VIETNAM NATIONAL UNIVERSITY, HANOI
VIETNAM JAPAN UNIVERSITY
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HOANG ANH DUONG

EXPLORING THE INFLUENCE OF REMOTE LEADERSHIP COMPETENCY ON THE OUTCOME OF VIRTUAL IT SERVICE TEAM: THE ROLE OF INTRA-TEAM COMMUNICATION AS A MEDIATOR

MASTER'S THESIS

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COMMITMENT

I confirm that the thesis titled "Exploring the Impact of Remote Leadership Competency on the Outcomes of Virtual IT Service Teams: The Role of Intra-Team Communication as a Mediator" is my original research conducted under the supervision of Associate Professor Prof. Mitsue Ishida and Dr. Mai Duc Anh. The data utilized in the thesis is accurate, and the quantitative analysis and conclusions drawn in the thesis have not been previously published in any other research. All sources cited in this thesis are properly acknowledged.

I solemnly affirm, with personal integrity, that this research outcome is my own work and does not infringe upon the Regulations on the Prevention of Plagiarism in Academic and Scientific Research Activities at VNU Vietnam Japan University (Issued together in Decision No. 700/QD-ĐHVN dated 30/9/2021 by the Rector of Vietnam Japan University). I am fully prepared and willing to take responsibility for my thesis.

Hanoi, June 2024

Author

Hoang Anh Duong

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ABSTRACT

Purpose- The purpose of this study is to investigate the connection between the competencies of remote leadership to virtual team coordination. Then, analyze the effect of intra-team communication to the relationship between virtual team coordination and virtual team effectiveness.

Methodology- This study polls 300 Vietnam developers who have experience working in teams in a fully online or hybrid online environment in which they are hired to work for the term of IT service project. Using SmartPLS4 software with PLS-SEM and multigroup analysis approach, the proposed relationships between all variables are examined.

Findings- Vietnamese developers working in a virtual context in the IT services sector perceive that their team leader has the necessary competencies (Trust building through communication technology, diversity management, optimizing virtual team meetings, Virtual team monitoring) for virtual teams to coordinate effectively. Addtionally, the study shows that the more effort virtual team members put into coodination, the more they will want to share feedback and build ideas. This thing motivates the team to achieve better outcome.

Implications- In the evolving landscape of remote work, effective leadership is pivotal to the success of virtual teams. Studies indicate that remote leaders who excel in specific competencies—namely, trust building through communication technology, diversity management, optimizing virtual team meetings, and virtual team monitoring—can significantly enhance coordination among team members. These competencies are essential as they address the unique challenges of virtual environments, such as physical separation, cultural differences, and the potential for miscommunication. Beyond these competencies, fostering a collaborative and coordinative culture is vital for virtual team success. Encouraging feedback sharing and idea building can significantly improve team outcomes. Leaders should create a safe environment for feedback, using regular sessions, anonymous surveys, and open forums to facilitate this. Constructive feedback helps team members understand their strengths and areas for improvement, promoting

continuous development. Similarly, promoting idea building encourages innovation and engagement.

Keywords: Remote leadership competency, Intra-team communication, Virtual team coordination, Virtual team effectiveness

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ICT	Information and Communication Technology
IT	Information Technology
VT	Virtual team

CHAPTER 1: INTRODUCTION

1.1. Research rationale

Flexible working is the next battleground for talent. The need for specific skill sets has led organizations to hire regardless of geographic barriers. In Vietnam, according to research by TopDev- Vietnam's top leading IT recruitment platform- highlight that the shortage of IT personnel is always the most difficult problem for the IT market. Although the salary and bonuses have been increasing remarkably for this industry, it is predicted that from 2023 - 2025, Vietnam will still have a shortage of 150,000 to 200,000 developers/engineers annually. Besides that, with technological advancements, remote work has gained traction, allowing professionals to perform their duties from any location. In 2023, Vietnam holds the 59th position in the Global Remote Work Index (GRWI), which assesses the potential of 108 countries as leading telecommuting destinations. The country has received positive evaluations for its internet quality, digital infrastructure, and advancements in digital governance. There has been a notable increase in the demand for IT professionals in the remote work sector. Furthermore, according to Vietnam Digital Readiness (2021) highlight that 80% of Gen Z believing they can be effective in a remote work setting, the youngest generation in the workforce is poised to represent a third of Vietnam's workforce by 2025. After 3 years living & working with Covid-19, the traditional work has changed a lot. A new form of working has appeared - hybrid working, pure remote working. It offers employees the autonomy to choose to work wherever and however they are most productive. In the survey was conducted by TopDev in 2022 for Developers (Vietnam IT Market Report). Which working method do you prefer? The majority of responses prioritize hybrid work and 100% remote working. But it can also be seen that businesses in the IT sector are not ready for that.

In recent years, the adoption of virtual teams (VTs) for Information Technology IT services has become commonplace in most organizations. Jiménez et al. (2017) emphasize the increasing prevalence of global software development projects as an example. Virtual teams, also referred to as geographically dispersed, distributed, or remote teams, consist of individuals collaborating from different locations, both temporally and organizationally, often culturally diverse if team members span different

countries (Klitmøller & Lauring, 2013). These teams rely on communication technologies like instant messaging, email, and video or voice conferencing to collaborate (Jiménez et al., 2017). The trends toward globalization, coupled with advancements in information and communication technology (ICT), have significantly encouraged and facilitated the use of virtual teams, especially in IT service projects (Townsend et al., 1998; Martins et al., 2004).

Despite their widespread adoption, certain aspects of virtual teams, such as planning, creativity, subgroup formation, and adoption of new ICT technologies, have not received sufficient research attention (Gilson et al., 2014). In addition to globalization and advancements in ICT, other factors driving the increasing adoption of virtual teams include the need for cost reduction, enhanced competitiveness, and the opportunity to leverage global resources (Aksentijević et al., 2015; Alves & Castro, 2006). Therefore, globally dispersed IT service teams depend on shared knowledge, shared resources, and leveraging the unique skills and capabilities of diverse team members (Bardhan et al., 2012; McLarnon et al., 2019). The potential for round-the-clock team collaboration, optimal team selection, and leveraging local knowledge are appealing to organizations (Huda et al., 2009; Jiménez et al., 2009). However, managing these virtual teams often presents operational challenges that can outweigh the potential benefits (Kirkman et al., 2002).

Previous research on virtual teams for IT services projects has highlighted several important management issues, including cultural differences (Shachaf, 2008; Gurung & Pratter, 2006), communication technology (Bardhan et al., 2012; Yu et al., 2013), geographical distance (Morrison-Smith & Ruiz, 2020; Cramton & Webber, 2005), language barriers (Daim et al., 2012), team leadership (Casey, 2010; Siebdrat et al., 2009), time zone difference (Sarker & Sahay, 2004; Espinosa et al., 2012), knowledge sharing among dispersed team members (Ni et al., 2018; Naicker & Benjamin, 2014), shared team identity, and trust between members (Moe & Šmite, 2008). These challenges contrast sharply with those encountered in traditional colocated IT services teams, which typically revolve around issues like budget, schedule, and system quality, often attributed to inadequate project management . Therefore, the increased reliance on virtual teams and the development of more complex software artifacts have introduced

new challenges to the IT service environment (Oak & Laghate, 2016). Specifically, effectively coordinating teamwork in such settings remains a pressing question. Virtual teams inherently pose coordination challenges (Rehman et al., 2020; Morrison-Smith & Ruiz, 2020), especially when high levels of coordination are necessary for successful project outcomes, making the optimal coordination approach unclear.

Despite previous research exploring coordination challenges in virtual teams, little attention has been paid to the competencies required for leaders to effectively manage these teams. This research gap highlights the need for further exploration into the leadership skills and competencies necessary to successfully manage virtual teams. Given the unique challenges and complexities associated with leading virtual teams, it is essential for leaders to possess a diverse skill set that goes beyond traditional leadership capabilities (Kirkman et al., 2002).

1.2. Research objective and research questions

Research questions:

- What can the leader (Project manager) do to make virtual team members coordinate smoothly?

In the condition that members of the virtual working team come from different organizations. And the communication in the remote work is a difficulty by barriers such as form of communication.

- Whether the promotion of better coordination in the virtual working team makes team member more openness in communication?

- Whether openness in communication between each member in team can making the team's outcome better?

Research objectives:

- Validate the necessary level of these skill: Trust building through Communication technology, Diversity management, Optimizing virtual team meetings, Virtual team monitoring for remote leader

- Study the role of intra-team communication between virtual team coordination and virtual team effectiveness

1.3. Research method

- Sampling method: non-probability sampling
- Data collection: Online questionaire Servey
- Analysis procedure: Data analysis was performed using Smart PLS. All aspects of the structural model, including its validity, reliability, and exploratory factor analysis's validity, have been thoroughly analyzed. In the next part, the findings are given and discussed.

1.4. Contributions

- The study shows that remote leaders possessing these competencies (Trust building through Communication technology, Diversity management, Optimizing virtual team meetings, Virtual team monitoring) will improve coordination among virtual team members, thereby motivating the team to achieve better outcome.
- Addtionally, the study shows that the more effort virtual team members put into coodination, the more they will want to share feedback and build ideas. This thing motivates the team to achieve better outcome.

1.5. Structure of the thesis

There are five parts to this thesis:

Chapter 1: Introduction- Explaining of the research's fundamental concepts in terms of its context, purpose, scope, and significance.

Chapter 2: Literature review- Examining prior articles to acquire a comprehensive understanding of

Chapter 3: Methodology – Illustrating theoretical framework, research design, data collection and analysis procedures.

Chapter 4: Finding - Presenting research outcomes

Chapter 5: Discussion and Conclusion: Addressing findings, limitations and future research directions

CHAPTER 2: LITERATURE REVIEW, THEORETICAL BACKROUND AND HYPOTHESIS DEVELOPMENT

2.1. Theoretical backround

2.1.1 Media richness theory

Virtual teams face challenges such as geographical distances, cultural diversity, and varying organizational backgrounds. Effective communication cues are critical for establishing interpersonal bonds and trust, but computer-mediated communication frequently fails to provide these elements (Beranek and Martz, 2005).

The Media Richness Theory, as outlined by Daft and Lengel (1986) and discussed by Lin et al. (2008), suggests that organizational effectiveness relies heavily on the ability to utilize communication channels that provide rich information, particularly in reducing uncertainty and clarifying ambiguities. The limited use of media in virtual teams may restrict the quantity and quality of information exchanged within an organization, hindering its objectives.

Hambley et al. (2007) propose that a deeper understanding of communication technologies used by virtual teams can enhance efficiency by distinguishing between various communication media. By leveraging insights from existing literature on virtual team coordination, leaders can facilitate greater knowledge flow within virtual teams. Identifying key factors that influence virtual team coordination can provide valuable guidance for enhancing the quantity and quality of information exchange, ultimately reducing uncertainty and ambiguity in task performance (Lin et al., 2008).

2.1.2. Social exchange theory

Social Exchange Theory, developed by sociologist George Homans (1961), aims to elucidate how individuals interact with one another and assess the value gained or lost in these interactions. Essentially, the theory posits that people evaluate the potential benefits of engaging with others against the effort and risks involved before deciding whether to proceed.

Intra-team communication is often conceptualized as a form of social exchange within organizations. It entails the sharing of information, ideas, and feedback among team

members, incorporating aspects beyond mere transactional exchanges (Guzzo and Shea,1992). This includes building relationships, fostering trust, and promoting collaboration. Effective intra-team communication hinges on understanding the social dynamics within the team, such as individual personalities, communication styles, and interpersonal relationships (Xiao & Huang, 2015). Recognizing intra-team communication as a social exchange can help organizations appreciate the significance of interpersonal connections and cultivate environments conducive to open and efficient communication (Mitrofan & Bulborea, 2013).

Timely information sharing is crucial for achieving team goals, which underscores the importance of effective intra-team communication. Team performance heavily relies on such communication for problem-solving and ensuring the timely availability of information, as noted by Leenders, Van Engelen, and Kratzer (2003)

According to Stout, Cannon-Bowers, Salas, and Milanovich (1999), effective teamwork is facilitated by communication, which fosters a climate of trust and support. In today's digital age, with global connectivity facilitated by the internet, companies are witnessing shifts in team structures and communication mediums. Face-to-face communication is no longer a strict necessity, and alternative communication methods are sometimes preferred.

2.2. Literature review and hypothesis development

2.2.1. Remote Leadership competency

Remote leadership, also known as virtual leadership or e-leadership, is the ability to effectively lead and manage a team or organization from a remote or virtual work environment (Wart et al., 2017). Remote leadership requires a unique set of competencies to effectively navigate the challenges of leading a team from a distance (Malhotra et al., 2007). In addition to the traditional leadership skills such as communication, decision-making, and strategic thinking, remote leaders must also demonstrate exceptional abilities in areas such as digital fluency, virtual team building, and performance management in a remote setting (Roy, 2012).

Remote leaders need to be proficient in leveraging digital tools and technologies to facilitate communication, collaboration, and project management. This includes

knowledge of virtual meeting platforms, project management software, and other digital collaboration tools that enable seamless remote work experiences (Radman, 2020).

Creating a sense of team cohesion and belonging in a virtual environment is a crucial competency for remote leaders. This involves fostering a supportive team culture, promoting trust and transparency, and finding innovative ways to build relationships and camaraderie among team members who may be geographically dispersed (Kozlowski et al., 2021).

Effectively evaluating and managing employee performance in a remote setting requires a different approach than traditional in-person performance management. Remote leaders must be adept at setting clear performance expectations, providing regular feedback, and implementing performance metrics that account for the unique challenges of remote work (Zigurs, 2003). They must also be skilled at motivating and engaging remote team members, providing support and resources, and addressing performance issues in a virtual environment Remote leaders must also possess strong communication skills to overcome the challenges of distance and effectively convey information, expectations, and feedback to their team members (Daim et al., 2012).

While there are certainly benefits to remote leadership, it's important to consider the potential downsides and challenges that come with leading a team from a distance. One of the main concerns is the loss of immediacy and personal connection that often comes with face-to-face interactions. In a remote setting, leaders may struggle to pick up on non-verbal cues or subtle changes in team dynamics, which can impact their ability to effectively manage and support their team members (Tworoger et al., 2013). Additionally, the lack of physical presence may lead to feelings of isolation and disconnection among team members, which can ultimately affect morale and productivity(Kirkman et al., 2002). Remote leaders must also be adaptable and flexible, as they may encounter technical difficulties or time zone differences that require them to think on their feet and find creative solutions (Malhotra et al., 2007). While remote leadership certainly has its advantages, it's important for leaders to be mindful of the potential drawbacks and challenges that come with managing a remote team. Balancing the benefits of flexibility and autonomy with the need for strong interpersonal connections and effective communication is essential in successful remote leadership.

In this research article, the author will focus on researching the necessary competencies of leaders for remote working.

2.2.1.1. Trust building through Communication technology

Trust, a cornerstone of effective teamwork, is particularly crucial in these settings where face-to-face interactions are limited (Malhotra et al., 2007). Trust within virtual teams typically relies more on observable actions rather than abstract goodwill (Jarvenpaa & Leidner, 1999). Online goodwill is hard to discern, so it's important to clearly communicate expectations and actions for transparency.

Establishing clear communication norms is essential for fostering trust and cohesion (Malhotra et al., 2007). These norms dictate how information is shared, stored, and accessed among team members (Henttonen & Blomqvist, 2005; Ghosh et al., 2004). Without explicit norms, team members may resort to practices prevalent in their local settings, leading to disjointed communication and a lack of integration of work efforts (Hinds & Mortensen, 2005). Key elements of communication norms include guidelines for the use of communication technology, such as the frequency of checking repositories, etiquette for electronic communication, and protocols for document ownership and revision (Ghosh et al., 2004; Ghosh et al., 2017; Sonnenwald, 1996). By standardizing communication practices, virtual teams can minimize misunderstandings and promote a shared understanding among members, thereby enhancing trust and collaboration (Malhotra et al., 2007; Hunsaker & Hunsaker, 2008).

Maintaining confidentiality within the team and managing external communication are critical aspects of trust building in virtual teams (Notes, 2013; Altschuller & Benbunan-Fich, 2010). Breaches in confidentiality can undermine trust among team members and jeopardize the success of collaborative efforts (Henttonen & Blomqvist, 2005; El-Kassrawy, 2014). Therefore, establishing norms regarding what information can be shared externally is essential for protecting sensitive data and preserving trust within the team (Yang & Maxwell, 2011; Kayworth & Leidner, 2002). Additionally, the creation of external-facing platforms for sharing documents requires careful coordination and consensus among team members to ensure that confidential information remains secure (Chen et al., 2008; Kao & Liu, 2013; Kozlowski et al., 2021). By managing external communication effectively, virtual teams can uphold trust both within the team and with

external stakeholders, fostering a culture of transparency and accountability (Malhotra et al., 2007).

Successful virtual teams recognize the importance of periodically revisiting communication norms and team processes to adapt to evolving circumstances and maintain alignment (Maznevski & Chudoba, 2000; Malhotra et al., 2007). Virtual get-togethers or periodic evaluations provide opportunities for team members to reassess their norms, renew their sense of purpose, and reinvigorate their shared identity (Barkhi et al., 2006). These interventions serve not only to reinforce trust but also to address any emerging challenges or tensions within the team. By fostering open dialogue and reflection, virtual teams can enhance communication effectiveness and strengthen trust among members over time.

Research by Gibson and Cohen (2003) suggests that explicit communication norms help mitigate misunderstandings and conflicts within virtual teams. When team members adhere to agreed-upon norms for sharing information, they can anticipate each other's communication preferences, leading to smoother coordination. Furthermore, a study by Cummings and Haas (2012) highlights the importance of establishing norms for information sharing and processing in virtual team environments. By defining expectations regarding the frequency, format, and channels of communication, team members can streamline the exchange of information, facilitating efficient coordination of tasks and activities.

Therefore, the author proposes the following hypothesis:

H1: The leader's ability to build trust through communication technology positively affects virtual team coordination.

2.2.1.2. Diversity management

Diversity management is an approach designed to integrate employees from diverse backgrounds into both the informal and formal frameworks of an organization, aiming to provide the company with a competitive advantage (Mor-Barak, 2005). Cox and Beale (1999) posit that viewing diversity as an organizational asset can confer a competitive advantage if effectively harnessed. This notion resonates with Thomas' (1996) research, which outlines a diversity management process for handling

organizational diversity. The process entails four steps, expounded upon below. Firstly, managers must comprehend the issue by analyzing current environmental changes and defining the problem precisely. Secondly, they must scrutinize the diversity composition to understand the situation. Thirdly, managers should identify diversity tensions, which refer to conflicts arising from interactions within the diversity mix. These tensions can be both beneficial and detrimental, fostering innovation and broadening perspectives or hindering goal attainment. In this step, the focus should be on understanding and addressing the root causes of negative diversity tensions (Thomas, 1996). Finally, Thomas (1996) advocates for evaluating diversity within the group and exploring action options to improve problem-solving processes.

In this research article, the author focuses on virtual teams whose members do not come from the same organization. Therefore, virtual teams will consist of individuals with diverse backgrounds, experiences, and decision-making styles, which greatly influence the ability to coordinate in team when there is a lack of face to face interaction (Kirkman et al., 2002). To ensure that this diversity is understood and valued, Edmondson & Harvey (2016) suggest that leaders should create an explicit "expertise directory" at the beginning of the team's formation. Typically, this directory has images along with comprehensive details about each member's education, work history, experience, and associations with other professionals. This approach fosters collaboration by providing team members with insights into each other's backgrounds and expertise. While traditional face-to-face teams may rely on informal interactions like dinners and drinks to build rapport, virtual teams must rely on electronic directories (Ozimek, 2020).

Given that many members of virtual teams may be have not previously worked together, Kirkman et al (2002) suggest that assign pairs of individuals to tasks based on the potential for mutual learning. These pairs are intentionally diverse in terms of geography and function, enabling unique combinations that would not be feasible in colocated teams. After completing a task, individuals are reassigned to new tasks to prevent the formation of ingroup-outgroup dynamics commonly observed in virtual teams. When these pairs include culturally diverse members, the close working relationship that develops often helps to dismantle cultural stereotypes and overcome communication barriers. This close collaboration fosters virtual bonding within pairs and sub-groups,

which can ultimately contribute to greater collaboration and team cohesion across the entire virtual team.

A study by van Knippenberg and Schippers (2007) indicates that diverse teams outperform homogeneous teams in tasks requiring creativity and innovation. By effectively managing diversity and leveraging the varied expertise of team members, virtual teams can generate novel ideas and solutions, leading to more effective coordination of tasks and projects. Furthermore, Cox and Blake (1991) emphasize that, by effectively managing diversity, team members feel appreciated and respected for their unique perspectives and contributions, and they tend to cooperate and coordinate their efforts toward common goals. Therefore, the author proposes the following hypothesis:

H2: The leader's ability to manage diversity will positively affects virtual team coordination.

2.2.1.3. Optimizing virtual team meetings

Virtual meetings, also known as online meetings or remote meetings, are gatherings or interactions between individuals or groups held over the internet rather than in a physical location (White, 2014). These meetings utilize various digital communication technologies and platforms to facilitate real-time audio, video, and text-based interactions among participants who may be geographically dispersed (Ilag, 2021). Optimizing virtual team meetings refers to the process of implementing best practices and strategies to enhance the efficiency, productivity, and overall effectiveness of remote team interactions (Malhotra et al., 2007). This involves clear objectives, structured agendas, effective use of technology, time management, active participant engagement, clear communication, follow-up actions, and regular feedback (Malhotra et al., 2007).

Similar to operating a traditional working group, virtual teams also need to have internal meetings to resolve problems that arise during the project (White, 2014). But unlike traditional meetings, virtual teams have to face challenges that come from time zone differences, cultural differences, or technology issues (Kirkman et al., 2002). As a team leader, it is your responsibility to orient, connect, detect problems and find solutions so

the team can continue to operate well. To do this well, internal meetings within the group are indispensable. So creating quality internal meetings in a virtual context can be considered one of the key factors for the team to operate effectively.

Preparation is key to the success of virtual team meetings (White, 2014). Clear written agendas, with allocated time slots for each agenda item, are circulated in advance to provide structure and focus (Schwarz, 2015). Furthermore, Bartell & Brown (n.d) suggest that regularly updating progress and related documents on shared repositories facilitates collaboration and ensures that discussions are kept informed. These pre-meeting practices lay the ground work for meaningful discussions and decision-making during the meeting itself.

In addition, unlike traditional meetings, virtual meetings will have barriers from the unpredictable psychology and behavior of participants. This causes openness in sharing between members to decrease significantly. Therefore, leaders need to grasp the shortcomings of virtual meetings to take appropriate actions to achieve effectiveness for each meeting.

Icebreaker activities, such as sharing personal anecdotes or discussing hobbies, to create a relaxed and inclusive atmosphere. By encouraging team members to connect on a personal level, leaders cultivate a sense of camaraderie and trust within the team (Nicolaides et al., 2014). Additionally, Campbell et al (2003) highlighting major events or experiences in members' lives demonstrates empathy and reinforces the human connection, setting the stage for productive collaboration. Furthermore, to maintain engagement and focus throughout the meeting, regular check-ins and voting tools are used to gauge participants' satisfaction with ongoing discussions and ensure that everyone has an opportunity to contribute (Cheng & Deek, 2014; Pinsonneault & Kraemer, 1990). By leveraging these tools and techniques, leaders keep team members engaged and involved in the meeting proceedings, maximizing collaboration and idea generation.

Since virtual meetings serve as the primary means of driving progress and commitment, it is essential to end each session clearly and responsibly (Montoya, 2020). White, (2014) suggest that it is essential to create a list of actionable items, including assigned tasks and deadlines, that are shared promptly with all participants. By providing clear

direction and follow-up tasks, leaders reinforce the team's commitment to achieving goals and maintain momentum between meetings.

Besides, the arguments of Hertel et al. (2005) show that when participants are actively engaged in discussions and decision-making processes during virtual meetings, they are more likely to align their efforts and coordinate effectively towards achieving common goals. Additionally, DeRosa et al. (2004) also agreed with this point of view when the authors suggest that well-facilitated meetings enable teams to reach consensus more quickly and make informed decisions. When virtual meetings are optimized for decision-making, team members can align their objectives and expectations more effectively, thus facilitating coordination and productivity.

Therefore, the author proposes the following hypothesis:

H3: The leader's ability to optimize virtual meetings will positively affects virtual team coordination.

2.2.1.4. Virtual team monitoring

Virtual team monitoring refers to the process of overseeing and managing the performance, activities, and interactions of team members who work remotely (Malhotra et al., 2007). This involves using various tools and techniques to track progress, ensure accountability, and facilitate communication and collaboration among team members (Hertel et al., 2005).

In virtual context, by leveraging both asynchronous (e.g., electronic threaded discussions, document postings) and synchronous (e.g., virtual meetings, Instant Messaging) communication platforms, leaders can gauge individual participation, collaboration levels, and overall team engagement (Malhotra et al., 2007). By analyzing communication data, leaders identify potential issues such as social loafing, lack of participation, or communication breakdowns, enabling timely interventions to address underlying concerns (Barkhi et al., 2006). Additionally, Marks & Panzer (2004) monitoring communication patterns allows leaders to recognize and reward active participation, fostering a culture of accountability and collaboration within the team.

Virtual teams rely heavily on information technology tools to facilitate communication, collaboration, and project management (Townsend et al., 1998). By tracking technology

usage metrics and soliciting feedback from team members, leaders can gain valuable insights into the effectiveness and usability of various tools and platforms (Fiore & Wiltshire, 2016). Beside that, A study by Marks & Panzer (2004) suggests that monitoring systems that track individual and team performance metrics foster a sense of accountability and responsibility among team members. When team members know that their actions are being monitored and evaluated, they are more likely to adhere to agreed-upon goals and deadlines, leading to improved coordination of tasks and activities.

Therefore, the author proposes the following hypothesis:

H4: The leader's ability to monitor virtual team will positively affects virtual team coordination.

2.2.2. Virtual team coordination

Coordination in an organization involves unity of effort among components, including task definition, information sharing, and synchronization of activities (Godart et al., 2001). This collective effort is demonstrated by how thoughtfully consistent and logically coherent the work activities are within the organization (Kraut & Streeter, 1995). In virtual context, this involves using digital tools and strategies to manage dependencies, schedules, and information flow. According to McLarnon et al (2019), the authors consider virtual team coordination to be the result of the combined effects of effective communication, seamless workflow integration, thorough project planning, and clear role definition.

Efficient virtual team coordination relies on facilitating meaningful and timely communication (Qi et al., 2010). This requires messages to be clearly articulated, utilizing a shared pool of knowledge, language, and contextual understanding to prevent ambiguity and misinterpretation (Duranti & Almeida, 2012). In virtual environments, where spatial and temporal barriers are significant, communication dynamics undergo a paradigm shift (Nguyen & Duval, 2014). Asynchronous communication is increasingly becoming the standard due to differing time zones and work schedules (Nguyen & Duval, 2014). This leads to delays in responses and hampers the smooth flow of feedback, ultimately hindering coordination efforts. In a well-coordinated environment, effective integration of the team's information, resources, and members' skills and

abilities can streamline workflow pace and task sequencing, resulting in improved performance and effective (Melo et al., 2013). Furrthermore, research by McLarnon et al (2019) suggests that virtual teams characterized by high levels of coordination tend to exhibit greater levels of team effectiveness. When team members coordinate their activities seamlessly and work in concert towards common objectives, they are better positioned to achieve optimal outcomes and deliver results that align with organizational goals. Effective coordination enhances task clarity, reduces redundancy, and fosters synergy among team members, thereby enhancing overall team effectiveness.

Therefore, the author proposes the following hypothesis:

H5: Virtual team coordination will positively relate to virtual team effectiveness

Within the realm of virtual team coordination, communication is vital for maintaining a common understanding of tasks and activities (Qi et al., 2010). Task-oriented communication plays a crucial role in facilitating the exchange of vital information and building trust among team members based on their unique skills and expertise (Qi et al., 2010). Effective communication is a critical aspect of virtual team collaboration, serving as a key indicator of its success (Anderson et al 2007). Further more, Anderson et al. (2007) reference that challenges in communication, whether in traditional or virtual teams, have been linked to decreased performance, underscoring the significance of seamless communication within organizations when it comes to virtual team effectiveness.

Therefore, the author proposes the following hypothesis:

H6: Virtual team coordination will positively relate to intra-team communication

2.2.3. Intra-team communication

Intra-team communication refers to the exchange of information, ideas, and messages between members of a team or within an organization (Khin et al., 2016). According to McKinney et al (2004), intra-team communication is not just about the exchange of information; it encompasses the sharing of emotions, thoughts, and feedback among team members . Efficient communication within a team builds trust, enhances team cohesion, and fosters a sense of belonging (Mazzei, 2010). However, as with any aspect of teamwork, finding the right balance is crucial. Excessive communication can indeed

lead to interruptions, but it's important to distinguish between meaningful exchanges and unnecessary disruptions (Leonard, 2004).

Effective intra-team communication involves several stages of collective cognition (Hutchins & Kendall, 2010). Initially, it necessitates members sharing their unique information and perspectives, then processing these individually (Dechurch & Mesmer-Magnus, 2010). This requires group members to recognize the information they possess exclusively and share it with others. Additionally, effective intra-team communication entails integrating various members' information and perspectives (Steinheider & Menold, 2004). To achieve this, members must discuss and assess each other's information to determine its validity and relevance to the team's objectives. Lastly, integrating one's own information with that of others involves considering the implications of diverse perspectives on the team's task (Hoever et al., 2012).

Research by Gibson and Cohen (2003) highlight that when team members feel comfortable expressing their ideas and concerns, they can engage in constructive dialogue to identify solutions and make informed decisions. This proactive approach to problem-solving enhances team effectiveness by minimizing disruptions and maximizing productivity.

Therefore, the author proposes the following hypothesis:

H7: intra-team communication will positively relate to virtual team effectiveness

Moreover, according to Seers (1989) highlight that communication allows for the exchange of social support within the team Social support, such as encouragement, assistance, and recognition, fosters a positive team climate and contributes to members' well-being and motivation. Beside that, Bishop et al (2000) highlight when team members feel supported by their peers, they are more likely to actively engage in coordination efforts and contribute to the team's succes.

Therefore, the author proposes the following hypothesis:

H8: intra team communication will mediate the ralationship between virtual team coordination and virtual team effectiveness

2.2.4. Virtual team effectiveness

Team effectiveness is a multifaceted concept encapsulating the ability of a collective of individuals to collaborate harmoniously towards shared objectives and produce desired outcomes (Staples & Cameron, 2005). Cohen and Bailey (1997) delineates three pivotal dimensions pivotal in comprehending team effectiveness: performance, which entails both the quantitative and qualitative aspects of output; member attitudes, encompassing employee satisfaction and commitment levels; and behavioral outcomes, including indicators like absenteeism, turnover rates, and safety records. Building upon this framework, Ross et al (2008) augmented the discourse by incorporating additional factors such as team member styles and organizational culture, acknowledging the nuanced interplay between individual characteristics and broader contextual elements. At its core, team effectiveness hinges on the interplay between performance and member satisfaction, a sentiment echoed by Lin et al (2008). Despite the structural disparities between virtual teams and their traditional counterparts, the overarching expectation remains unchanged: to achieve predefined objectives efficiently and effectively. Therefore, in the context of virtual teams, evaluating effectiveness extends beyond mere task completion to encompass the holistic well-being and fulfillment of team members, thus mirroring the comprehensive nature of team dynamics in the digital realm.

2.3. Research model

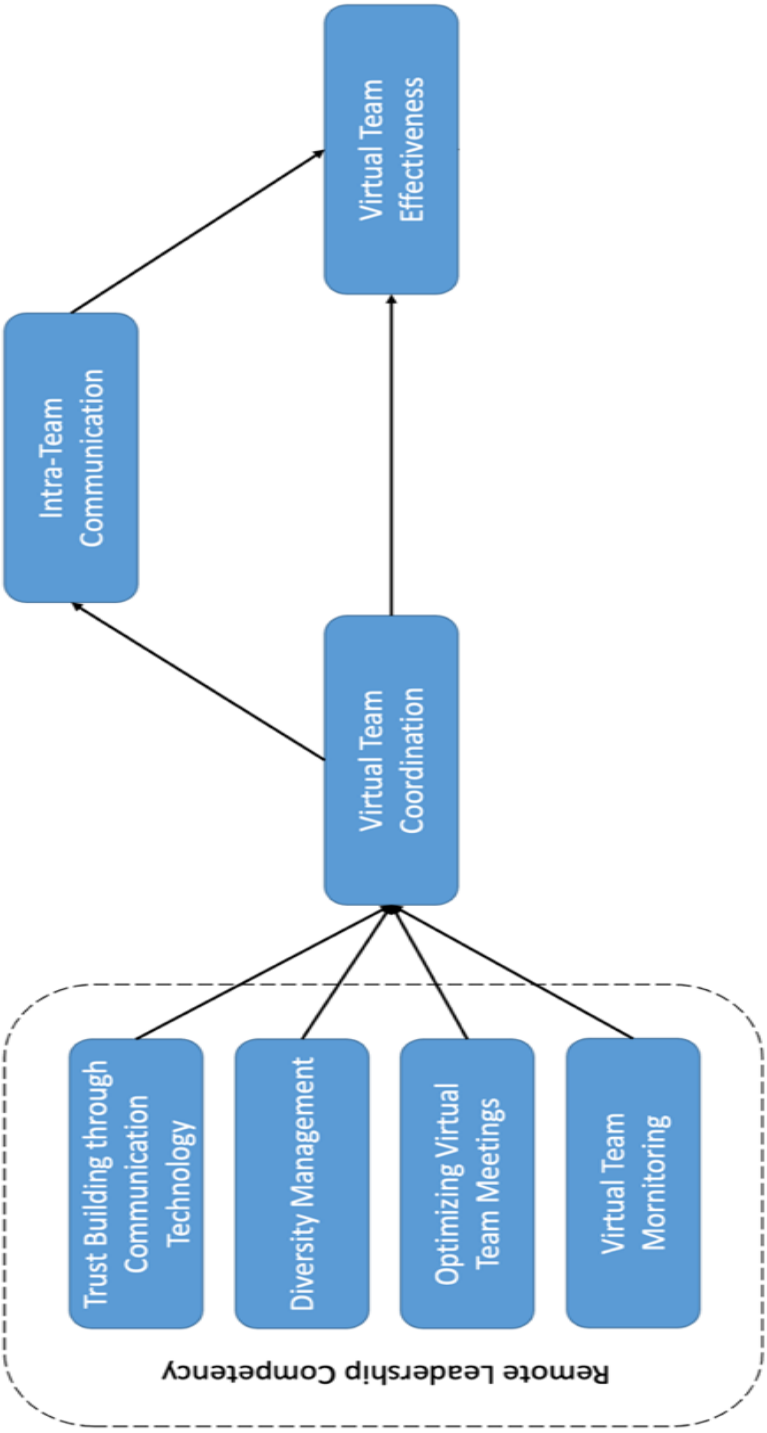

Figure 2.1. Model of analyzing the relationship between effectiveness and leadership in virtual teams

Hypothesis 1: The leader's ability to build trust through communication technology positively affects virtual team coordination.

Hypothesis 2: The leader's ability to manage diversity will positively affects virtual team coordination.

Hypothesis 3: The leader's ability to optimize virtual meetings will positively affects virtual team coordination.

Hypothesis 4: The leader's ability to monitor virtual team will positively affects virtual team coordination.

Hypothesis 5: Virtual team coordination will positively relate to virtual team effectiveness

Hypothesis 6: Virtual team coordination will positively relate to intra-team communication

Hypothesis 7: intra-team communication will positively relate to virtual team effectiveness

Hypothesis 8: intra team communication will mediate the relationship between virtual team coordination and virtual team effectiveness

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Research process

The author began by identifying the Competency of remote leadership, virtual team coordination, intra-team communication and virtual team effectiveness by articles from prestigious journal. Then, reviewing the literature to found the gap that theoretical research has yet to discovered. Various method could be used such as reading articles in science periodicals, newspapers, or online. The following phase was the creation and dissemination of research questions. The author then follows up with a discussion and conclusion that shed light on the study's findings and propose opportunities for additional exploration, after which the data is edited and coded to ensure dependability among respondents.

3.2. Research design

The purpose of this study is to investigate the connection between the competencies of remote leadership to virtual team coordination. Then, analyze the effect of intra-team communication to the relationship between virtual team coordination and virtual team effectiveness. Rather of focusing on creating hypothesis by gathering observations and collecting data linked to the original theory.

Along with using a quantitative strategy to develop a numerical representation of a phenomena through data collecting, this study also follows in the footsteps of similar prior studies in this subject by adopting the endeavored-and-true questionnaire survey method. Due to time constraints and a lack of available resources, the author has decided to employ a deductive approach, a quantitative methodology, and a questionnaire to complete this essay.

To begin, this study employs articles, textbooks, and media to ensure research motivation and a thorough review of literature. The survey for developers was developed in English using questions from existing research, and then translated into Vietnamese language after being double-checked for quality by several native Vietnamese developers who working in virtual team in IT service sector. This pilot survey confirmed the interpretation of the study items as well as Vietnamese translation of the survey questions.

According to Gorsuchi (1983), good samples should have at least 200 readings. In addition, according to Hair et al. (2011), a ratio of 5:1 between observations and questionnaire items is the absolute minimum. Therefore, there are 31 measurement items for 4 variables in this investigation, which necessitates a minimum 155 observation. The author received from 300 people who completed al the measuring items.

This research employs Smart PLS software in order to investigate the association between the provided frameworks and the hypothesized relationships, as well as to grasp and modify such associations.

3.3. Data collection instruments

A Eight-parts, well-structured questionnaire was developed for this study. The first portion has eight questions that collect demographics information about respondents, such as their gender, age group, Working Experience in Virtual team, project scale, project type, project duration, number of members, form of participation.

The second section consists of 4 questions adapted from Effective virtual team leader Scale, developed by Malhotra et al., (2007) ((Likert-type scale score of 5 from complete disagreement to complete agreement) to measure the leader's capability in trust building through Communication technology.

The third section consists of 3 questions adapted from Effective virtual team leader Scale, developed by Malhotra et al., (2007) ((Likert-type scale score of 5 from complete disagreement to complete agreement) to measure the leader's capability in diversity management.

The fourth section consists of 4 questions adapted from Effective virtual team leader Scale, developed by Malhotra et al., (2007) ((Likert-type scale score of 5 from complete disagreement to complete agreement) to measure the leader's capability in optimizing virtual team meetings.

The fifth section consists of 2 questions adapted from Effective virtual team leader Scale, developed by Malhotra et al., (2007) and 2 questions adapted from Team goal monitoring developed by Tammy L. Rapp et al., (2014) (Likert-type scale score of 5 from complete disagreement to complete agreement) to measure the leader's capability in optimizing virtual team meetings.

The sixth section consists 5 questions adapted from A Systematic Literature Review of Instruments to Measure Coordination developed by Candice L. Thomas et al., (2018) (Likert-type scale score of 5 from complete disagreement to complete agreement) to measure the level of virtual team coordination.

The seventh section consists 4 questions adapted from the degree to which individuals engaged in information elaboration, developed by Harvey, S. (2015) (Likert-type scale score of 5 from complete disagreement to complete agreement) to measure the level of intra-team communication.

The seighth section consists 7 questions adapted from virtual team effectiveness, developed by Pangil et al., (2014) (Likert-type scale score of 5 from complete disagreement to complete agreement) to measure the level of virtual team effectiveness.

Table 3.1. Development of measurement items

Construct	Item code	Measurement item	Source
Trust building through Communication technology	BC1	The team leader focus the norms on how information is communicated	Malhotra et al., 2007
	BC2	The team leader revisits and adjusts the communication norms as the team evolves (virrtual get-togethers)	
	BC3	The team leader makes progress explicit through the use of virtual workspace	
	BC4	The team leader equal “suffering” in the geographically distributed world	
Diversity management	DM1	The team leader maintains a prominent team expertise directory and skills matrix in the virtual workspace	Malhotra et al., 2007

	DM2	The team leader utilizes virtual sub-teaming to pair diverse members and rotate sub-team members	
	DM3	The leader allows diverse opinions to be expressed through the use of asynchronous electronic means (e.g., electronic discussion threads)	
Optimizing virtual team meetings	OVTM1	The team leader effectively manages the process of idea divergence between meetings (asynchronous idea generation) and idea convergence and conflict resolution during virtual meetings (synchronous idea convergence)	Malhotra et al., 2007
	OVTM2	The team leader utilizes the start of virtual meetings (each time) for social relationship building	
	OVTM3	The team leader ensures through 'check-ins' during meetings that everyone is engaged and heard from	
	OVTM4	The team leader ensures that at the end of each meeting, the minutes and future work plan are posted to the team repository	
Virtual team monitoring	VTM1	The team leader closely scrutinizes asynchronous (electronic threaded discussion and document postings in the knowledge repository) and synchronous (virtual meeting participation and instant	Malhotra et al., 2007

		messaging) communications patterns	
	VTM2	The team leader effectively makes progress explicit through balanced scorecard measurements posted in the team's virtual workspace	
	VTM3	The team leader regularly monitors how well we are meeting our goals	Tammy L. Rapp et al., 2014
	VTM4	The team leader discusses what needs to be done to reach our goals	
Virtual team Coordination	VTC1	Specific responsibilities of each member of our team are transparent	Candice L. Thomas et al., 2018
	VTC2	Members of my team are able to hold each other accountable in making progress on joint tasks	
	VTC3	Members of my team know in what order actions need to take place to optimize outcomes	
	VTC4	In general, our team knows the steps necessary to address complicated situations when they arise	
	VTC5	Our team has a collective understanding of best practices for our work	
Intra-team communication	ITC1	While talking to other members of my team, ideas often develop that none of us had thought of before	Harvey, S. (2015)
	ITC2	My team members are a major source of information for my job	

	ITC3	Other members of this team often come up with good ideas that will help the team to do our job	
	ITC4	Our team often generates new ideas	
Virtual team effectiveness	VTE1	I enjoy being a member of this team	Pangil et al., 2014
	VTE2	There is respect for individuals in my team	
	VTE3	I feel the members of my team value my input	
	VTE4	Team member's morale is high in my team	
	VTE5	In the past, my team has been effective in reaching its goals	
	VTE6	When my team completes its work, it is generally on time	
	VTE7	"When my team completes its work, it is generally within the budget"	

3.4. Data analysis approach

According to Henseler and Chin (2010), the research model is dissected into two sections: the assessment of the measurement model and the evaluation of the structural model. To begin, the accuracy, convergence, and discrimination of the measurement model's concepts are evaluated.

Then, the existence of correlations between variables is investigated using a SEM model. The test is significant at the 5% level. The outer weights provide the criterion for comparing the outcomes of each indicator. Factor loading tends to be larger in structural models than outer weights (Hair et al., 2011).

CHAPTER 4: ANALYSIS RESULTS

After being translated into Vietnamese, the results are shared with developers who have experience working in teams in a fully online or hybrid online environment. Participants' answers were based on their experience working on their largest project ever; Additionally, particpants are hired to work for the term of that project. Online survey questions were collected. There are a total of 362 answers, however only 300 answers are considered correct. Data analysis was performed using SmartPLS software. All aspects of the structural model, including validity, collinearity concerns, reliability, and validity of exploratory factor analysis, were thoroughly analyzed. In the next section, the results will be presented and discussed.

4.1. Sample description

This section includes the survey's data analysis results and corresponding conclusions. Examining responses to descriptive survey queries can be performed using descriptive data analysis.

Table 4.1 shows that there are significant differences between men and women, in which men account for 69% (n=207) and women account for 31% (n=93) in the sample. The majority of these respondents span a wide age range. The ages of these respondents ranged from under 18 to 39 years old. Respondents between the ages of 23 and 39 years old make up a significant proportion of the population, accounting for 88.3%. In fact, the age group with the highest frequency of respondents is 23-29 years old (74.3%). Additionally, 42.3% (n=127) of respondents had 1 to 3 years of experience working in virtual teams, followed by 29.4% (n=88) of respondents who had 4 to 6 years of experience working in virtual teams; Respondents with more than 6 years of experience working in virtual teams were a 6% minority (n=18). Besides, the form of participation is also mentioned. In particular, the majority of opinions noted that working online combined with working face-to-face accounts for the majority with 82.7% (n=248).

For informational questions related to virtual teams such as: project size, project type, project duration, number of team members. The author noted the results as follows. Project scale ranges from 100 million VND to 1 billion VND, accounting for the majority of 63.3% (n=190). Among them, the project scale from 100 million VND to

500 million VND is the most intense (42%, n=126). Two types of projects dominated this survey: Introducing or developing new things (40.3%, n=121) and Consulting (32.3%, n=97). The duration of these projects is also very diverse, most are under 9 months. Of these, the two most commonly responded terms are less than 3 months (36.3%, n=109) and from 4 to 6 months (31.7%, n=95). In these projects, the number of members is mostly not too many, fluctuating around less than 9 members, accounting for 71.3% (n=214). Among them, groups with less than 5 members account for the largest proportion, 42% (n=126).

Table 4.1. Respondent's background

	Frequency	%
Gender		
Female	93	31%
Male	207	69%
Age group		
Under 18	7	2.4%
18-22	28	9.3%
23-29	223	74.3%
30-39	42	14%
Above 40	0	0%
Working Experience in Virtual team (Year)		
Less than 1 year	67	22.3%
1 to 3 years	127	42.3%
4 to 6 years	88	29.4%
More than 6 years	18	6%
Project Scale		
Under 100 millions VND	55	18.3%
100-500 millions VND	126	42%
0.5-1.0 billions VND	64	21.3%
1.0-5.0 billions VND	39	13%
Above 5.0 billions VND	16	5.4%
Project type		

Introducing or development of new things	121	40.3%
System improvement	48	16%
Process improvement	6	2%
Consulting	97	32.3%
Others	28	9.4%
Project Duration		
Less than 3 months	109	36.3%
4-6 months	95	31.7%
7-9 months	60	20%
10-12 months	13	4.3%
Above 12 months	23	7.7%
Number of members		
Less than 5 members	126	42%
5-9 members	88	29.3%
10-14 members	52	17.3%
Above 15 members	34	11.4%
Form of participation		
Online only	52	17.3%
Hybrid	248	82.7%

4.2. Descriptive statistics

Table 4.2 presents the mean and standard deviation of all items in the survey. According to the data, all respondents tend to consider their leaders to meet the following skills: Trust building through Communication technology, Diversity management, Optimizing virtual team meetings, Virtual team monitoring when operating virtual teams. (The overall score has an average value of slightly above 4.0).

Table 4.2. Descriptive statistics

Variable	Item	Mean	SD
Trust building through Communication technology	BC1	4.05	1.014
	BC2	4,107	1.004
	BC3	4.083	0.988

	BC4	4.033	0.962
	Overall	4.068	
Diversity management	DM1	4.047	1.006
	DM2	4.113	0.97
	DM3	4.08	0.973
	Overall	4.08	
Optimizing virtual team meetings	OVTM1	4.07	0.993
	OVTM2	4.067	0.984
	OVTM3	4.037	0.967
	OMVT4	3.987	0.963
	Overall	4.04	
Virtual team monitoring	VTM1	4.15	1.007
	VTM2	4.07	1.006
	VTM3	4.023	1.028
	VTM4	4.053	1.012
	Overall	4.074	
Virtual team Coordination	VTC1	3.5	1.179
	VTC2	3.51	1.253
	VTC3	3.53	1.247
	VTC4	3.443	1.26
	VTC5	3.523	1.263
	Overall	3.501	
Intra-team communication	ITC1	3.513	1.328
	ITC2	3.557	1.322
	ITC3	3.5	1.305
	ITC4	3.51	1.372
	Overall	3.52	
Virtual team effectiveness	VTE1	3.08	1.294
	VTE2	3.087	1.265
	VTE3	3.117	1.234
	VTE4	3.08	1.208

	VTE5	3.147	1.296
	VTE6	3.173	1.229
	VTE7	3.117	1.325
	Overall	3.114	

4.3. Results from measurement model testing

According to Hair et al., 2011, the research should analyze the measure's validity The capability of a set of scales to consistently and accurately reflect the relevance of the proposed model was demonstrated by an internal correlation and total item's reliability test. Based on the results of reliability testing with Cronbach's Alpha coefficients, the scale components are displayed in tables 4.3 and 4.4.

According to Nunnally (1987), According to Cronbach's Alpha, a reliable indicator should have a minimum of 0.7. Although Hair et al. (2009) suggested that a scale's Cronbach's Alpha cutoff be 0.7 or above to ensure unidirectionality and reliability; however, a cutoff of 0.6 is enough for a first exploratory inquiry. The greater the value of Cronbach's Alpha, the more trustworthy the scale.

Table 4.3. Cronbach's Alpha evaluation

Variable	Number of items	Cronbach's alpha
Trust building through Communication technology	4	0.834
Diversity management	3	0.774
Optimizing virtual team meetings	4	0.827
Virtual team monitoring	4	0.834
Virtual team Coordination	5	0.870
Intra-team communication	4	0.909
Virtual team effectiveness	7	0.911

Composite reliability (CR) needs to be at least 0.7 in order to demonstrate sufficient convergence or internal consistency (Gefen et al., 2000). Similarly, the average variance extracted (AVE) must be more than 0.5 in order to show adequate convergent validity (Bagozzi & Yi, 1988; Fornell & Larcker, 1981). Both CR and AVE in Table 3 satisfy these normative requirements.

Table 4.4 presents the assessment of construct reliability and validity. The Cronbach's Alpha values exceeded the recommended threshold of 0.70, ranging from 0.774 to 0.911. Additionally, the Composite Reliabilities ranged from 0.869 to 0.936, meeting the requirement of being above the minimum recommended value of 0.70 (Hair et al., 2019). The seven variables' AVE values varied between 0.652 to 0.785, meeting the suggested criterion of more than 0.50. Additionally, the factor loadings exceeded the suggested cutoff point of 0.4 (Hair et al., 2019). In summary, the examination of the measurement properties of the scale indicates undimensionality and conceptual consistency.

Table 4.4. Construct reliability and validity

Variable	Item	Factor loading	Cronbach's Alpha	Composite Reliabilities	AVE
Trust building through Communication technology	BC1	0.867	0.834	0.889	0.667
	BC2	0.790			
	BC3	0.832			
	BC4	0.774			
Diversity management	DM1	0.830	0.774	0.869	0.688
	DM2	0.833			
	DM3	0.826			
Optimizing virtual team meetings	OVTM1	0.829	0.827	0.885	0.659
	OVTM2	0.817			
	OVTM3	0.762			
	OMVT4	0.836			
Virtual team monitoring	VTM1	0.797	0.834	0.888	0.666
	VTM2	0.833			
	VTM3	0.824			
	VTM4	0.810			
Virtual team Coordination	VTC1	0.790	0.870	0.906	0.658
	VTC2	0.794			
	VTC3	0.815			
	VTC4	0.805			

	VTC5	0.851			
Intra-team communication	ITC1	0.893	0.909	0.936	0.785
	ITC2	0.884			
	ITC3	0.876			
	ITC4	0.892			
Virtual team effectiveness	VTE1	0.804	0.911	0.929	0.652
	VTE2	0.831			
	VTE3	0.793			
	VTE4	0.794			
	VTE5	0.794			
	VTE6	0.816			
	VTE7	0.820			

Discriminant validity was evaluated to determine if each construct was distinct and not overlapping with others (Hair Jr et al., 2016). The results, presented in Table 4.5 showed that the highest HTMT value was 0.849, which is below the threshold of 0.90 (Malhotra, & Segars, 2001), indicating adequate discriminant validity. Thus, the measurement model demonstrated satisfactory construct validity.

Table 4.5. Discriminant validity analysis by Heterotrait-Monotrait Ratio

	Diversity management	Optimizing virtual team meetings	Trust building through Communication technology	Virtual team Coordination	Virtual team effectiveness	Virtual team monitoring
Diversity management						
Optimizing virtual team meetings	0.168					
Trust building	0.254	0.115				

through Communication technology						
Virtual team Coordination	0.542	0.572	0.554			
Virtual team effectiveness	0.571	0.506	0.529	0.706		
Virtual team monitoring	0.172	0.189	0.141	0.524	0.553	
Intra-team communication	0.533	0.547	0.554	0.841	0.849	0.578

Figure 2 and Table 4.4 illustrate the path coefficients from the PLS-SEM analysis. Among 4 factors that are potentially affecticg the Virtual Team coordination in IT service sector, the author found evidence showing the positive impact of four leadership competencies: Trust building through communication technology, Diversity management, Optimizing virtual team meetings , Virtual team monitoring.

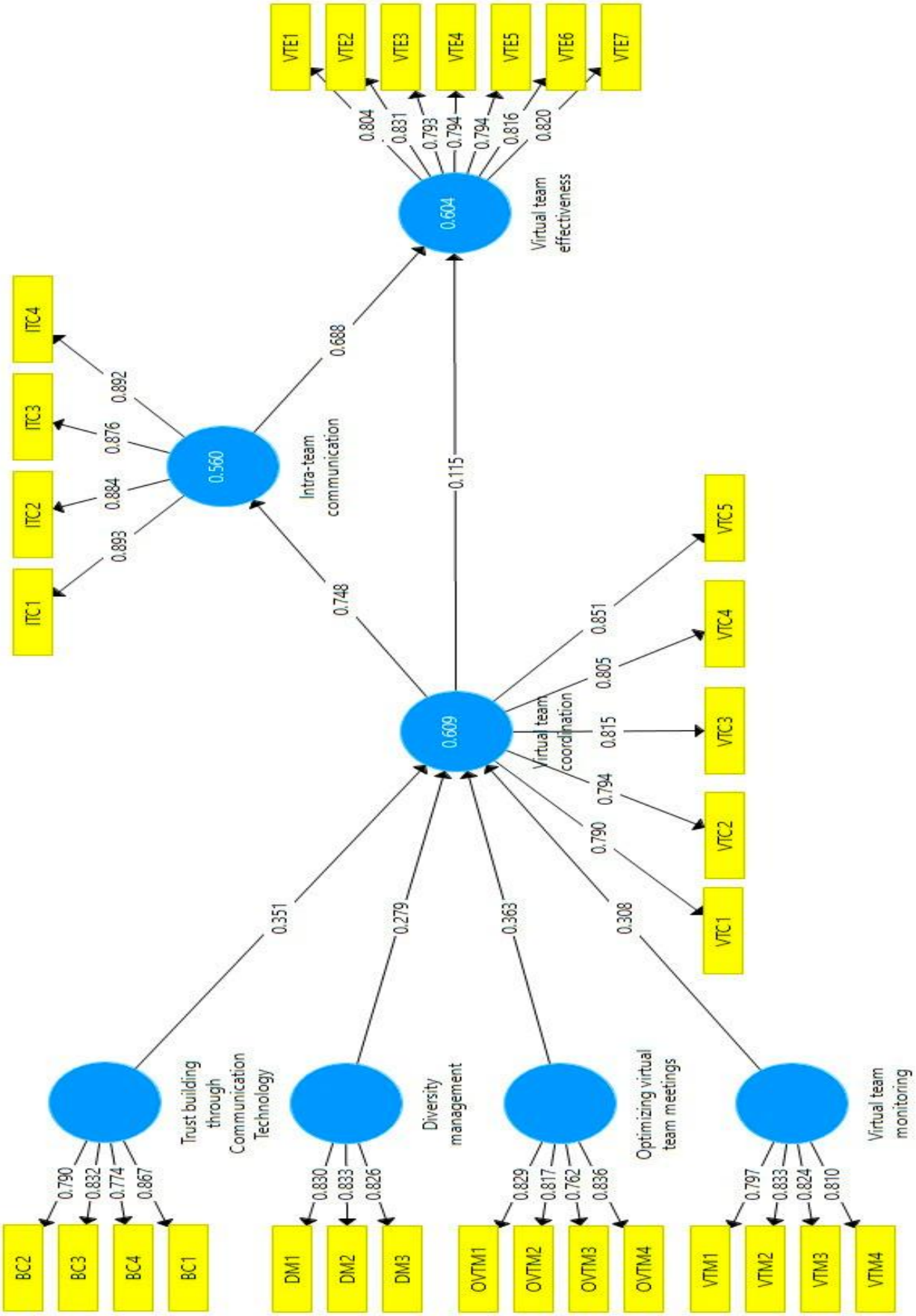

Figure 4.1. Structural Model

4.4. Results from hypothesis testing

All hypotheses are tested, and bootstrapping is utilized to investigate path coefficients and two-tailed p-values. The study included 5,000 total samples. All connections can be supported in one of two ways: directly or indirectly. All of Hypotheses are supported.

Table 4.6. The estimations of path coefficients

	Path coefficients	**p-value**	**Conclusion**
Direct effects			
H1: Trust building through Communication technology -> Virtual team Coordination	0.351	0.000	Supported
H2: Diversity management -> Virtual team Coordination	0.279	0.000	Supported
H3: Optimizing virtual team meetings -> Virtual team Coordination	0.363	0.000	Supported
H4: Virtual team monitoring -> Virtual team Coordination	0.308	0.000	Supported
H5: Virtual team Coordination -> Intra-team communication	0.748	0.000	Supported
H6: Virtual team Coordination -> Virtual team effectiveness	0.115	0.006	Supported
H7: Intra-team communication -> Virtual team effectiveness	0.688	0.000	Supported
Indirect effect			
H8: Virtual team Coordination -> Intra-team communication -> Virtual team effectiveness	0.514	0.000	Supported
Adjusted R^2			
Virtual team Coordination	0.604		
Intra-team communication	0.558		
Virtual team effectiveness	0.601		

CHAPTER 5: DISCUSSION AND CONCLUSIONS

5.1. Discussion

According to Table 4.2, Vietnamese developers working in a virtual context in the IT services sector perceive that their team leader has the necessary competencies (Trust building through communication technology, diversity management, Optimizing virtual team meetings, Virtual team monitoring) for virtual teams to coordinate effectively since the overall score has an average value of slightly above 4.0. In contrast, their virtual team coordination does not exhibit the same trend, as the mean VTC is 3.501, with a range of 3.443 to 3.523.

The drivers come from remote leadership competency that promote the virtual team coordination in IT service sector are Trust building through communication technology ($\beta = 0.351$, p-value = 0.000), diversity management ($\beta = 0.279$, p-value = 0.000), Optimizing virtual team meetings ($\beta = 0.363$, p-value = 0.000), and Virtual team monitoring ($\beta = 0.308$, p-value = 0.000).

Regarding the impact of the Virtual team coordination to Virtual team effectiveness and the mediator role of intra-team communication. According to Zhao et al. (2010), to assess the hypothesis regarding the mediating effects among the components, this study used bootstrapping statistics during the SEM analysis. The author discovered a significantly positive relationship among these three variables. Specifically, Virtual team coordination -> Virtual team effectiveness ($\beta = 0.115$, p-value = 0.006); Virtual team coordination -> Intra-team communication ($\beta = 0.748$, p-value = 0.000); and Intra-team communication -> Virtual team effectiveness ($\beta = 0.688$, p-value = 0.000). These findings indicate that, in addition to directly improving virtual team effectiveness, virtual team coordination also enhances intra-team communication, which in turn further boosts virtual team effectiveness. Therefore, this result suggests that the intra-team communication fully mediate the relationships of virtual team coordination and virtual team effectiveness.

5.2. Implications

In the evolving landscape of remote work, effective leadership is pivotal to the success of virtual teams. Studies indicate that remote leaders who excel in specific competencies—namely, trust building through communication technology, diversity management, optimizing virtual team meetings, and virtual team monitoring—can significantly enhance coordination among team members. These competencies are essential as they address the unique challenges of virtual environments, such as physical separation, cultural differences, and the potential for miscommunication. Regular check-ins, transparent communication, and creating a sense of presence are vital strategies that leaders can employ

Beyond these competencies, fostering a collaborative and coordinative culture is vital for virtual team success. Encouraging feedback sharing and idea building can significantly improve team outcomes. The author Malhotra et al (2007) mentioned that the coordination of a virtual team requires intentional effort, emphasizing the importance of building strong relationships where knowledge is freely shared, collective expertise is utilized, actions are anticipated, and all members feel confident in contributing to the team's success (Malhotra et al., 2007). Leaders should create a safe environment for feedback, using regular sessions, anonymous surveys, and open forums to facilitate this. Constructive feedback helps team members understand their strengths and areas for improvement, promoting continuous development. Similarly, promoting idea building encourages innovation and engagement.

The studies also reveal that increased collaboration efforts by virtual team members lead to greater engagement in feedback sharing and idea building, which in turn motivates the team to achieve better results. Recognizing and rewarding these collaborative efforts can further enhance motivation and morale. Leaders should implement recognition programs that highlight and reward teamwork, thereby reinforcing the value of collaboration. Additionally, facilitating meaningful interactions among team members through structured team-building activities and cross-functional projects can strengthen team bonds and enhance coordination.

Despite the challenges in virtual context, embracing virtual teams can yield significant benefits for organizations. By tapping into specialized expertise from around the globe,

virtual teams can generate innovative solutions to complex, often global issues, embodying the principle of "think global, act local."

5.3. Limitations and suggestions for further research

Like any research project, this study has its limitations. Firstly, it uses a cross-sectional design, collecting data at a single point in time without considering the sequence of proposed relationships. Future studies might get a deeper knowledge of the causal relationships under investigation by utilizing a longitudinal design or by including numerous time periods. Secondly, the study focuses exclusively on developers in the IT service sector, indicating that future research could take a dyadic approach by including both leaders and followers to analyze their perspectives. There are also opportunities to investigate other facets of e-leadership, such as its antecedents (like virtuality and technology readiness), the outcomes (like team creativity and digital well-being), mediators (like leader-member exchange), and moderators (like perceived organizational support and cultural diversity). Future investigations could also explore remote leadership through different styles, such as digital transformational leadership. The data point to interesting demographic trends, like age and education, that are associated with the effectiveness and coordination of virtual teams. This suggests that future research could look at how different generations view remote leadership in order to better understand the complexities of the relationship between performance, virtual team coordination, and leadership styles. Furthermore, it may be beneficial to investigate how demographic factors like gender, family status, and cultural background intersect with remote leadership styles and team performance.

5.4. Conclusion

Digital transformation has become a necessity for all organizations, leading to a resurgence of interest in remote leadership and remote work. Despite their importance, research in these areas is still in its early stages, with valuable contributions being fragmented and limited. The potential benefits of adopting remote leadership and remote work, such as increased efficiency, productivity, cost savings, and effective issue resolution, could be substantial. However, the misuse or lack of utilization of remote leadership competencies can have negative consequences. This highlights the need for followers and leaders to focus more on these concepts. The current study highlights the

significant impact of remote leadership competencies on virtual team coordination and the role of intra-team communication in enhancing team effectiveness. It also enhances the understanding of these concepts by providing empirical evidence of their effects. While recent scholarly work has addressed these concepts by focusing on technology utilization through traits, competencies, and behaviors, there is still much to explore regarding remote leadership styles, underlying factors, and outcomesThus, this study highlights the need for additional research to enhance this significant area of leadership literature and offers a vital contribution to the development of remote leadership theory.

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APPENDIX

Appendix 1. Survey Questionnaire (Englishversion)

Dear you!

I am Hoang Anh Duong, currently a graduate student of the Master of Business Administration program of Vietnam Japan University- Hanoi National University.

I am implementing the research project related to "Analyzing the relationship between effectiveness and leadership in virtual teams" under the guidance of Prof. Dr. Mitsue (Yokohama National University, Japan) and Dr. Mai Anh (Vietnan National University). So, I am very happy to be able to receive support from you to complete the research.

Expected questionnaire takes 5-10 minutes to answer. Hope you guys take some time to answer the questionnaire. Data information collected will be confidential and the results of this survey are only for scientific research purposes after statistical analysis, not for any commercial purposes.

Through this assessment, I hope to receive important information to better understand the importance of remote leadership and internal communication to be able to operate the virtual team effectively.

Note: Your answer is based on your biggest project experience ever; In addition, in this project you are hired to work within that project duration

Thanks for your important contribution!

Best regard

Hoang Anh Duong

Email: 22117013@st.vju.ac.vn

Section 1: General information

1. Gender
   - Male
   - Female
   - Other
2. Age group
   - Under 18
   - 18-22
   - 23-29
   - 30-39
   - Above 40
3. The largest project size that you have participated in in the form of online working (100% online or combining directly and online)?
   - Under 100 million VND
   - 100-500 million VND
   - 500 million VND-1.0 billion VND
   - 1.0-5.0 billion VND
   - Above 5.0 billion VND
4. Type of Project
   - Introducing or developing a new feature on the product.
   - System improvement.
   - Process improvement.
   - Consulting
   - Other:
5. What kind of work in the project is you involved in the project?
   - Join the group in the form of pure virtual (exchange and interact with members of the group through electronic devices).
   - Join the group in the form of combining online and direct work.
6. Number of members in the group to complete that project?
   - Less than 5 members
   - 5-9 members
   - 10-14 members

- More than 15 members

7. How long did it take your team to complete that project?

- Less than 3 months
- 4-5 months
- 6-9 months
- 10-12 months
- More than 12 months

8. How many years of experience did you have working in a "Virtual Team" environment before participating in that largest project?

- Less than 1 year
- 1-3 years
- 4-6 years
- More than 6 years

Section 2: Questions about your team and leader (project manager)

Please answer the best question below

1 - Very disagreement

2 - disagree

3 - Neutral

4 - Agree

5 - Completely agree

The questions are about to follow the following sequence	1	2	3	4	5
The team leader focus the norms on how information is communicated					
The team leader revisits and adjusts the communication norms as the team evolves (virtual get-togethers)					
The team leader makes progress explicit through the use of virtual workspace					

The team leader equal “suffering” in the geographically distributed world					
The team leader maintains a prominent team expertise directory and skills matrix in the virtual workspace					
The team leader utilizes virtual sub-teaming to pair diverse members and rotate sub-team members					
The leader allows diverse opinions to be expressed through the use of asynchronous electronic means (e.g., electronic discussion threads)					
The team leader effectively manages the process of idea divergence between meetings (asynchronous idea generation) and idea convergence and conflict resolution during virtual meetings (synchronous idea convergence)					
The team leader utilizes the start of virtual meetings (each time) for social relationship building					
The team leader ensures through 'check-ins' during meetings that everyone is engaged and heard from					
The team leader ensures that at the end of each meeting, the minutes and future work plan are posted to the team repository					
The team leader closely scrutinizes asynchronous (electronic threaded discussion and document postings in the knowledge repository) and synchronous (virtual meeting participation and instant messaging) communications patterns					

The team leader effectively makes progress explicit through balanced scorecard measurements posted in the team's virtual workspace					
The team leader regularly monitors how well we are meeting our goals					
The team leader discusses what needs to be done to reach our goals					

The questions are about to follow the following sequence	1	2	3	4	5
Specific responsibilities of each member of our team are transparent					
Members of my team are able to hold each other accountable in making progress on joint tasks					
Members of my team know in what order actions need to take place to optimize outcomes					
In general, our team knows the steps necessary to address complicated situations when they arise					
Our team has a collective understanding of best practices for our work					

The questions are about to follow the following sequence	1	2	3	4	5
While talking to other members of my team, ideas often develop that none of us had thought of before					
My team members are a major source of information for my job					

Other members of this team often come up with good ideas that will help the team to do our job					
Our team often generates new ideas					

The questions are about to follow the following sequence	1	2	3	4	5
I enjoy being a member of this team					
There is respect for individuals in my team					
I feel the members of my team value my input					
Team member's morale is high in my team					
In the past, my team has been effective in reaching its goals					
When my team completes its work, it is generally on time					
When my team completes its work, it is generally within the budget					

Appendix 2. Survey Questionnaire (Vietnamese version)

Quý Anh/chị thân mến!

Tôi là Hoàng Anh Dương, hiện là học viên cao học chương trình Thạc sĩ Quản trị kinh doanh của Trường Đại học Việt Nhật- Đại học Quốc gia Hà Nội.

Tôi đang thực hiện đề tài nghiên cứu liên quan đến "Phân tích mối quan hệ giữa sự hiệu quả và năng lực lãnh đạo trong các nhóm ảo " dưới sự hướng dẫn của GS.TS. Mitsue Ishida (Đại học Quốc lập Yokohama, Nhật Bản) và Tiến sĩ Mai Anh (Đại học Quốc Gia Hà Nội, Việt Nam). Vậy nên, tôi rất vui khi có thể nhận được sự hỗ trợ từ quý Anh/Chị để hoàn thành bài nghiên cứu.

Bảng câu hỏi dự kiến cần 5-10 phút để trả lời. Mong Quý Anh/Chị bớt chút thời gian trả lời bảng hỏi. Thông tin dữ liệu thu thập sẽ được bảo mật và kết quả của cuộc khảo sát này chỉ nhằm mục đích nghiên cứu khoa học sau khi phân tích thống kê, hoàn toàn không cho bất kỳ mục đích thương mại nào.

Thông qua đánh giá này, tôi hy vọng sẽ nhận được thông tin quan trọng để hiểu rõ hơn tầm quan trọng của năng lực lãnh đạo từ xa và giao tiếp nội bộ để có thể vận hành đội nhóm ảo một cách hiệu quả

Chú ý: Câu trả lời của bạn dựa trên kinh nghiệm làm việc trong dự án lớn nhất từ trước đến nay của bạn; Ngoài ra, trong dự án này bạn được thuê để làm việc trong thời hạn của dự án đó.

Cảm ơn sự đóng góp quan trọng của bạn!

Trân trọng!

Hoàng Anh Dương

Email: 22117013@st.vju.ac.vn

Phần I: Thông tin chung

1. Giới tính
   - Nam
   - Nữ

- Khác

2. Anh/Chị thuộc nhóm tuổi nào?
- Dưới 18 tuổi
- 18-22 tuổi
- 23-29 tuổi
- 30-39 tuổi
- 40 tuổi trở lên

3. Quy mô dự án lớn nhất mà Anh/Chị đã tham gia dưới hình thức làm việc trực tuyến (100% trực tuyến hoặc kết hợp giữa trực tiếp và trực tuyến)?
- Dưới 100 triệu VNĐ
- 100-500 triệu VNĐ
- 500 triệu VNĐ-1.0tỷ VNĐ
- 1.0-5.0 tỷ VNĐ
- 5.0 tỷ VNĐ trở lên

4. Loại hình của dự án
- Giới thiệu hoặc phát triển một tính năng mới trên sản phẩm.
- Cải tiến hệ thống.
- Cải tiến quy trình
- Tư vấn giải pháp
- Other:

5. Anh/Chị tham gia làm việc trong dự án trên với hình thức nào?
- Tham gia vào nhóm dưới hình thức hoàn toàn trực tuyến (Trao đổi và tương tác với các thành viên trong nhóm qua các thiết bị điện tử)
- Tham gia vào nhóm dưới hình thức kết hợp giữa làm việc trực tuyến và trực tiếp

6. Số lượng thành viên trong nhóm để hoàn thành dự án đó?
- Ít hơn 5 thành viên
- 5-9 thành viên
- 10-14 thành viên
- Nhiều hơn 15 thành viên

7. Thời gian mà nhóm của Anh/Chị hoàn thành dự án đó?
- ít hơn 3 tháng
- 4-5 tháng

- 6-9 tháng
- 10-12 tháng
- Nhiều hơn 12 tháng

8. Anh/Chị đã có bao nhiêu năm kinh nghiệm làm việc trong môi trường "Nhóm ảo" trước khi tham gia làm dự án lớn nhất đó?

- Dưới 1 năm
- 1-3 năm
- 4-6 năm
- Nhiều hơn 6 năm

Phần II: Câu hỏi về nhóm làm việc và người quản lý của bạn

Bạn vui lòng trả lời đúng nhất câu hỏi dưới đây về quản lí trực tiếp của bạn

1 – Rất không đồng ý

2 - Không đồng ý

3 - Trung lập

4 - Đồng ý

5 - Hoàn toàn đồng ý

Các câu hỏi được sắp theo trình tự sau	1	2	3	4	5
Trưởng nhóm (Project Manager) hiệu quả thiết lập và duy trì các quy tắc giao tiếp trong nhóm làm việc trực tuyến					
Trưởng nhóm (Project Manager) xem xét lại và điều chỉnh các chuẩn mực giao tiếp khi nhóm phát triển.					
Trưởng nhóm (Project Manager) thể hiện rõ tiến độ thông qua việc sử dụng các công cụ không gian làm việc ảo.					
Trưởng nhóm (Project Manager) đảm bảo phân phối lượng công việc công bằng cho các thành viên có sự khác biệt về vị trí địa lý.					

Trưởng nhóm (Project Manager) thiết lập một danh sách rõ ràng về chuyên môn của các thành viên trong nhóm và bảng đánh giá kỹ năng trong môi trường làm việc trực tuyến.					
Trưởng nhóm (Project Manager) sử dụng các nhóm trao đổi trực tuyến phụ để ghép các thành viên và luân chuyển các thành viên với mục đích linh hoạt đáp ứng yêu cầu của công việc.					
Trưởng nhóm (Project Manager) cho phép bày tỏ các ý kiến đa dạng thông qua việc sử dụng các phương tiện điện tử không đồng bộ.					
Trưởng nhóm (Project Manager) thành thạo giám sát quá trình chuyển đổi từ việc tạo ra ý tưởng không đồng bộ giữa các cuộc họp sang việc thống nhất ý tưởng chung và giải quyết xung đột đồng thời trong các cuộc họp ảo.					
Trưởng nhóm (Project Manager) tận dụng thời điểm bắt đầu các cuộc họp ảo (mỗi lần) để xây dựng, gắn kết với các thành viên trong nhóm.					
Trưởng nhóm (Project Manager) đảm bảo thông qua 'check-ins' trong suốt các cuộc họp rằng mọi người đều tham gia và được lắng nghe.					
Trưởng nhóm (Project Manager) đảm bảo rằng vào cuối mỗi cuộc họp, biên bản và kế hoạch làm việc trong tương lai sẽ được đăng lên kho lưu trữ của nhóm.					
Trưởng nhóm (Project Manager) xem xét kỹ lưỡng các thông tin trao đổi không đồng bộ (Document, Report,...) và thông tin trao đổi đồng bộ (Direct messenger, Team meeting,...)					

Trưởng nhóm (Project Manager) thể hiện tiến độ của dự án một cách hiệu quả, rõ ràng thông qua các phép đo thẻ điểm cân bằng (bao gồm: yếu tố tài chính, khách hàng, quá trình thực hiện dự án) trong không gian làm việc trực tuyến của nhóm.					
Trưởng nhóm (Project manager) thường xuyên theo dõi, cập nhật mức độ hoàn thành dự án của nhóm.					
Trưởng nhóm (Project Manager) sẽ thảo luận những việc cần làm để đạt được mục tiêu mà nhóm đề ra.					

Các câu hỏi được sắp theo trình tự sau	1	2	3	4	5
Trách nhiệm cụ thể của từng thành viên trong nhóm của chúng tôi rất minh bạch.					
Các thành viên trong nhóm của tôi có thể quy trách nhiệm cho nhau trong việc đạt được tiến bộ trong các nhiệm vụ chung.					
Các thành viên trong nhóm của tôi biết các hành động cần thực hiện theo thứ tự nào để tối ưu hóa kết quả.					
Nói chung, nhóm của chúng tôi biết các bước cần thiết để giải quyết các tình huống phức tạp khi chúng phát sinh.					
Nhóm của chúng tôi có sự hiểu biết chung về các phương pháp phù hợp nhất cho công việc của mình.					

Các câu hỏi được sắp theo trình tự sau	1	2	3	4	5

Khi nói chuyện với các thành viên khác trong nhóm của tôi, những ý tưởng thường nảy sinh mà trước đây không ai trong chúng tôi nghĩ tới.					
Các thành viên trong nhóm của tôi là nguồn thông tin chính cho công việc của tôi					
Các thành viên khác của nhóm dự án này thường đưa ra những ý tưởng tốt để giúp nhóm đạt được mục tiêu.					
Nhóm dự án của chúng tôi thường tạo ra những ý tưởng mới					

Các câu hỏi được sắp theo trình tự sau	1	2	3	4	5
Mức độ hài lòng của Anh/Chị khi là thành viên của nhóm?					
Có sự tôn trọng đối với các thành viên trong nhóm dự án của Anh/Chị					
Các thành viên trong nhóm dự án đánh giá cao ý kiến đóng góp của Anh/Chị					
Tinh thần của các thành viên trong nhóm dự án luôn thể hiện sự tích cực và nhiều năng lượng					
Nhóm dự án của Anh/Chị đã đạt được mục tiêu (Biên lợi nhuận, sự hài lòng của khách hàng về sản phẩm,...) một cách hiệu quả phải không?					
Khi nhóm dự án của Anh/Chị hoàn thành công việc thì thường là đúng thời hạn phải không?					
Khi nhóm dự án của Anh/Chị hoàn thành công việc, nhìn chung nó nằm trong ngân sách đề ra phải không?					