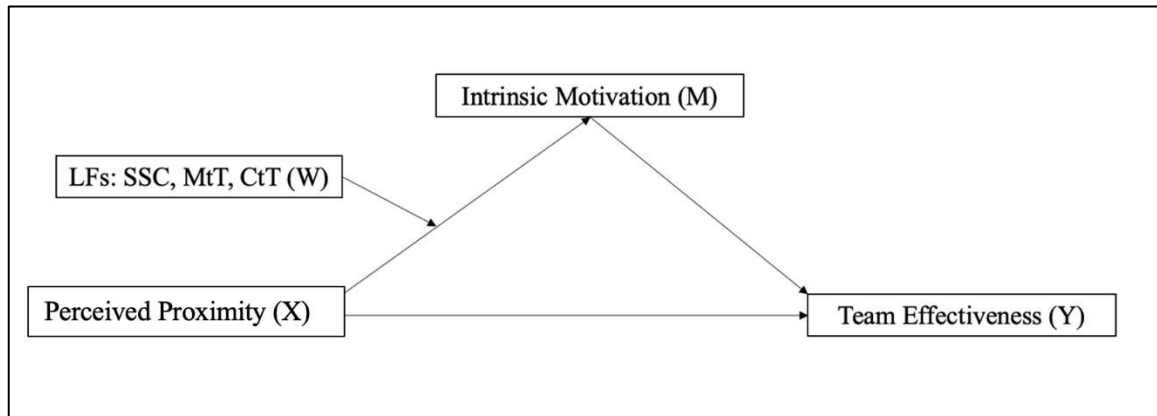
Note. *X = Independent variable, Y = Dependent variable, M = Mediating variable, W = Moderating variable.*

Conclusion

As discovered in this literature review, leadership functions in virtual teams address critical challenges. The literature proves the unique dynamics of virtual teams, necessitating a shift in leadership styles. Moreover, effective leadership functions are essential for motivating team members and can positively influence team effectiveness. Therefore, the main hypothesis that will be tested is:

H1: Team members that perceive high proximity within their team and that have a leader that implements leadership functions, will feel more intrinsic motivation and hence that will impact perceived team effectiveness.

Figure 2. - Framework of Hypothesis 1



Note. LF = Leadership Functions, SSC = Support Social Climate, MtT = Monitor the Team, CtT = Challenges the team.

Methodology

Participants

For this research, 202 respondents (n=202) in total completed a survey. Each participant gave anonymous answers to the questions. Male respondents made up 78% of the total number of participants (n = 139), while female respondents made up 22% (n = 39). In terms of age, the majority of participants were between 30-40 years, corresponding to 39%. 34% were between 20-30 years old, 18% between 40-50 years old and the remaining 50+ age group corresponds to 9% of the total. The age is 35,65 years and the standard deviation is 10,44 years.

In terms of nationality, the majority of participants (n=64), or 36% of the total, come from the Netherlands. Other participants are from Belgium (16%); Portugal (10%); Germany (6%); Australia (5%); Switzerland (4%), Austria (3%), and others (20%). With regards to working at home or remotely, the majority of participants mentioned always working remotely, corresponding to 65% of the total. 30% almost always work 3% percent work sometimes remotely and 2% of the respondents never or rarely. Most participants are team leaders or managers (n=122) corresponding to 69% of the total. The other participants are team members corresponding to 31%.

Regarding team size, 35% work in a team with 5-10 people, 27% work in a team with 5-10 members, 25% work in a team with 15-20 members, 7% of participants work in a team have 1-5 team members and the remaining 6% work in a team with 20 up to max 34 team members. The mean is approximately 12,21 members with a standard deviation of 8,37 members. Most team members the majority, 44% have been working in the current team between 5-10 years, 32% have been working in their current team between 1-5 years, 12% have been working in the current team between 10-15 years, 9% have been working in the current team between 15-20 years and the remaining 3% have been working in their current team for 20 years up till maximum 31 years. The mean is approximately 7,11 years with a standard deviation of 5,37 years.

Concerning years of work experience, the majority of participants 36% have between 5-10 years of work experience, 21% have between 1-5 years of work experience, 20% have between 10-15 years of work experience, 12% have between 15-20 years of work experience,

6% have between 20-25 years of work experience and the remaining 5% have between 25 until maximum 49 years of experience. The mean is approximately 11,23 years with a standard deviation of 7,89 years.

Procedure

The study has been developed to complete the master's program at Católica-Lisbon School of Business and Economics, following the dissertation seminar on virtual team effectiveness. To examine the previously mentioned hypotheses, the approach utilized in this analysis included quantitative research and a questionnaire. Initially, a questionnaire was created that covered the variables of perceived virtuality, leadership functions, intrinsic motivation, team effectiveness, and demographic data. This survey was handed out to people who work in teams; an online questionnaire was distributed through email, social media channels, and WhatsApp. All participants were informed that responses were anonymous by asking them to accept the consent form (Appendix 1).

The questionnaire was organized into five different sections, with each representing a study variable: (1) Perceived Virtuality; (2) Leadership Functions; (3) Intrinsic Motivation; and (4) Team Effectiveness. The first phase focused on demographic information, gathering demographic information about respondents such as gender, age, place of origin, working remotely or from the office, and team function (see Appendix 1).

Specific measure scales were chosen to assess the validity of the hypotheses. The measures used to analyze each variable are described in the section that follows.

Measures

Perceived proximity

In this research, various measures were used for each of the studied variables. Perceived virtuality was measured with a scale developed by Walter et al., 2008 and Hill et al., 2015. The proximity part of the perceived virtuality scale was used since this part was the most relevant for this study. The decision to focus on the perceived proximity by team members aspect of the perceived virtuality scale arises from its connection to the study's objectives. In terms of virtual team effectiveness, proximity is critical for understanding the dynamics of remote teamwork. Evaluating perceived proximity between team members aims to obtain

insight into how virtual distance affects team members' overall effectiveness in virtual situations. In this way, proximity acts as a proxy for the degree of virtuality perceived by team members because it reflects perceived closeness or distance even when physically separated. Therefore, concentrating on the proximity dimension helps to delve deeper into the nuances of perceived virtuality and its impact on team effectiveness. (Costa et al., 2023). Participants were asked to answer on a 5-point Likert scale, where e.g. 1 meant distant and 5 meant nearby. In this study, it's important to note that proximity is used as an operationalization of perceived virtuality, to align with the other variables tested in this study (Walter et al., 2008) (Hill et al., 2015).

Leadership functions

Leadership functions were measured through the 3 specific elements from the leadership functions scale invented by Morgeson et al., 2009. The scale consists of a theoretical framework that classifies leadership into different leadership functions and aims to determine how well this leadership is performed according to team members. The first element focused on the leadership function of supporting the social climate, the second element focused on the leadership function of monitoring the team, and the third element focused on the leadership function of challenging the team. Each element function consists of 3 items to determine how the leader is managing the team. Each question asked participants to rate their degree of agreement with each statement on a 7-point Likert scale (1–7), with 1 being complete disagreement and 7 representing complete agreement. (Morgeson et al., 2009).

Intrinsic motivation

Intrinsic motivation was measured by using 1 specific element of the motivation scale found by Gagné et al., 2010. This element of the scale consisted of 3 items/statements to determine why an individual puts effort into their current job. The statements are as follows, “because I have fun doing my job”, “because what I do in my work is exciting”, and “because the work I do is interesting”. Each item was to be answered by participants on a 7-point Likert scale (1–7) where 1 = not at all; and 7 = completely related to why they put effort into their current job with regards to each statement (Gagné et al., 2010).

Team effectiveness

Team effectiveness was measured with a scale invented by Aubert and Kelsey. The scale includes 8 items to determine how an individual feels in the team with regards to team effectiveness. Examples of items include, “My team is effective”, “my team has a good performance”, and “I would not hesitate to participate in another task/project with the same team”. Participants were asked to answer each question in a 7-point Likert-scale (1-7) where 1 = completely disagree; 7 = completely agree related to their level of agreement for each statement (Aubert & Kelsey, 2003). Cronbach's alpha was calculated to determine the scales' reliability. A scale is considered credible if its alpha value surpasses 0.7 (Pallant, 2005). Calculations show that all variables meet this minimum. Table 1 shows the results.

Table 1. - Cronbach's values

Variable Scale	Sub-dimension	<i>Number of items</i>	<i>Cronbach's Alpha</i>
Perceived Virtuality		5	0.82
Leadership Functions:		9	0.76
	Support the social climate	3	0.72
	Monitors the team	3	0.68
	Challenges the team	3	0.75
Intrinsic Motivation		3	0.71
Team Effectiveness		8	0.80

Note. Number of items per scale and Cronbach's Alphas

Table 1 shows that all factors tested in this research are reliable ($>0,7$). For reliability, the Cronbach alpha value should be more than 0.7 (Pallant, 2005). All variables tested in this research demonstrate to have a Cronbach alpha that is reliable. 2 different groups for the study were defined. One consisted of team members and the other of team managers/leaders. As shown in the section before, 69% (n=122) of questionnaire participants were team managers/leaders, and 31% (n=80) corresponded to team members.

Research Findings

Data Analysis

Data analysis has been conducted using IBM SPSS Statistics software, and specific tests and moderated mediation analyses were performed utilizing the PROCESS macro (model 7) developed by Andrew Hayes (Hayes, 2013). Initially, the correlations between each variable and its means ($\bar{x}$) and standard deviations (σ) are presented. The main hypothesis (H1) tested the effect of the independent variable perceived proximity (X) on the dependent variable of team effectiveness (Y) through intrinsic motivation as a mediator variable, using the leadership functions as a moderator (V) of the relationship between perceived proximity and intrinsic motivation.

To test the main hypothesis, 3 sub-hypotheses were tested. Hence, the first sub-hypothesis (H1.1) tested the effect of the independent variable perceived proximity (X) on the dependent variable of team effectiveness (Y) through intrinsic motivation as a mediator variable, using the leadership function of supporting the social climate as a moderator (V) of the relationship between perceived proximity and intrinsic motivation. The second sub-hypothesis (H1.2) tested the effect of the independent variable perceived proximity (X) on the dependent variable of team effectiveness (Y) through intrinsic motivation as a mediator variable, using the leadership function of monitoring the team as a moderator (V) of the relationship between perceived proximity and intrinsic motivation. The third sub-hypothesis (H1.3) tested the effect of the independent variable perceived proximity (X) on the dependent variable of team effectiveness (Y) through intrinsic motivation as a mediator variable, using the leadership function of challenging the team as a moderator (V) of the relationship between perceived proximity and intrinsic motivation.

Hence, H1.2 and H1.3 tested the more task-related part of leadership functions, including a leader who monitors the team and challenges the team as moderators. And see whether there was a difference in significance between leadership functions that focus on social connection or task-related leadership functions.

The analyses were performed using a tool for SPSS called Process (Hayes, 2013). PROCESS is a tool to conduct moderation and mediation analysis that enables the assessment of conditional and indirect effects. Mediation models with several independent variables, permit

the estimate of both direct and indirect effects as well as their significance. On mediation models, it also makes computing conditional effects possible. Moreover, this tool estimates the indirect influence on several samples generated from the data by bootstrapping a resampling approach. Combining results from H1.1-H1.3 showed an approximate result to the main hypothesis (H1). The hypothesis that leadership functions moderate the relationship between intrinsic motivation and team effectiveness was tested to better understand the complex dynamics within virtual teams. Specifically, the testing of how perceived proximity influences intrinsic motivation, which in turn affects team effectiveness. The objective of testing this hypothesis was to emphasize the importance of the management of virtual teams and the critical role that leadership plays in increasing the levels of intrinsic motivation of individuals to improve team effectiveness in virtual settings.

Results

Each variable's standard deviation (σ) and mean ($\bar{x}$) are shown in the following table along with the correlations among all the variables.

Table 2. - Descriptive statistics and correlations

Variable	Mean ($\bar{x}$)	SD (σ)	Correlations					
			1.	2.1	2.2	2.3	3.	4
1. Perceived Proximity	5,62		1					
2.1 LF: Support the social climate	5,55	1,06	0.45**	1				
2.2 LF: Monitors the team	5,43	1,08	0.33**	0.25**	1			
2.3 LF: Challenges the team	5,21	1,12	0.27**	0.17**	0.33**	1		
3. Intrinsic Motivation	5,43	1,05	0.52**	0.47**	0.36**	0.30**	1	
4. Team Effectiveness	5,31	1,06	0.60**	0.55**	0.40**	0.35**	0.60**	1

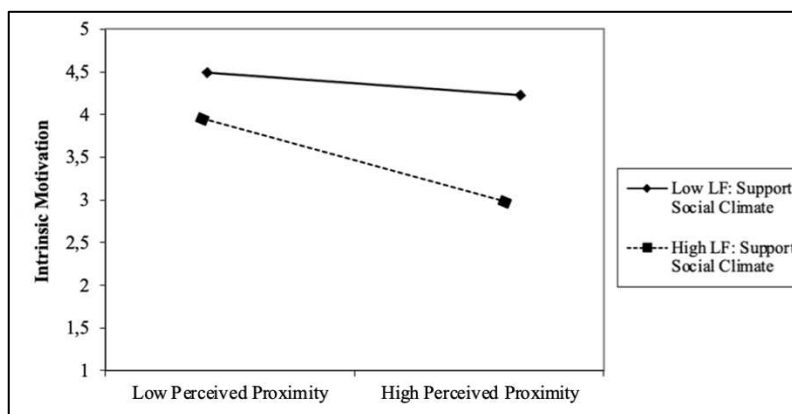
Note. Mean, standard deviation, and correlation between variables (Significance level 0,01 **)

To investigate the indirect impacts of perceived proximity (X) on team effectiveness (Y) through intrinsic motivation (M), a moderated mediation analysis has been performed. The relationship between intrinsic motivation and perceived proximity was moderated by leadership functions (H1). The moderated mediation model has been investigated using the SPSS program PROCESS, which made it possible to evaluate the direct, indirect, and moderation effects all at once, seeking to explore whether highly virtual teams with leadership functions encourage levels of intrinsic motivation among members, which in turn enhances team effectiveness.

A bootstrapping method with 4000 samples was used to assess the moderated mediation results to determine significance at a 95% confidence interval. It was discovered that the moderated mediation effect was significant ($B = 0.0032$, 95% CI: {0.0021, 0.0045}), indicating the nuanced influence of perceived proximity on team effectiveness through intrinsic motivation, moderated by leadership roles. Since there is no zero in the interval between the lower and higher confidence intervals, perceived proximity and team effectiveness are directly correlated. There was a significant impact, as indicated by the direct coefficient of ($B=0.2749$) (95% CI: {0.1719; 0.3778}).

Table 3 shows that the interaction between perceived proximity and the leadership function of a leader that supports the social climate was a significant predictor of intrinsic motivation ($b = .28$, $p = .034$). Simple slope analyses showed that the relationship between perceived proximity and intrinsic motivation was positive and significant for respondents with high levels of a leader who supports the social climate ($b = .72$, $p = .001$; see Figure 3); however, the same relationship was not significant for respondents in case of low levels of the leadership function supports the social climate ($b = .07$, $p = .781$).

Figure 3. – The moderating effect of LF: Support the social climate



H1.1 tested the effect of perceived proximity on team effectiveness through intrinsic motivation (mediator), using the leadership function of supporting the social climate as a moderator of the relationship between perceived proximity and intrinsic motivation. Using the procedures for moderated-mediation regression outlined by Andrew Hayes (Hayes 2013). Regarding the mediating role of intrinsic motivation on the relationship between perceived proximity and team effectiveness, as expected, the effect of intrinsic motivation on team effectiveness was positive and significant ($b = .56$, $p < .001$). Perceived proximity was shown to have a direct effect on team effectiveness ($b = .71$, $p < .001$).

Table 3. - test of the moderated-mediation model

Variable	Intrinsic motivation			Team Effectiveness		
	<i>b</i>	<i>SE</i>	<i>t-value</i>	<i>b</i>	<i>SE</i>	<i>t-value</i>
Constant	2.75***	.19	14.47	1.88***	.22	8.55
Negative Affect	.22***	.04	5.50	.18***	.04	4.50
Perceived Proximity	.55***	.09	6.11	.71***	.12	5.92
LF: Support social climate	.41***	.08	5.13			
Perceived Proximity x LF SSC	.28**	.07	4.00			
LF: Monitor the team	.37***	.05	7.40			
Perceived Proximity x LF MtT	.19**	.09	2.11			
LF: Challenge the team	.29***	.04	7.25			
Perceived Proximity x LF CtT	.25**	.06	4.17			
Intrinsic Motivation				.56***	.12	4.67
R2	.42***			.46***		

Note. * $p < .05$, ** $p < .01$, *** $p < .001$ (SSC = support social climate, MtT = monitor the team, CtT = challenge the team)

Results from H1.1 show that the indirect effect of perceived proximity on team effectiveness through intrinsic motivation at high levels of the leadership function supports the social climate was significant, supporting the moderated-mediation model (Index = 0.19; BootLLCI = 0.5621 and BootULCI = 0.1221). On the other hand, at low leadership function levels, the same indirect effect was less strong (Index = 0.04; BootLLCI = 0.3062 and BootULCI = 0.1820). Therefore, the significance of the leadership function a support the social climate in virtual team environments is highlighted by the fact that it seems to reinforce the indirect impact of perceived proximity on team effectiveness through intrinsic motivation. See table 3 and 4 below:

Table 3. - Mediated moderation PROCESS (High levels of LF: support the social climate)

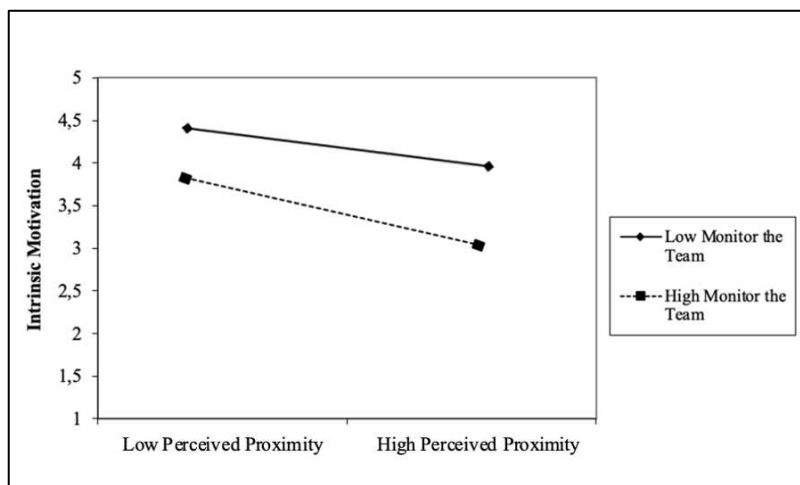
	Index of Mediated Moderation			
	<i>Index</i>	<i>BootSE</i>	<i>BootLLCI</i>	<i>BootULCI</i>
MOD	0.19	0.1173	0.5621	0.1221

Table 4. - Mediated moderation PROCESS (low levels of LF: support the social climate)

	Index of Mediated Moderation			
	<i>Index</i>	<i>BootSE</i>	<i>BootLLCI</i>	<i>BootULCI</i>
MOD	0.04	0.0222	0.3062	0.1820

Table 3 shows the interaction between perceived proximity and the leadership function. A leader who supports the social climate was a significant predictor of intrinsic motivation ($b = .19$, $p = .031$). Simple slope analyses showed that the relationship between perceived proximity and intrinsic motivation was positive and significant for respondents with high levels of a leader who supports the social climate ($b = .68$, $p = .001$; see Figure 4). However, the same relationship was not significant for respondents in case of low levels of leadership function support social climate ($b = .03$, $p = .751$).

Figure 4. - The moderating effect of LF: Monitor the team



H1.2 tested the effect of perceived proximity on team effectiveness through intrinsic motivation (mediator), using the leadership function of monitoring the team as a moderator of the relationship between perceived proximity and intrinsic motivation. Using the procedures for moderated-mediation regression outlined by Andrew Hayes (Hayes 2013).

Results from H1.2 show that the indirect effect of perceived proximity on team effectiveness through intrinsic motivation at high levels of the leadership function monitoring the team was significant, supporting the moderated-mediation model (Index = 0.26; BootLLCI = 0.6221 and BootULCI = 0.1449). On the other hand, at low leadership function levels, the same indirect effect was less strong (Index = 0.07; BootLLCI = 0.2916 and BootULCI = 0.1742). Therefore, the significance of the leadership function of monitoring the team in virtual team environments is highlighted by the fact that it seems to reinforce the indirect impact of perceived proximity on team effectiveness through intrinsic motivation. See table 6 and 7 below:

Table 4. - Mediated moderation PROCESS (High levels of LF: monitor the team)

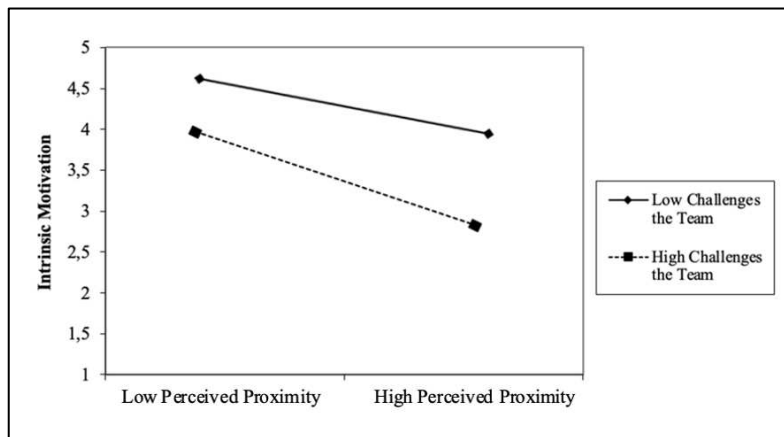
Index of Mediated Moderation				
	<i>Index</i>	<i>BootSE</i>	<i>BootLLCI</i>	<i>BootULCI</i>
MOD	0.26	0.1203	0.6221	0.1449

Table 5. - Mediated moderation PROCESS (low levels of LF: monitor the team)

Index of Mediated Moderation				
	<i>Index</i>	<i>BootSE</i>	<i>BootLLCI</i>	<i>BootULCI</i>
MOD	0.07	0.0198	0.2916	0.1742

Table 3 shows the interaction between perceived proximity and the leadership function. A leader who supports the social climate was a significant predictor of intrinsic motivation ($b = .25$, $p = .029$). Simple slope analyses showed that the relationship between perceived proximity and intrinsic motivation was positive and significant for respondents with high levels of a leader who supports the social climate ($b = .59$, $p = .001$; see Figure 5). However, the same relationship was not significant for respondents in case of low levels of leadership function support the social climate ($b = .06$, $p = .641$).

Figure 5. - The moderating effect of LF: Challenges the Team



H1.3 tested the effect of perceived proximity on team effectiveness through intrinsic motivation (mediator), using the leadership function of challenging the team as a moderator of the relationship between perceived proximity and intrinsic motivation. Using the procedures for moderated-mediation regression outlined by Andrew Hayes (Hayes 2013).

Results from H1.3 show that the indirect effect of perceived proximity on team effectiveness through intrinsic motivation at high levels of the leadership function challenging the team was significant, supporting the moderated-mediation model (Index = 0.24; BootLLCI = 0.5321 and BootULCI = 0.1707). On the other hand, at low leadership function levels, the same indirect effect was less strong (Index = 0.04; BootLLCI = 0.3711 and BootULCI = 0.2317). Therefore, the significance of the leadership function of monitoring the team in virtual team environments is highlighted by the fact that it seems to reinforce the indirect impact of perceived proximity on team effectiveness through intrinsic motivation. See table 6 and 7 below:

Table 6. - Mediated moderation PROCESS (High levels of LF: challenge the team)

	Index of Mediated Moderation			
	<i>Index</i>	<i>BootSE</i>	<i>BootLLCI</i>	<i>BootULCI</i>
MOD	0.24	0.1358	0.5321	0.1707

Table 7. - Mediated moderation PROCESS (low levels of LF: challenge the team)

	Index of Mediated Moderation			
	<i>Index</i>	<i>BootSE</i>	<i>BootLLCI</i>	<i>BootULCI</i>
MOD	0.04	0.0314	0.3711	0.2317

Combining and comparing the results of H.1.1-1.3, the indirect effect of perceived proximity on team effectiveness through intrinsic motivation at high levels of leadership functions by leaders was significant, supporting the moderated-mediation model (Index = 0.23; BootLLCI = 0.6512 and BootULCI = 0.1521). On the other hand, at low leadership function levels, the same indirect effect was less strong (Index = 0.05; BootLLCI = 0.3076 and BootULCI = 0.2049). The relationship between perceived proximity, intrinsic motivation, and team effectiveness is influenced by leadership functions. Therefore, the significance of leadership functions in virtual team environments is highlighted by the fact that it seems to reinforce the indirect impact of perceived proximity on team effectiveness through intrinsic motivation. See table 8 and 9 below:

Table 8. - Mediated moderation PROCESS (High levels of leadership functions H1.1-H1.3)

	Index of Mediated Moderation			
	<i>Index</i>	<i>BootSE</i>	<i>BootLLCI</i>	<i>BootULCI</i>
MOD	0.23	0.1273	0.6512	0.1521

Table 9. - Mediated Moderation PROCESS (low levels of leadership functions H1.1-H1.3)

Index of Mediated Moderation				
	<i>Index</i>	<i>BootSE</i>	<i>BootLLCI</i>	<i>BootULCI</i>
MOD	0.05	0.0262	0.3076	0.2049

All things considered, the outcomes emphasize how the three leadership functions, supporting social climate, monitoring the team, and challenging the team positively contribute to intrinsic motivation by team members, thereby enhancing team effectiveness within virtual environments.

Discussion

The main hypothesis (H1) resulting from analysis of the combined hypotheses (H1.1 – H1.3) shows a significant influence on the relationship between perceived proximity and team effectiveness. Intrinsic motivation of team members (mediator) plays a significant part in the indirect impact of perceived proximity on team effectiveness. Furthermore, leaders who perform leadership functions (moderators) have a significant impact on intrinsic motivation, which enhances team effectiveness.

Concerning H1.1, the results support the expected effect: there is a significant indirect influence of perceived proximity on team effectiveness through intrinsic motivation at high levels of the leadership function, supporting the social climate. On the other hand, at low leadership function levels, this effect is not shown. These findings highlight the critical role that the leadership function of a leader that supports the social climate plays in creating a positive social environment, which in turn shows to increase team effectiveness by enhancing the intrinsic motivation of team members. Research by Hill et al. (2015) highlights the impact of perceived proximity on team effectiveness through intrinsic motivation, particularly at high levels of the leadership function of a leader that supports the social climate. According to Morgeson et al. (2009), leaders who place a high priority on fostering interpersonal relationships and psychological safety, which are aspects of this leadership function, are more likely to increase their team members' intrinsic drive and general effectiveness.

In addition, Deci and Ryan's (2000) Self-Determination Theory (SDT) emphasizes the significance of autonomy, relatedness, and competence in promoting intrinsic motivation.

According to Walter et al. (2008), leaders who place a high priority on creating and maintaining a positive social climate successfully meet the relatedness need by fostering a sense of community and connection among team members. As a result, members of a team are more intrinsically motivated to collaborate and make significant contributions to the team's objectives.

These results have consequences that go beyond the specifics of this research. As shown by Lee (2021), they draw attention to the important role that leadership plays in minimizing the difficulties brought on by virtual teamwork. Intrinsic motivation by team members and team effectiveness are likely to increase for organizations that invest in the leadership function of a leader that supports the social climate in virtual teams.

Similarly, H1.2 produced expected results. We found that there is a noticeable indirect impact of perceived proximity on team effectiveness through intrinsic motivation at high levels of leadership function requiring team monitoring. On the other hand, at low leadership function levels, this effect is not shown. This emphasizes how important it is for leaders to effectively implement the leadership function of monitoring the team in virtual environments since it is demonstrated to create a positive effect on intrinsic motivation by team members and therefore team effectiveness. The study found that perceived proximity has an indirect impact on team effectiveness through intrinsic motivation. This effect is especially evident at high levels of the leadership function of monitoring the team. The findings are in line with the findings by Mutha (2023), who emphasizes the difficulties that arise from poor communication and coordination in virtual environments. Furthermore, according to Morgeson et al. (2009), leaders who keep lines of communication open and regularly monitor team activities are more likely to minimize any potential interruptions to the effectiveness of the team.

Furthermore, Deci and Ryan's (2000) Self-Determination Theory (SDT) emphasizes the importance of competence in developing intrinsic drive. According to Gagné et al. (2010), leaders who actively monitor team dynamics and regularly provide feedback to team members effectively satisfy the competence need by encouraging skill and understanding of their tasks. As a result, team members show to become more intrinsically motivated. As noted by Aubert & Kelsey (2003), leadership plays a crucial role in helping teams navigate the challenges of working remotely. Teams that put a high priority on building leadership

skills for proactive team monitoring in virtual teams are likely to realize increases in overall effectiveness.

Results from testing H1.3 also provided insights that were in line with expectations. The findings show that there is a significant indirect impact of perceived proximity on team effectiveness through intrinsic motivation at high levels of leadership function challenging the team. On the other hand, at low levels of leadership function, this effect is not shown. The link between perceived proximity and team effectiveness through intrinsic motivation is reinforced by this, highlighting the importance of this leadership role in positively impacting a virtual team's effectiveness.

The impact of perceived proximity on intrinsic motivation and team effectiveness, as observed, especially with high levels of leadership function challenge the team, aligns with the findings of Marks et al. (2001) regarding the significance of promoting innovation and setting high standards in teams. According to Zaccaro et al. (2001), leaders who push their teams to go above and beyond expectations and adapt new ideas are more likely to create a team culture focused on development. As highlighted by Morgeson et al. (2009), the difficulties faced by virtual teams, like possible feelings of loneliness and communication problems highlight the crucial role that leadership functions challenging the team plays in fostering team resilience and flexibility. Leaders who challenge their teams to think outside the box foster an innovative mindset that enhances team performance when working in virtual settings. As mentioned before Deci and Ryan (2000)'s Self-Determination Theory (SDT) emphasizes the role that autonomy, competence, and relatedness have in promoting intrinsic motivation. As highlighted by Gagné (2010), leaders who push their team to reach their maximum potential and offer chances for skill development help to fulfill the competence need. As a result, team members are more intrinsically motivated to strive for better results.

Since results from testing H1.1-H1.3 are relatively similar it can emphasize how crucial it is for leaders to have both social and structural leadership functions, since it is likely to increase the intrinsic motivation of team members and hence create a positive effect on team effectiveness in teams that work virtually. Nevertheless, it would be recommended for researchers to continue research on the dynamics of leadership functions and team effectiveness of firms that work with virtual teams are growing rapidly. Researchers can offer

useful insights to improve team effectiveness in virtual teams by delving deeper into the complex interactions between perceived proximity, leadership functions, team member motivation, and team effectiveness.

All in all, the findings of this study contribute to a deeper understanding of how leadership functions influence the intrinsic motivation of team members and therefore team effectiveness in virtual settings. By emphasizing the importance of leadership functions of supporting the social climate, monitoring the team, and challenging the team, the study provides valuable insights with implications for both organizational practices and future research in this field.

Practical Implication

The study's findings provide valuable insights for businesses looking to improve the effectiveness of their virtual teams. Organizations can maximize team effectiveness by implementing customized methods by understanding the critical role that leadership functions play in optimizing intrinsic motivation by team members and team effectiveness in virtual settings. First of all, it would be recommended to give top priority to funding leadership development initiatives created especially for virtual team leaders. This training should concentrate on developing leadership functions linked to supporting the social climate, monitoring the team, and challenging the team. Finally, it is recommended that organizations support continued study and education in the area of virtual team effectiveness and leadership. Organizations may enhance team performance and adjust their strategy to shifting virtual work environments by staying up to date on emerging trends and best practices.

Limitations

In addition to the study's merits, there are a few limitations that need to be mentioned. First, the sample size ($n=202$) is relatively large, yet it is never large enough. A bigger sample size draws more accurate results. Furthermore, the data was gathered cross-sectionally from a single source and at the individual level only within a limited period. More information ought to be gathered at various times. The time limits placed on writing the thesis dissertation prevented this from happening. To see the effects on the results, it's recommended that data be gathered at several points in time for future research.

Second, it is important to point out that this study primarily operates at the individual level of analysis. Although this method provides insightful information on how team effectiveness is influenced by perceptions of proximity on the individual level of team members, team-level viewpoints should also be included in future studies in this area. Examining the team's views as a whole is necessary to comprehend perceived proximity's effects on team effectiveness. Through the adoption of a team perspective that replaces the individual perspective, researchers can comprehend how virtuality impacts team effectiveness. Including a team-level analysis offers a different perspective on the study of improving team effectiveness in virtual work settings.

A third limitation pertains to the research's exclusive focus on how leadership functions moderate team members' intrinsic motivation, which in turn mediates the relationship between perceived proximity and team effectiveness. For a more thorough understanding, even though this aspect is crucial, it is advisable to investigate other mediator and moderator variables. For example, new research indicates that team dynamics and results may be greatly impacted by organizational culture. A strong organizational culture increases team performance and encourages employee engagement, according to research by Denison and Mishra (1995). Consequently, studying how intrinsic motivation, leadership, and organizational culture interact may provide insightful information about how well teams function. Furthermore, studies in the future should focus on outcomes of perceived virtuality other than team effectiveness. Examining how team members' trust is affected, for example, may provide insight into the interpersonal dynamics of virtual teams. Research by Jarvenpaa and Leidner underlined the value of trust in virtual teams and how it promotes cooperation and reduces conflict (Jarvenpaa and Leidner 1998). Therefore, using the current model and replacing team effectiveness with member trust could provide a more complex understanding of virtual team dynamics. All things considered, we can learn more about how virtuality affects team dynamics and effectiveness by examining outcomes like trust and broadening the range of mediator variables to include organizational culture.

Last but not least, future research could also investigate the same research for a specific industry. If, for example, perceived proximity by team members was tested for a specific industry like the consumer packaged goods industry, perhaps its relation to team effectiveness would show different outcomes.

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Appendices

Appendix 1: Questionnaire

Impact of Perceived Virtuality on Virtual Team Effectiveness

Objective: The aim of this study is to discover more theory with regards to team effectiveness. In particular for virtual teams. This study arises in the context of the virtual team effectiveness developed by the virtual teams effectiveness and productivity seminar of Catolica University Lisbon, led by the researcher Teis Visser, under the guidance of Ana Paula Giordano.

Procedures: You will be asked to complete the following questionnaire. It will be important that you are in a quiet place, without interruptions. Please turn off notifications (e.g., email) and other beeps. The session will last approximately 10 minutes and will be divided into 3 parts: 1. Your Demographics 2. The composition of your current or former work team 3. Experiences you had while working in this team

Voluntary participation and right to withdraw: Your contribution is voluntary and you can decide at any time not to participate.

Benefits, risks, or discomfort in participation: There are no expected risks associated with participation in the study. Your answers will contribute to the advancement of scientific knowledge in the field of human resource management.

Confidentiality, anonymity and privacy: Your responses will always be processed in complete confidentiality, and will be analysed exclusively for the purpose described above by the research team responsible for the study.

The use of the data collected throughout this study, including in this survey, will always be done in a strictly anonymous way, and in an aggregated form, and they cannot be related to you. The data will not be shared with third parties.

Contact: If you have any questions, please contact: s-tvisser@ucp.pt. By answering 'Yes', you confirm that you are over 18 years of age, that you have read and understood the information presented on this page, you agree you have been given the necessary information about the study and that you voluntarily agree to participate in it.

I agree to participate in this study:

Demographic Questions

Do you currently work in a team?

- ☐ Yes
- ☐ No

What is your role within your team?

- ☐ • Team Member
- ☐ • Team Leader/Manager

How long have you been working in your current team?

Less than a year

Do you work remotely (from home or other location that is not your company's office)?

- ☐ Never
- ☐ Rarely
- ☐ Sometimes
- ☐ Almost always
- ☐ Always

What is your country of origin?

Afghanistan

How many years of professional experience do you have?

1

How many people are there in your team?

1

What is your gender?

- ☐ Male
- ☐ Female
- ☐ Non-binary / third gender
- ☐ Prefer not to say

What's your age?

16

Perceived Virtuality

CONSIDER YOUR TEAM WORK OVER THE LAST WEEK. ON EACH LINE BELOW, SELECT THE OPTION YOU THINK BEST DESCRIBES YOUR CONNECTION TO YOUR TEAM WHILE YOU WERE WORKING ON YOUR TASK OR PROJECT. Answer the following 5 items in each continuum, between 1 (meaning for example, distant) and 5 (for example, nearby)."

	1	2	3	4	5
Distant-1 / Nearby-5	☐	☐	☐	☐	☐
Far-1 / Close-5	☐	☐	☐	☐	☐
Seperate-1 / Together-5	☐	☐	☐	☐	☐
Remote-1 / Proximal-5	☐	☐	☐	☐	☐
Disconnected-1 / Connected-5	☐	☐	☐	☐	☐

THINK ABOUT THE WORK/PROJECT TEAM AND ANSWER TO THE FOLLOWING STATEMENT:

	1- completely disagree	2- Disagree	3- neither agree nor disagree	4- Agree	5- Completely agree
Our team uses technology effectively to communicate virtually (i.e., using technologies) with one another.	☐	☐	☐	☐	☐
Our team communicates virtually (i.e., using technologies) with other team members in a way that is clear and easily understood	☐	☐	☐	☐	☐
Our team takes steps to avoid misunderstandings when communicating virtually (i.e., using technologies) with team members (e.g., by providing important background information, verifying receipt of messages, requesting and providing clarification).	☐	☐	☐	☐	☐
Our team sends virtual (i.e., using technologies) communication with a positive and encouraging tone.	☐	☐	☐	☐	☐

Please allocate the proportion (in %) of total work/project time you spent communicating with other team members this week using:

Face-to-face communication	
Telephone	
Email	
Videoconferences	
Instant messaging	
Document sharing	
Collaboration Software (e.g. MS Teams, Slack)	
Other	
Total	

Intrinsic Motivation

Why do you or would you put efforts into your current job?

	1-not at all	2- very little	3- a little	4- moderately	5- strongly	6- very strongly	7- completely
Because I have fun doing my job.	☐	☐	☐	☐	☐	☐	☐
Because what I do in my work is exciting.	☐	☐	☐	☐	☐	☐	☐
Because the work I do is interesting.	☐	☐	☐	☐	☐	☐	☐

Leadership functions

Please consider how your leader manages you team. Read the following statements and answer to what extend you agree, in a scale from 1 (Totally disagree) to 7 (Totally agree).

	1- Totally disagree	2- Disagree	3- Somewhat disagree	4- Neither agree nor disagree	5- Somewhat agree	6- Agree	7- Totally agree
Engages in actions that demonstrate respect and concern for team members.	☐	☐	☐	☐	☐	☐	☐
Looks out for the personal wellbeing of team members	☐	☐	☐	☐	☐	☐	☐
Does things to make it pleasant to be a team member.	☐	☐	☐	☐	☐	☐	☐
Requests task-relevant information from team members.	☐	☐	☐	☐	☐	☐	☐
Notifies flaws in task procedures or team outputs	☐	☐	☐	☐	☐	☐	☐
Monitors team and team member performance.	☐	☐	☐	☐	☐	☐	☐
Reconsiders key assumptions in order to determine the appropriate course of action.	☐	☐	☐	☐	☐	☐	☐
Contributes ideas to improve how the team performs its work.	☐	☐	☐	☐	☐	☐	☐
Challenges the status quo.	☐	☐	☐	☐	☐	☐	☐

Team effectiveness

Think about how you feel about your team and choose the option that best reflects it. (1 – Strongly disagree; 2 – Disagree; 3 – Somewhat disagree; 4 – Neither agree nor disagree; 5 – Somewhat agree; 6 – Agree; 7 – Strongly agree)

	1 - Strongly disagree	2 - Disagree	3 - Somewhat disagree	4- Neither agree nor disagree	5 - Somewhat agree	6 - Agree	7 - Strongly agree
My team is effective.	☐	☐	☐	☐	☐	☐	☐
My team has a good performance.	☐	☐	☐	☐	☐	☐	☐
My team has high quality performance.	☐	☐	☐	☐	☐	☐	☐
My team is successful in the tasks.	☐	☐	☐	☐	☐	☐	☐
I would not hesitate to participate in another task/project with the same team.	☐	☐	☐	☐	☐	☐	☐
If possible, I would switch to another team.	☐	☐	☐	☐	☐	☐	☐
If I had the opportunity, I would rather work with a different team, instead of working with this one.	☐	☐	☐	☐	☐	☐	☐
This team would work well in future projects.	☐	☐	☐	☐	☐	☐	☐