Influencing Factors of Team Effectiveness in Global Virtual Teams

Buket Celik Ünal, TU Berlin, Germany*

ABSTRACT

Virtual teams are gaining importance because they have given organisations and employees the ability to work from anywhere in the world without relocating them. The ability to work remotely and collaborate virtually has allowed organisations to expand their reach and tap into a global talent pool. Additionally, COVID-19 has resulted in seeking alternative work arrangements, including the information technology (IT) industry. However, virtual teams also have challenges that can affect team efficiency and effectiveness. Factors such as knowledge sharing, trust, language and cultural differences, distance, and time zone differences can all impact virtual team performance. This research describes several important factors that affect global virtual team efficiency, especially in IT projects, and underlying solutions are addressed to reduce the barriers. By understanding the challenges and implementing effective solutions, organisations can leverage the benefits of virtual teams.

KEYWORDS

Challenges, Communication, Global Virtual Teams, Team Effectiveness

INTRODUCTION

The digital era has brought significant changes to the organizations that operate and collaborate, particularly in globalized markets. The COVID-19 pandemic has also accelerated the shift to remote work to be able to collaborate effectively in virtual environments (Garro-Abarca et al., 2021).

Virtual teams are formed by individuals with different backgrounds and from different cultures and nationalities (Zander et al., 2012). The intercultural dimension brings diversity, creativity, and new perspectives to problem-solving. However, cultural differences can also pose a challenge for virtual teams, thus it is important to manage the differences for effective collaboration (Eubanks, et al., 2016). Virtual teams are becoming more frequently implemented within organizations (Marlow et al., 2017).

Communication technologies are supporting virtual teams, providing the necessary infrastructure for collaboration across geographical, cultural, and organizational boundaries. Information technology provides the necessary infrastructure to support the development of virtual environments. Virtual teams represent large know-how that is a promising source of innovation (Ebrahim et al., 2009). Overall, virtual teams present both opportunities and challenges for organizations. People with different cultural backgrounds work together, bringing creativity, new ideas, and new approaches to problem-solving.

*Corresponding Author

By leveraging the benefits of virtual teams while effectively managing the costs, companies can achieve their goals and remain competitive in the global marketplace (Popescu et al., 2014). Virtual teams provide benefits but incur costs as well. Virtual teams while effectively managing the costs, companies can achieve their goals and remain competitive in the global marketplace. Therefore, companies need to manage the virtual teams in specific ways (Siebdrat et al., 2009).

DEFINITION OF TEAM AND VIRTUAL TEAM

A team is a group of people who are focusing to achieve a defined goal. Team members collaborate with a high degree of interdependence, share responsibility for self-management, and work toward a common goal (Jain, 2009). A virtual team is a group of people who work with a shared purpose across space, time, and organizational boundaries using technology to collaborate. Virtual team members can be located across a country from different cultures and they rarely meet face-to-face (Kimble et al., 2000). Virtual teams have several unique characteristics which are mainly, 1) physically distributed members, 2) communication through a number of synchronous and asynchronous methods. There are different researches in the literature and according to Duarte and Snyder (2006), it is easy to characterize virtual teams as traditional teams. However, virtual teams are more complex as they have time differences, distance, different organizational structures and they use information technology to communicate and collaborate (Rosa, 2013). Although virtual teamwork is a current topic in literature it is difficult to define the complexities and clear solutions. The team is described as a small number of people with different backgrounds who are committed to achieving a common goal. Virtual teams work across boundaries of time, space by using computer-driven technologies (Chudoba et al., 2005 and Anderson et al., 2007). Virtual teams included members who are located in different physical locations. They use different forms of computer-mediated communication to coordinate (Peters and Manz, 2008). Amongst the different definitions of a virtual team, the concept from Powell et al. (2004) is the most widely accepted definition. They define virtual teams as groups of geographically, organizationally and time dispersed workers to achieve the organizational tasks. Consequently, a summary of the definition of a virtual team can be defined as, a group of geographically, and time dispersed workers collaborating with computer-mediated communication technologies in order to achieve the common goal for organizations.

Communication Within Global Virtual Teams

Virtual communication has many advantages. Due to globalization and the need for rapid knowledge transfer across borders and time zones, computer-mediated technologies allow users to communicate at any time and any location with access to the technology. Virtual teams overcome the limitations of time, space that traditional teams have. Moreover, virtual communication allows you to think about your response before you send an e-mail or reply to a message which reduces misunderstanding (Baltes et al., 2002). On the other hand, virtual communication provides cost savings to employees and to companies as well (Johnson et al., 2001). In addition to cost savings, a virtual working environment encourages innovation. Because in virtual teams' productivity is much more important than other characteristics (Bergiel et al., 2008). Although, virtual communication has various benefits in terms of cost, distance, cultural difference, and access to expertise it has disadvantages as well.

Virtual communication has software problems from time to time which causes delays or cancellations (Powell et al., 2004). This causes rescheduling the timetable which can be difficult to schedule the meeting again due to time zone barriers. In addition to this, technological expertise issues arise in virtual environments. Some team members do not feel comfortable enough with technological structure. Indeed, one of the most important disadvantages is the lack of team cohesion and trust. Because sometimes people need to see or even feel to understand what people think. Because virtual team members often assume others` intentions incorrectly when they do not respond to e-mails or messages (Bergiel et al., 2008 and Dewar, 2006). Consequently, studies showed that both virtual

and face-to-face communication has advantages and disadvantages. Therefore, it is important to use communication modes appropriately in a certain situation.

RESEARCH MODEL

Virtual team members interact and collaborate through communication tools (Dávideková and Hvorecký, 2017). In this theoretical model, we propose that knowledge sharing positively affects trust and team effectiveness in virtual work environments. Moreover, higher levels of trust positively affect team effectiveness. The knowledge-based model states that organizations gather knowledgeable and skilled individuals to perform organizational tasks. Teams perform better when they have skillful members relevant to the task. In virtual environments, the knowledge must be shared amongst team members through the use of information technologies. In the long-term collaborations, participants and team members share their knowledge without any expectations which is the main benefit of effective collaboration. To collaborate effectively, virtual teams should distribute knowledge adequately otherwise, virtual teams will be less efficient, have higher costs while searching information, inadequate decision making due to the missing data. Thus, knowledge sharing enables effective team outcomes (Alsharo et al., 2017).

In virtual teams, members are linked through a common goal. The success, failure, and challenges of any virtual team are affected by the interaction of four dimensions (figure 1) which are purpose, time, people, and links (Juneja, Management Study Guide Content).

Each of these four dimensions can be further analyzed in three systems of inputs, processes, and outputs:

- Purpose is one of the significant key factors for a virtual team. Because well-defined goals, tasks, and measurable results guide the team towards the desired direction.
- People, members of the virtual team must work at internal and external organizational levels. Therefore, a productive virtual team needs integration at both internal and external levels in virtual work environments.
- Links, virtual team members are connected to each other through communication tools such as emails, video/audio conferencing, skype, instant messaging, etc. Such communication tools reduce the boundaries between members and develop trust among them.

Figure 1. Four-dimensional model of virtual teams (adapted from Juneja, Management Study Guide Content Team, 2019)
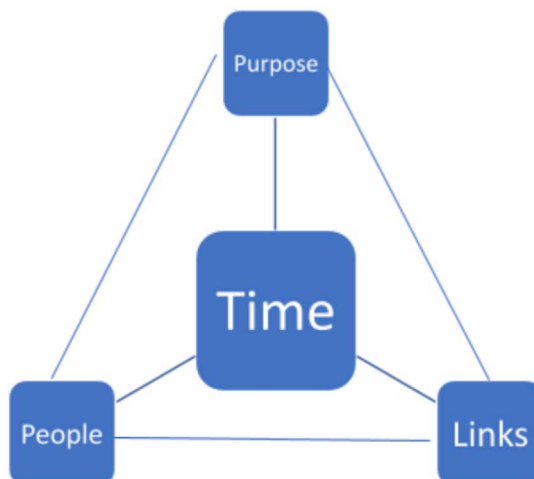
- Time has been related to people, purpose, and links. In virtual teams, it is not possible to meet at the same time and at the same place that´s why, time zone differences, language, and behavioral differences become more difficult (Jimenez et al., 2017). Thus, it is important to organize the meetings according to each member`s calendar to discuss and track the tasks and the project (Juneja, Management Study Guide Content).

Applying the Model

Virtual teams can overcome many challenges. Team collaboration is the backbone of the team. It supports team success and effectiveness. However, collaboration depends on trust, knowledge sharing between the team, social interaction among team members. Without these components' teams cannot make effective decisions. Forming trust in virtual teams is difficult as members are in different locations, lack of face-to-face interaction, working in different time zones. With the lack of physical interaction, virtual team members should demonstrate their willingness for the collaborative tasks (Alsharo et al., 2017). Virtual teams have many opportunities for collaboration across boundaries. Based on the model, virtual teams should be careful on team building, awareness, knowledge sharing, and communication tools in order to collaborate effectively (Godar and Ferris, 2004).

RESEARCH METHOD AND HYPOTHESES

Research Method

Several issues have been identified in the previous chapters as influencing factors in virtual teams such as distance, time zones, leadership, cultural difference, language difference, and trust. These factors influence project outcomes and coordination mechanisms. Coordination mechanisms involve; i) coordination by standards, ii) coordination by plans, iii) coordination by formal mutual coherence, iv) coordination by informal mutual coherence. Coordination by standards refers to methodologies, codes of practice, etc., which are used by team members. Coordination by plans refers to project plans, schedules, etc., to coordinate the team members. Coordination by formal mutual coherence refers to project meetings for team members to interact in a pre-defined manner. Coordination by informal mutual coherence refers to interacting in an informal manner such as e-mails, informal meetings, phone calls, and communications. Relation between virtual team influencing factors and coordination mechanisms are shown in figure 2.

The effectiveness of standards, plans, informal and formal mutual coherence are affected by distance, trust, time zones, cultural differences, and language differences (Kiely et al., 2010). The objective of this research is to investigate the impact of distance, trust, language difference, cultural difference, time difference, knowledge sharing on virtual teams. As an initial step, a conceptual model is presented, and the next step is building a theory and producing hypotheses for empirical research. A single case study research approach is selected for theory building and refinement. The case study emphasizes the understanding of empirical data in natural settings and is particularly fit for the purpose of exploring relationships between virtual team influencing factors. The case study involves 36 partners (industrial companies, research centers, universities, and institutions, etc.). From each organization, at least one or two people are representing the organization. This project is chosen for study on the basis of its use of virtual teams and the project will advance the state of the art in test automation for software teams. This specific project met several important criteria. Because this project is operated over several geographically dispersed project locations with multiple time zones and the team is culturally diverse. The project focused on increasing the development speed without sacrificing the quality of software development teams. The project is planned for 36 months duration with team members located in six geographical locations – Germany, Sweden, Finland, Spain, Turkey, and Netherlands. There are upwards of 120 team members working on the project in different locations at any point in time. The team is split into the work packages, such as project management,

Figure 2. The relationships between virtual team influencing factors and coordination mechanisms (updated/adapted from Kiely et al., 2010)
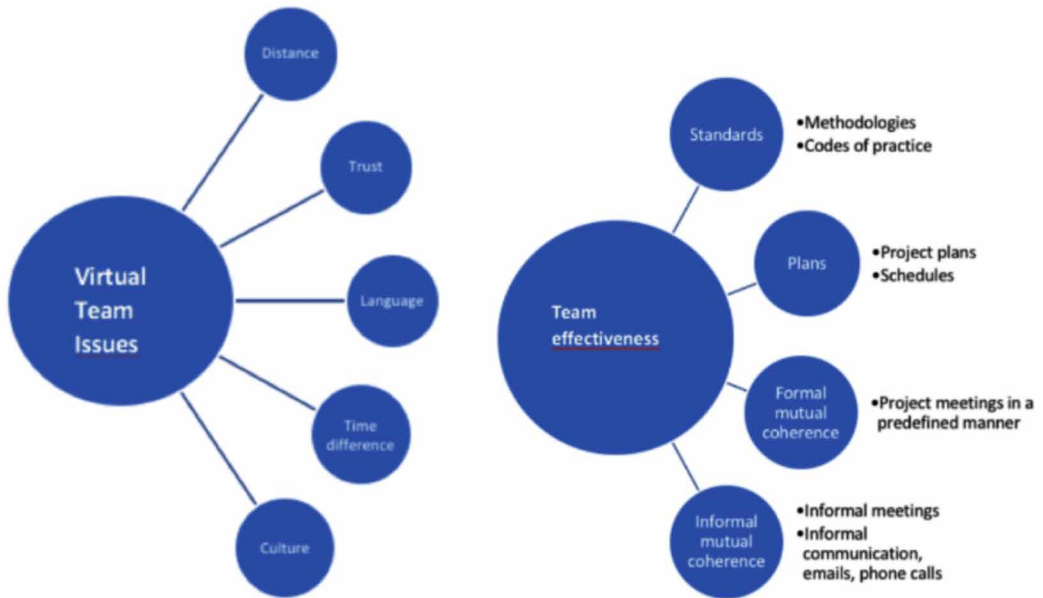
industrial use cases, test effectiveness, test priorities, test quality & standards, dissemination, and exploitation. In addition to that, each work package has sub-units. All team members are in different geographical locations and have responsibilities for different work packages and sub-units. Data is gathered from a wide variety of team members. Thus, participants were selected from all project sites and those participating in the study performed a range of project roles within the team (e.g., project lead, country coordinator, project manager, software engineer/developer, software tester, researcher, PhD student, etc.). Follow-up emails were used to distribute the survey to different organizations. The research utilized a model from a theory in formulating and determining the hypotheses about the relationships between influencing factors of virtual teams. This process continued in an iterative manner and resulted in the evaluation of relationships.

Methodology

The survey method for data collection is used to test the proposed research model. From the analysis of the data, it could be identified how the effectiveness of coordination mechanisms is impacted by virtual team issues, e.g., distance, time zones, language, culture, trust, and knowledge sharing.
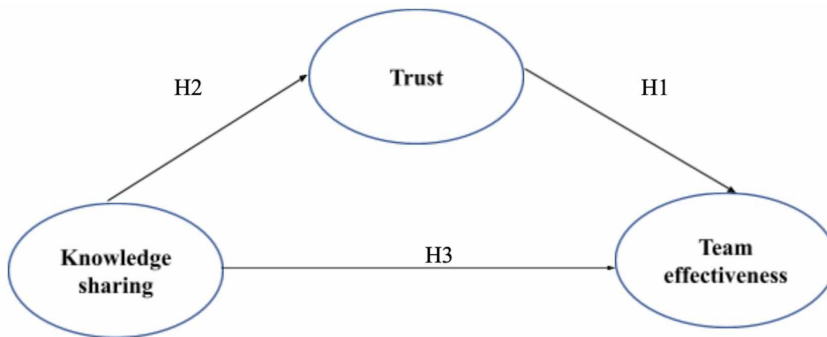
Hypotheses

In this section, the research model is designed along with the research hypotheses, which explain the relationships between knowledge sharing, trust, and their impact on virtual team effectiveness. The theoretical research model is demonstrated in Figure 3.

Hypothesis One: In virtual teams, trust has a positive impact on team effectiveness among team members.

Trust is an essential component of effective collaboration in virtual teams because it facilitates communication, cooperation, and coordination. This leads to better decision-making, problem-

Figure 3. Research model-relationship between trust, knowledge sharing and team effectiveness (adapted from Kiely et al., 2010)

solving, and innovation within the team (Paul and McDaniel, 2004). Based on this hypothesis, team effectiveness and trust relationship will be argued.

Hypothesis Two: In virtual team environments, knowledge sharing has a positive impact on trust among team members.

In virtual environments, knowledge sharing is a way of building relationships. Sharing knowledge among virtual team members allows them to learn from each other's experiences, which can lead to more effective problem-solving. Moreover, it also helps to build trust and strengthen relationships among team members.

Hypothesis Three: In virtual teams, knowledge sharing among team members has a positive impact on team effectiveness.

Virtual teams need to distribute the knowledge adequately among their team members. Several studies have demonstrated a positive relationship between knowledge sharing and team effectiveness (Gray, 2007). With this hypothesis, it will be argued whether or not sharing knowledge has a positive effect on team effectiveness.

Furthermore, team effectiveness can be affected by different virtual team issues which are shown in figure 4. Because virtual teams may have several challenges. These hypotheses are analyzed in this part.

Hypothesis Four: In virtual teams, cultural difference has a negative impact on team effectiveness.

Effective cross-cultural collaboration requires a cross-cultural mindset, clear communication, and active listening skills. By adopting these strategies, virtual teams can overcome cultural barriers and collaborate more effectively.

Hypothesis Five: In virtual teams, language difference has a moderately negative impact on team effectiveness.

Language can be a significant barrier to effective collaboration in virtual teams, especially when team members have different native languages.

Figure 4. Relationship between virtual team influencing factors and team effectiveness (adapted from Alsharo et al., 2017)
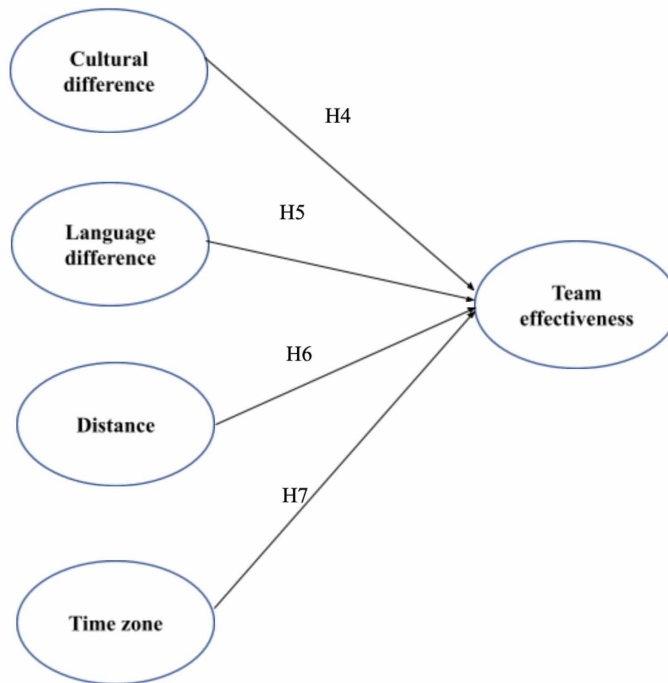
Hypothesis Six: In virtual teams, distance has a negative impact on team effectiveness.

Difficulties may arise in virtual teams because of the physical separation of team members across geographically dispersed project sites. By adopting strategies such as clear communication channels, regular meetings, and fostering team cohesion and trust, virtual teams can overcome these challenges and collaborate more effectively.

Hypothesis Seven: In virtual teams, the time difference has a moderately negative impact on team effectiveness.

Project progress will be affected by the time difference between the project sites. When team members are working in different time zones, it can be challenging to schedule meetings and coordinate project tasks effectively.

DATA ANALYSIS AND RESEARCH FINDINGS

This chapter gives an overview of the survey response and analyzes the questions used in the survey. Data analysis includes demographics and descriptive analysis. According to the results, the majority of participants were 81.06% from 34 and under years, 24.70% of participants were German and 25.66% of participants were English. The survey is spread on the internet from different social media channels therefore the participants were not only from Europe also from all over the world (e.g., Australia, Canada, Russia, United States, Israel, Taiwan, Mexico, Malaysia, Pakistan, India, China, United Arab Emirates, Ethiopia, Ireland, Latvia, Japan, Portugal, Hungary, Poland, Thailand,

Lebanon, Greece, Cyprus, Philippines, Indonesia, etc.). But the majority of the participants were from Europe. In this research, the scope is for IT projects/industries (because I was working on an IT project as a project manager) that´s why the majority of the participants were from the IT industry, e.g., software engineers, solution architects, IT specialists.

Hypotheses Results

Hypothesis One: In virtual teams, trust has a positive impact on team effectiveness among team members.

To indicate the relationship between trust and team effectiveness Chi-square test was conducted. The sample included 417 respondents. The association between the variables is statistically significant if Asymptotic significance (2-sided) < 0.05 which is the case here. It is the probability of observing our sample outcome if the variables are independent in the entire population.

There is a significant association between trust and team effectiveness. Specifically, the value of $X2 (5, N=417) = 336.482$ indicates a strong relationship between the two variables, and the p-value of 0.00 suggests that this relationship is statistically significant. The results suggest that building trust among team members is critical for team effectiveness in virtual settings (figure 5).

Hypothesis Two: In virtual team environments, knowledge sharing has a positive impact on trust among team members.

It appears that there is a significant association between knowledge sharing and trust among team members. Specifically, the value of $X2 (5, N=417) = 304.683$ indicates a strong relationship between the two variables, and the p-value of 0.00 suggests that this relationship is statistically significant. The results suggest that knowledge sharing among team members can have a positive impact on trust and help to enhance team effectiveness in virtual settings (figure 6).

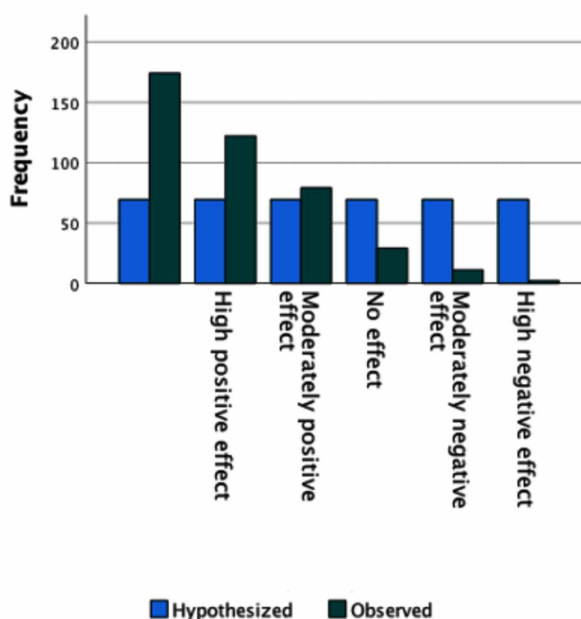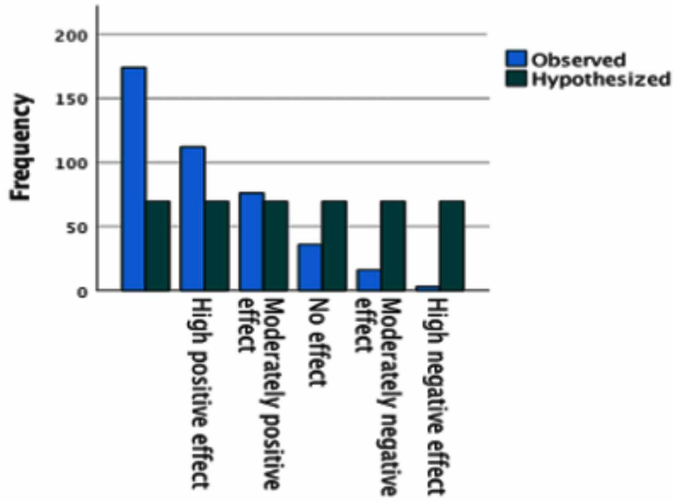Figure 5. Trust and team effectiveness relationship

Figure 6. Knowledge sharing and trust relationship among team members

Hypothesis Three: In virtual teams, knowledge sharing among team members has a positive impact on team effectiveness.

In H3, there is a significant association between knowledge sharing and team effectiveness. Specifically, the value of $X2$ (5, N=417) = 325.460 indicates a strong relationship between the two variables, and the p-value of 0.00 suggests that this relationship is statistically significant. The results suggest that knowledge sharing among team members is critical for team effectiveness in virtual settings (figure 7).

Figure 7. Knowledge sharing and team effectiveness relationship
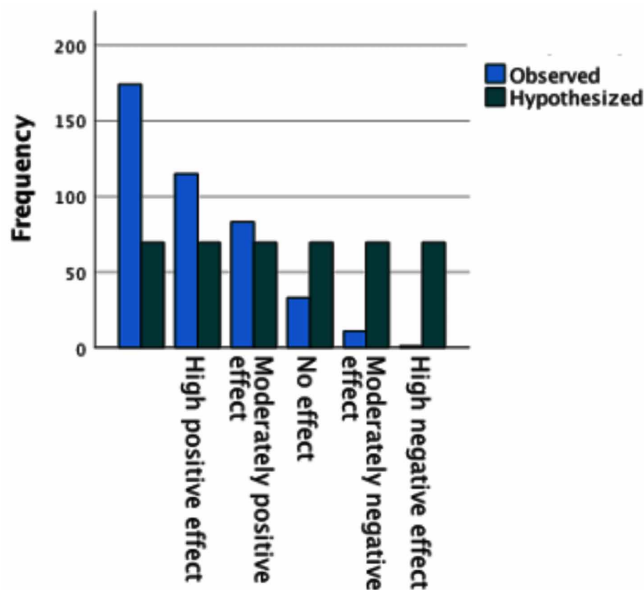
Hypothesis Four: In virtual teams, cultural difference has a negative on team effectiveness.

In H4, an association between cultural difference and team effectiveness was observed $X^2(5, N = 417) = 253.144$, p = .000. The probability is 0.00 in our case and the conclusion is we reject the null hypothesis that our variables are independent in the entire population and the result is significant. It is expected that cultural difference has a negative effect on team effectiveness, but the results show that the variables are associated with each other and cultural difference has a moderately positive impact on team effectiveness (figure 8). Therefore, Hypothesis 4 is not supported.

Hypothesis Five: In virtual teams, language difference has a moderately negative impact on team effectiveness.

In H5, there is a significant association between language difference and team effectiveness. Specifically, the value of X2 (5, N=417) = 298.295 indicates a strong relationship between the two variables, and the p-value of 0.00 suggests that this relationship is statistically significant. So language differences have a moderately negative impact on team effectiveness (figure 9).

Hypothesis Six: In virtual teams, distance has a negative impact on team effectiveness.

In H6, an association between distance and team effectiveness was observed $X^2(5, N = 417) = 278.353$, p = .000. The probability is 0.00 in our case and the conclusion is we reject the null hypothesis that our variables are independent in the entire population and the result is significant. It is expected that distance has a negative effect on team effectiveness. According to the responses the variables are associated with each other and distance has no effect on team effectiveness, thus H6 is not supported (figure 10).

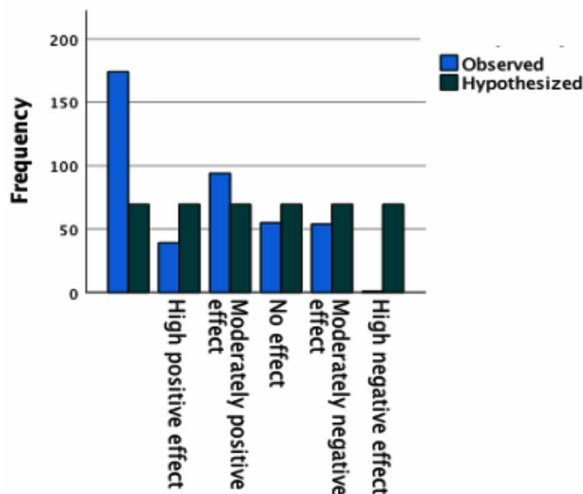**Hypothesis Seven:** In virtual teams, time difference has a moderately negative impact on team effectiveness.

Figure 8. Cultural difference and team effectiveness relationship

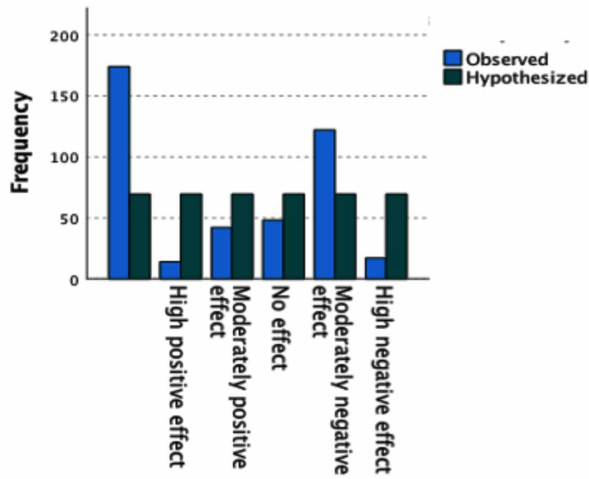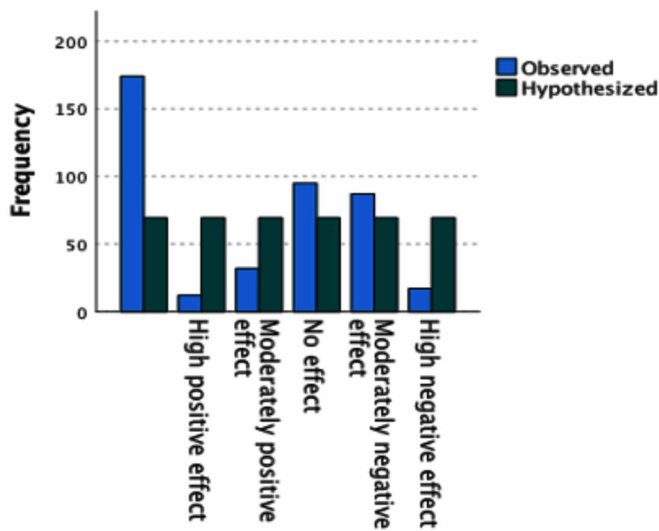**Figure 9. Language difference and team effectiveness relationship**

Figure 10. Distance and team effectiveness relationship

In H7, there is a significant association between time difference and team effectiveness. Specifically, the value of X2 (5, N=417) = 269.835 indicates a strong relationship between the two variables, and the p-value of 0.00 suggests that this relationship is statistically significant. So, time difference has a moderately negative impact on team effectiveness (figure 11).

DISCUSSION

The objective of this research is to investigate the impacts of virtual team issues such as trust, language difference, time difference, knowledge sharing, cultural difference, and distance on team effectiveness and the effectiveness of plans/standards and formal/informal mutual coherence. All virtual team issues and their impacts on team effectiveness were mapped which is shown in Table 1.

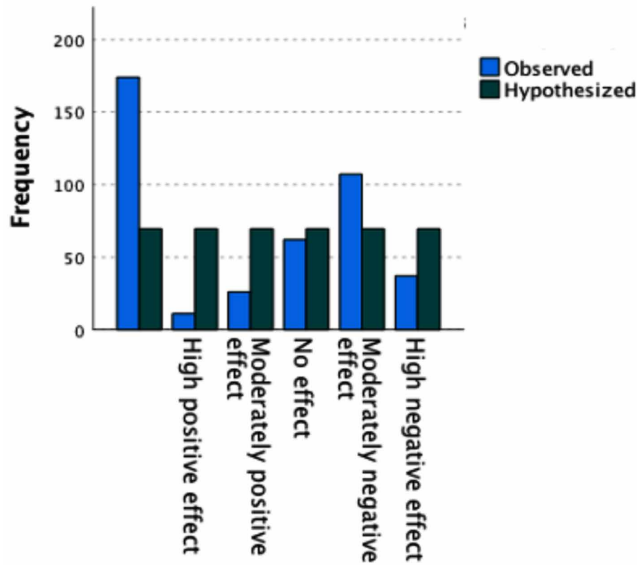**Figure 11. Time difference and team effectiveness relationship**

Table 1. Virtual Team Issues and Their Impacts on Team Effectiveness

Language difference	• Difficulties to understand workplace norms, misinterpretations during group decisions.
Time difference	• Difficulty in working multiple time zones. • Misunderstanding about the time differences. • Delays on the project.
Trust	• Unpredictable communication methods, only a few members are in communication. • Less productivity, more stress on the job.
Cultural difference	• Difficulty to interact/communicate with one another. • The difficulty about holidays across different locations of the team.
Knowledge sharing	• Difficulty on company workflows and processes such as instant messaging service, tools, etc. • Difficulty to use a central platform for all discussions and knowledge sharing (e.g., sharing documents, data, etc.). • Difficulty in using communication project management tools (e.g., Jira, Slack, Trello, etc.).
Distance	• Delayed response because of the distance. • Nonverbal communication such as body language and mimics which are lost. • Difficulty in using the collaboration tools such as video/audio chat apps, screen sharing, file sharing, etc.

According to the survey in this research, the results show that trust and knowledge sharing has a positive effect on team effectiveness. Time difference and language difference have a negative effect on team effectiveness. Distance has no effect on team effectiveness and cultural differences have a positive effect on team effectiveness.

Contrary to my results, Aubert and Kelsey, 2003, focused on the ability of trust formation in virtual teams. According to their study, 71 business students from two Canadian universities took part in this study. The students were grouped into 11 virtual teams from both universities. They were

asked to conduct a research project and submit a report at the end of the semester. However, they found that trust does not have a significant impact on team effectiveness.

Moreover, Pincas 2001 focused on the complexities brought by differences in linguistic cultures and hidden international education problems. It is argued that multi-cultural issues can cause many difficulties e.g., politeness, modes of emphasis, etc., which is the most difficult aspect of cross-cultural conversation. So, this study is discussing that cultural differences and language differences can have a negative impact on team performance. Consequently, according to my understanding, Pincas 2001, found that language differences may cause negative cross-cultural electronic communication. This study supported my findings of the language difference which has a negative effect on team effectiveness but did not support my findings of cultural differences. Another study from Tenzer et al., 2014, investigated how language differences influence trust formation in multicultural teams. In their research, they had 15 multicultural teams. 90 interviews with team members, team leaders, and senior managers in three German automotive corporations were done. Their research showed that language uniquely affects trust.

Another study is related to knowledge sharing. The results found in the literature support my findings of knowledge sharing which has a positive impact on team effectiveness. Davidavicˇiene et al., 2020, focused on the effect of knowledge sharing in virtual teams in the Middle East. The companies in this research were based in the United Arab Emirates from the IT industry who were working remotely. The results showed that culture, motivation, communication technologies, trust, and leadership have a positive impact on knowledge sharing. These factors affect the knowledge sharing process therefore they should be considered in order to achieve effectiveness and to reach high virtual team performance.

Although my results showed that distance has no impact on team effectiveness, the literature showed that physical distance can cause difficulties to strengthen team cohesion, communication problems, and joint perception of goals. So, my research focused on geographical distance and it was found that it has no impact on team performance. On the other hand, if it is a temporal distance, it can cause difficulties to establish a predictable rhythm in work processes. According to my understanding, temporal distance is related to time differences. Because difficulty in a predictable rhythm means that team members are separated by time zone and the coordination of work processes that can be challenging since synchronous communication between the team members is very limited (Gärtner et al., 2020). According to my results, the time difference has a moderately negative effect on team effectiveness. But in the literature, (Sivunen et al., 2016) 93 interviews were done from four different organizations in Finland. They found that small-time differences can be even more challenging than large-time differences and it may result in disruptive discontinuities in collaboration in global virtual teams.

CONCLUSION AND FUTURE RESEARCH

The results of this study have indications for both research and practice. For research, it provides new insights about the factors that affect virtual team effectiveness. In addition to this, because of COVID-19 more and more organizations started to work remotely. Thus, we identified the need for the future to better understand the impact of trust, knowledge sharing, cultural difference, language difference, distance, and time difference on virtual teams´ outcomes. For practice, this research emphasizes the significance of virtual team influencing factors to virtual team effectiveness and recommends that organizations support virtual teams on both technological, organizational, and social levels.

In order to stay a safer organization, to reduce project failures and risks virtual team settings need to be implemented properly for IT projects. To help accomplish the building an effective virtual team the following recommendations are learned from this research:

- The participants in this study were mainly in the area of IT (21.82%) (because the survey was designed for IT projects), followed by education (16.55%) and consumer products industry (12.47%). But due to the COVID-19, there were many participants who participated in the survey who were working remotely from different industries (e.g., energy, psychology, marketing, tourism, psychology, health and science, environmental sciences, public relations, design, engineering, government services). For age, 81.06% of participants were from 34 and under years and 70.28% of participants were from Europe, 24.70% of participants were from Germany followed by the United Kingdom (25.66%). The rest of the participants were from all over the world (e.g., Israel, Poland, United States, Canada, Portugal, Russia, Australia, Taiwan, Mexico, Malaysia, Pakistan, India, China, United Arab Emirates, Ethiopia, Ireland, Latvia, Hungary, Japan, Pakistan, Thailand, Cyprus, Greece, Philippines, Saudi Arabia, Bulgaria, Romania, Norway, Indonesia, South Africa, Egypt). For the time spent working in virtual teams almost 88.47% of the members had joined in the last 5 years. 48.15% of the members haRd less than 1-year of experience in working remotely which was because of COVID-19. The diversity of membership in organizations showed that 13.58% of the participants were leaders and 10.70% were managers and the proportion of team members was approximately 52.67% of the participants and the team size was around 6-10 people (34.16%). Under normal conditions, some of the participants have worked in virtual and face-to-face so due to the COVID-19 they didn¬¥t have many adjustment problems because they were already working remotely before the pandemic approximately 4 years or more or even permanent (23.88%), please see Appendix 2 for details of respondents¬¥ demographics. In addition to these, according to my personal experience and my personal conversation with my colleagues, I found that most of the people were very interested in continuing working in virtual environments or in mixed mode (virtually and face-to-face) in a new post COVID-19 normality.
- Global virtual teams bring additional risks therefore it is very important to be aware of the challenges in virtual teams (e.g., trust, knowledge sharing, cultural difference, language difference, distance, and time difference) and find appropriate solutions for the problems.
- In virtual teams it is important to get to know each other. Building trust and communication, learning each other`s experiences and skills will enable team members to confidence and success in the project.
- Trust is considered as one of the most important variables especially because of the increase in remote work during COVID-19. Companies should give greater importance to trust which strengthens communication, collaboration, cohesion, and team efficiency.
- Establish strong trust and communication among team members. Setting regular phone or video conference meetings will promote communication and help build trust within the team.
- Select the manager/leader with appropriate leadership skills such as working across boundaries and using technology effectively. Depending on the level of experience and skills, empowering the team members is vital in IT projects.
- Select the team member with good communication and relevant skills about the project.
- Define the project goals, roles, and responsibilities very clearly. The specifications of requirements of the projects are very clear from the beginning, especially with Agile methodologies. Therefore, it is possible to structure the IT projects in an orderly manner.
- Create an effective mechanism for knowledge sharing and knowledge management that can be accessible to all team members at any time. Knowledge sharing and learning are significant in virtual teams thus they should be actively encouraged by organizations and team leaders/managers. Moreover, processes, ideas, case studies, success stories, etc., should be written and reachable to everyone in the team.
- Establish conflict management processes.
- Provide training programs to help team members and to improve their skills. Training the team members will be more important in the coming years because of the increase in remote work due to the COVID-19.

- Keep the interests and goals of the team at the top.
- Prepare the agenda, share with the teams on time and respect the agenda.
- Closely track the project progress with weekly or bi-weekly meetings.
- Give feedback on time and encourage team members` responsibility and visibility for their actions.
- There is a risk that virtual team members may not report properly, therefore establishing the reporting structure of the project.

Consequently, trust, knowledge sharing, shared understanding, shared goals and good communication greatly help virtual teams perform better. Therefore, teams need to find a way to build virtual team efficiency affecting factors. A face-to-face meeting is helpful but not required. Results showed that team members can manage to work, communicate and finish the project successfully in a virtual environment. So, it is possible to work fully virtual. Also, participants agreed on distance has no effect on virtual team efficiency. Thus, if face-to-face communication is not possible, regular meetings via phone or video/audio conferencing can be set. By using these communication tools, it is possible to help teams to work the same as if they were working in a traditional team setting. The results, therefore, show that the increased remote work by COVID-19 can be an opportunity to innovate in a virtual environment to influence virtual team performance.

REFERENCES

Alsharo, M., Gregg, D., & Ramirez, R. (2017). Virtual team effectiveness: The role of knowledge sharing and trust. *Information & Management*, *54*(4), 479–490. doi:10.1016/j.im.2016.10.005

Anderson, A. H., McEwan, R., Bal, J., & Carletta, J. (2007). Virtual team meetings: An analysis of communication and context. *Computers in Human Behavior*, *23*(5), 2558–2580. doi:10.1016/j.chb.2007.01.001

Baltes, B. B., Dickson, M. W., Sherman, M. P., Bauer, C. C., & LaGanke, J. S. (2002). Computer-mediated communication and group decision making: A meta-analysis. *Organizational Behavior and Human Decision Processes*, *87*(1), 156–179. doi:10.1006/obhd.2001.2961

Bergiel, B. J., Bergiel, E. B., & Balsmeier, P. W. (2008). Nature of virtual teams: A summary of their advantages and disadvantages. *Management Research News*, *31*(2), 99–110. doi:10.1108/01409170810846821

Chudoba, K., Wynn, E., Lu, M., & Watson-Manheim, M. (2005). How virtual are we? Measuring virtuality in a global organization. *Information Systems Journal*, *15*, 279–306. doi:10.1111/j.1365-2575.2005.00200.x

Dávideková, M., & Hvorecký, J. (2017). Collaboration tools for virtual teams in terms of the SECI model. *Interactive Collaborative Learning: Proceedings of the 19th ICL Conference*, 1, 97-111. doi:10.1007/978-3-319-50337-0_9

Dewar, T. (2006). Virtual teams—Virtually impossible? *Performance Improvement*, *45*(5), 22–25. doi:10.1002/pfi.2006.4930450507

Duarte, D. L., & Snyder, N. T. (2006). *Mastering virtual teams: Strategies, tools, and techniques that succeed* (3rd ed.). Jossey-Bass.

Ebrahim, N. A., Ahmed, S., & Taha, Z. (2009). Virtual teams: A literature review. *Australian Journal of Basic and Applied Sciences*, *3*, 2653–2669.

Eubanks, D. L., Palanski, M., Olabisi, J., Joinson, A., & Dove, J. (2016). Team dynamics in virtual, partially distributed teams: Optimal role fulfillment. *Computers in Human Behavior*, *61*, 556–568. doi:10.1016/j.chb.2016.03.035

Garro-Abarca, V., Palos-Sanchez, P., & Aguayo-Camacho, M. (2021). Virtual teams in times of pandemic: Factors that influence performance. *Frontiers in Psychology*, *12*, 624–637. doi:10.3389/fpsyg.2021.624637 PMID:33679543

Godar, S. H., & Ferris, S. P. (2004). *Virtual and collaborative teams: Process, technologies and practice.* https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.725.8533&rep=rep1&type=pdf

Gray, S. L. (2007). *A grounded theory study of the phenomenon of collective competence in distributed, interdependent virtual teams* [PhD thesis, University of Phoenix]. ProQuest Dissertations Publishing, 3302616.

Jain, N. (2009). Run marathons, not sprints. In *97 Things Every Project Manager Should Know: Collective Wisdom from the Experts* (p. 96). O'Reilly Media, Inc.

Jimenez, A., Taras, V., Boehe, D. M., & Caprar, D. V. (2017). Working across boundaries: Current and future perspectives on global virtual teams. *Journal of International Management*, *23*(4), 341–349. Advance online publication. doi:10.1016/j.intman.2017.05.001

Johnson, M., Andreassen, T. W., Lervik, L., & Gustafsson, A. (2001). The evolution and future of national customer satisfaction index models. *Journal of Economic Psychology*, *22*(2), 217–245. doi:10.1016/S0167-4870(01)00030-7

Juneja, P. (n.d.). *Virtual Team - Origin, Definition and its Scope.* https://www.managementstudyguide.com/virtual-team.htm

Kiely, G., Butler, T., & Finnegan, P. (2010). Coordinating global virtual teams: Building theory from a case study of software development. LNCS, 6051, 281–295. doi:10.1007/978-3-642-13094-6_23

Kimble, C., Barlow, A., & Li, F. (2000). *Effective virtual teams through communities of practice.* Department of Management Science Research Paper Series, 00/9, University of Strathclyde, Strathclyde, UK.

Marlow, S. L., Laceranza, C. N., & Salas, E. (2017). Communication in virtual teams: A conceptual framework and research agenda. *Human Resource Management Review*, *27*(4), 575–589. doi:10.1016/j.hrmr.2016.12.005

Paul, D. L., & McDaniel, R. R. (2004). A field of study of the effect of interpersonal trust on virtual collaborative relationship performance. *Psychology, Computer Science*, *Management Information Systems Quarterly*, *28*(2), 183–227. doi:10.2307/25148633

Peters, L. M. L., & Manz, C. C. (2008). *Getting Virtual Teams Right the First Time: Keys to Successful Collaboration in the Virtual World*. Jossey-Bass/Pfeiffer.

Popescu, A. D., Borca, C., Fistis, G., & Draghici, A. (2014). Cultural diversity and differences in cross-cultural project teams. *Procedia Technology*, *16*, 525–531. doi:10.1016/j.protcy.2014.10.120

Powell, A., Piccoli, G., & Ives, B. (2004). Virtual teams: A review of current literature and directions for future research. *The Data Base for Advances in Information Systems*, *35*(1), 6–36. doi:10.1145/968464.968467

Rosa, R. P. C. (2013). *Virtual communication between virtual teams* [MSc thesis]. TU Delft, Netherlands.

Siebdrat, F., Hoegl, M., & Ernst, H. (2009). How to manage virtual teams. *MIT Sloan Management Review*. https://sloanreview.mit.edu/article/how-to-manage-virtual-teams/

Zander, L., Mockaitis, A. L., & Butler, C. L. (2012). Leading global teams. *Journal of World Business*, *47*(4), 592–603. doi:10.1016/j.jwb.2012.01.012

Buket Celik Ünal received her B.S. degree in Industrial Engineering and the M.S. degree in Energy Systems and Management. She got her doctorate degree at Berlin Technical University in Man-Machine Systems Department and working as a Project Manager in an IT Industry.