



**VILNIAUS UNIVERSITETO
VERSLO MOKYKLA**

INTERNATIONAL PROJECT MANAGEMENT PROGRAMME

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MASTER'S THESIS

<p><i>KOMUNIKACIJOS IR PASITIKĖJIMO VIRTUALIOSE IT PROJEKTŲ KOMANDOSE ŠAŠAJOS SU PROJEKTO SĖKME IR KOMANDOS NARIŲ PASITENKINIMU PROJEKTU</i></p>	<p><i>LINKS BETWEEN COMMUNICATION AND TRUST IN VIRTUAL IT PROJECT TEAMS WITH PROJECT SUCCESS AND TEAM SATISFACTION</i></p>
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SUMMARY

VILNIUS UNIVERSITY BUSINESS SCHOOL
INTERNATIONAL PROJECT MANAGEMENT PROGRAMME

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This Master's thesis analyzes relations of eight different communication aspects and trust between team members and trust in team leader in virtual IT project teams with project success and team members' satisfaction with project.

The aim of master's thesis is to analyze links between communication and trust in virtual IT project teams with project success and team satisfaction.

Objectives include analysis of topic related theoretical aspects, analysis of how communication aspects in virtual IT project team is related to trust between team members and team members' trust in leader, and to evaluation of project success and the team members' satisfaction with project; whether and how team members' trust in leader and trust between team members is related to evaluation of the project success and the team members' satisfaction with project, concluding with practical recommendations and conclusions based on empirical results.

Master's Thesis research was conducted using quantitative research method analyzing variables named above. Research conducted online, using online survey platform.

Results confirmed findings provided by other authors, trust and communication is related with team members' satisfaction with the project. Assumption made from literature analysis, that project success is related to communication and trust, was confirmed. Also, further research could be performed with different communication and trust variables, and/or larger sample size.

SANTRAUKA

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Šiame magistro darbe analizuojami aštuonių skirtingų komunikacijos aspektų ryšiai ir pasitikėjimas tarp komandos narių bei pasitikėjimas komandos lyderiu virtualiose IT projektų komandose su projekto sėkme ir komandos narių pasitenkinimu projektu.

Magistro baigiamojo darbo tikslas – išanalizuoti ryšius tarp komunikacijos ir pasitikėjimo virtualiose IT projektų komandomse ir projekto sėkmės ir komandos pasitenkinimo.

Tikslai apima mokslinės literatūros, susijusios su tema analizę, analizę, kaip komunikacijos aspektai virtualioje IT projekto komandoje yra susiję su pasitikėjimu tarp komandos narių ir komandos narių pasitikėjimu lyderiu bei su projekto sėkmės vertinimu ir komandos narių pasitenkinimu projektu; ar ir kaip komandos narių pasitikėjimas lyderiu ir pasitikėjimas tarp komandos narių yra susiję su projekto sėkmės vertinimu ir komandos narių pasitenkinimu projektu, pateikiamos praktinės rekomendacijos ir empiriniais rezultatais pagrįstos išvados.

Magistro baigiamojo darbo tyrimas atliktas taikant kiekybinį tyrimo metodą, analizuojant aukščiau įvardintus kintamuosius. Tyrimas atliktas internetu, naudojant internetinių apklausų platformą.

Rezultatai patvirtino kitų autorių pateiktas išvadas, pasitikėjimas ir komunikacija yra susiję su komandos pasitenkinimu projektu. Pasitvirtino iš literatūros analizės padaryta prielaida, kad projekto sėkmė yra susijusi su komunikacija ir pasitikėjimu. Be to, tolesni tyrimai galėtų būti atliekami naudojant skirtingus komunikacijos ir pasitikėjimo kintamuosius ir (arba) didesnę imties dydį.

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INTRODUCTION

Globalization, improvements in information and communication technologies, the increase in the number of remote workers and the emergence of computer-mediated groups, have led to changes in how workers communicate and collaborate in organizations. With current technological advances, the knowledge economy and digital culture, new ways of working are appearing in organizations. For virtual teams, the physical limits of distance are no longer relevant. Other characteristics of teamwork have become more important when working remotely, such as communication, trust, task characteristics, leadership, cohesion, and empowerment, all of which have an impact on a team's performance (Garro-Abarca, Palos-Sanchez, & Rus-Arias, 2020).

New technologies allow global companies, including small and medium enterprises (SMEs), to satisfy global product demand via new product development. This increased demand complexity has forced companies to establish multinational locations in order to commercialize their products directly, reducing development and manufacturing costs (locating low-value processes in regions where salaries are low), leading to knowledge acquisition from leading technological countries, and providing on-site services to their customers. Because of this increased complexity, virtual teams are more frequently used in all sizes of projects and in many companies; therefore, the more focus should be on the identification of knowledge areas when working with virtual teams in project-oriented organizations (Gallego, Ortiz-Marcos, & Romero Ruiz, 2021). Virtual teams need to be investigated so that this emerging type of organization can be fully understood, especially as new technologies for collaboration are constantly being developed (Garro-Abarca, et al, 2020).

Trust matters, particularly in virtual teams. However, the emphasis in virtual teams has been on establishing trust. Current teams already have an established level of team trust, but are now asked to work together with a heightened level of virtuality. Rather than worrying about building trust, current organizations have to worry about maintaining and monitoring team trust with decreased opportunity for observation (Feitosa & Salas, 2021).

Studying virtual team project teams on how to enhance project success and satisfaction area has become increasingly important since the appearance of the coronavirus pandemic or covid-19. Technological advances permit teleworking and collaboration in virtual teams. Fear of new pandemics and savings in transport costs will definitely promote this technology in coming years. Areas which can be investigated are communications, including technology, and trust (Garro-Abarca, et al, 2020).

The Aim of the Master's Thesis is to analyze links between communication and trust in virtual IT project teams with project success and team satisfaction.

Objectives of the thesis:

- 1) To analyze theoretical aspects of virtual IT project teams, team communication, trust, team members' satisfaction with project and success of the project;
- 2) To analyze evaluation of communication aspects, trust, team members' satisfaction with project, and project success;
- 3) To analyze relations between aspects of communication in virtual IT project teams, trust between team members, and team members' trust in leader;
- 4) To examine relations between aspects of communication in virtual IT project teams, evaluation of project success, and team members' satisfaction with project;
- 5) To determine relations between team members' trust in leader, evaluation of project success, and team members' satisfaction with project;
- 6) To identify relations between trust between team members, evaluation of project success, and team members' satisfaction with project;
- 7) To present conclusions and recommendations for virtual IT teams projects improvement.

Structure of the Master's Thesis

The Master's Thesis consists of four main sections – Introduction, Theoretical Background, Research Methodology and Research Results. All parts are divided into subparts by the topic covered research has been done on. The Introduction covers several aspects: the topic, description of the problem identified, the variables investigated in this study, and aim and objectives of the Master's Thesis. The first part presents the theoretical basis for the empirical study; methodology and research sample are presented in the Research Methodology part; the Research Results part presents results of the empirical study and their analysis. At the end received results are reviewed, conclusions and recommendations are provided.

1. THEORETICAL BACKGROUND OF COMMUNICATION, TRUST, PROJECT SUCCESS AND SATISFACTION IN VIRTUAL IT PROJECT TEAMS

Modern developments in technology have changed the way we socialize, communicate and work. Globalization, information and communication technologies, digital culture, and the increase in the amount of technology available for online communication results that more organizations are implementing virtual teams. The growth in the use of virtual teams in organizations has encouraged researchers to investigate the different aspects, factors, and challenges of these teams (Garro-Abarca, et al, 2020). IT projects are the archetype of projects requiring virtual teams due to their technological needs and usage of information and communication technology infrastructure (Gallego, et al, 2021).

1.1. Communication in virtual teams

Communication is a process within a team that is typically identified as strengthening team performance, as it promotes the development of integral team processes and outcomes. Therefore, the relationship between team communication and performance has been frequently reviewed (Marlow, Lacerenza, & Salas, 2017). Communication, team coordination and knowledge sharing are fundamental elements to predict the effectiveness and efficiency of the team (Garro-Abarca, Palos-Sanchez, & Aguayo-Camacho, 2021). As organizations more frequently implements virtual teams as a way of organizing projects, research on the effect of virtual tools usage on virtual team functioning have been conducted continuously (Marlow, et al, 2017).

Recent progress in technological capabilities allowing communication despite distance and time between users have allowed organizations to more frequently implement virtual teams. Together with the increasing growth of virtual teams' establishment, the effect of virtuality on team communication has received a high interest in the literature, as the method of communication is one fundamental difference between traditional, co-located, teams and virtual. Respectively, virtual teams communicate primarily via virtual tools. This has been disputed to have negative impact to diverse team outcomes and early studies in this area generally investigated to confirm this; however, more recent studies indicates that this communication relationship may have more complexity than initially thought (Marlow, et al, 2017).

It is important to identify the effects which can have impact to virtual teams' communication. Key limiting factors for reaching milestones and achieving success for a virtual team were indicated in recent study of Blalock, Alexis, & Walsh, (2021). The author discusses communication of tasks, collaborative communication, relationship formation, general communication difficulties:

- **Communication of tasks:** virtual teams tend to fail to communicate effectively in regards of project tasks. Virtual teams encounter difficulties to initially assign tasks and to follow up on team members progress on their responsibilities and dedicated tasks.
- **Collaborative communication:** virtual teams struggle to collaborate within a team (between a team members) and outside the team (with external partners, e.g. stakeholders) and evaluation and revision project deliverables.
- **Relationship formation:** team members' relationships forming virtually is negatively impacted, and due to team's relationship did not form well, team members struggle to effectively communicate.
- **General communication difficulties:** extended periods without timely responses from team members leads teams to experience negative impact on the execution of tasks and reaching of project goals. One of the factors why virtual teams experience difficulties in communication using the information and communication technology, is that technology fails to work due to technical difficulties or other circumstances. Additionally, it is important to select proper technology because inefficient nature of the technology keeps team members from effective communication and the communication becomes time consuming (Blalock, et al, 2021).

According to recent study of Gallego, et al (2021), during the planning phase of projects, virtual teams are mainly considered only in the scope, where virtual communication is necessary. In more detail, where end users or stakeholders are distant from the project teams. This aspect has direct impact to stakeholder management and communications management as well. For the virtual teams' IT tools are required to manage project execution and communication. When virtual teams are part of the project team, cultural differences should be identified and its management should be included in communication management strategies and organizational support in international companies (Gallego, et al, 2021).

Team communication can be described as the exchange of messages between two or more members of the team. Communication is an integral team process because it is an enabler of “the development and sustainment of other team processes that contribute to enhanced team performance, such as coordination and team monitoring” (Marlow, et al, 2017). As communication is such a broad construct, Marlow, et al (2017) examined the frequency, quality, and the content of communication as aspects of the communication that are most required to receive expected outcomes of the project (Marlow, et al, 2017).

1.2. Characteristics of virtual teams and importance of communication

Modern technological development has changed our communication, socialization, and work practices. Globalization, Information and Communication Technologies, digital culture, and the

increasing number of technologies suitable for online communication results that more companies and organizations are deploying virtual teams. The increasing usage of virtual teams in organizations has led researchers to explore different aspects, factors, and challenges of virtual teams (Garro-Abarca, et al, 2020).

A virtual team can be described as “geographically dispersed team members who communicate with each other using some variant mix of information and communication technologies” (Lee-Kelley and Sankey, 2007; Gallego, et al, 2021). According to Garro-Abarca, et al (2021) a virtual team is defined as “a group of people or stakeholders working together from different locations and possibly different time zones, who collaborate on a common project and use information and communication technologies intensively to co-create”.

It is apparent, that one of the main virtual team characteristics is virtuality, meaning the physical and time distance between members and having a common the overall goal. The recent study performed by Gallego, et al (2021) confirms the necessity to properly plan communication management when virtual teams are involved in a project team and showed the importance of virtual teams during project planning requirements collection and scope management processes. Therefore, project managers should consider involving virtual teams in project scope planning (Gallego, et al, 2021). Virtual teams are significant in project planning as many organizations work in a multi-location setting where virtually employees and teams works together with local ones. Consequently, it is essential for proper project planning to take into account virtually working employees and teams, not excluding. Therefore, collaboration in virtual in virtual teams needs to be strengthen and new ways to work are needed to meet the challenges of such collaboration (Gallego, et al, 2021). As an example, often team members at the same location frequently interact between each other on a deeper level than with the remote members of the team, and results in friction between team members and is therefore detrimental to team performance (Garro-Abarca, et al, 2021). Teamwork characteristics, such as communication, trust, leadership, cohesion, and empowerment, can affect team performance therefore they are important when organization has teams and team members work virtually (Garro-Abarca, et al, 2020).

According to Garro-Abarca, et al (2021), virtual teams are influenced by a number of factors. These factors can be classified into:

- Inputs (related to communication and trust),
- Processes (task-oriented and socio-emotional),
- Outputs (performance).

According study performed by Garro-Abarca, et al (2020), most researchers consider the technology used for remote communication to be an important factor for team performance as

information and communication technology influences personal communication and even more significantly in virtual teams. However, the author states that even though technology influence is significant, it is not the only important factor of team performance. Virtual teams consist of members who all have different needs and emotions, consequently trust, as described in previous section of this work, should be considered as an important factor as well. Another important factor is leadership. An effective manager can introduce a variety of technological tools to be adopted by the entire team in order to better manage the team performance. (Garro-Abarca, et al, 2020).

When concentrating on project implementation, it is important to understand the impact of leadership in virtual teams (e-leadership), teams' ability to solve problems arising from cultural or time differences, and to demonstrate the leadership style applied depending on the virtual team type (virtual teams or remote teams) and the amount of leaders (one or several). As mentioned before, virtual teams have a strong influence during project planning, mainly focusing on project planning parts covering the human resources and communication. The weight of leadership during project implementation can be understood through five success factors (White, 2014) precise objectives, strategies for virtual meetings, constant team members in virtual teams to develop trust, language skills improvement, and local achievement of global goals. Studies (Guzmán, Ramos, Seco, & Esteban, 2010) has examined the practices that need to be implemented in software development projects with virtual teams. The selection of innovative virtual team leaders, face-to-face meetings to debate important areas, and language skills improvement are good practices during the implementation of projects in which project teams are formed as virtual teams. Therefore, these factors must be involved in the scope of the project through requirements, and the scope of work via the project management plan (Gallego, et al, 2021).

1.2.1. Communication frequency

Team communication can be measured by volume or of frequency communication using wide range of communication channels (e.g., e-mail, calls, face-to-face interaction). Marlow, et al (2017) and Blalock, et al (2021) have suggested that teams who have formed relationships between team members are able to perform effectively, even in the absence of face-to-face communication, due to the fact shared cognition between team members (Marlow, et al, 2017). This understanding allows members of the team to contribute to the task and behave in a manner that is suitable and compatible with their team members. Moreover, it allows team members to predict how other team members might react to various events, despite being unable to communicate face-to-face (Marlow, et al, 2017).

Nevertheless, frequent communication is important, Marlow, et al (2017) states that a high volume of team communication may affect team performance in virtual teams as excess of unnecessary information may lead to cognitive overload, which could result in decreasing performance of the team members and due to that communication quality is more important in comparison to communication

frequency (Marlow, et al, 2017). Additionally, as communication volume increases, performance of virtual teams may decrease as irrelevant information overload detracts from necessary information exchange. With increased level of virtuality this impact may strengthen as a more frequent communication is likely to become information in a virtual form. Sorting through virtual messages and emails may have effect of information overload. Therefore, Marlow, et al (2017) suggest that within highly virtual teams “the greater the amount of communication interactions, the greater the cognitive load level”. More intense communication interactions between a virtual teams’ members may prevent teams’ performance more significantly than within less virtual teams because of the of the channel of communication (e.g., email) and the higher degree of effort required to maintain with a high volume of messages in comparison to verbal messages, which require less effort. Accordingly, “virtuality moderates the relationship between frequent communication and team processes and outcomes, such that the negative relationship is stronger in more virtual teams than in less virtual teams” (Marlow, et al, 2017).

1.2.2. Communication quality

Team communication can be examined by measuring communication quality, which, as already discussed, has higher effect for team outcomes than other aspects of team communication. For this reason, the role of communication quality between team members is higher in comparison to communication between team members’ frequency. Despite that, frequency cannot be neglected because it is an essential part of the communication, but communication quality is more substantial to the research of teams and virtual teams according to Marlow, et al (2017). Communication quality can be described as “the extent to which communication among team members is clear, effective, complete, fluent, and on time,” (González-Romá & Hernández, 2014). “In other words, communication frequency refers to how much communication occurs among team members whereas communication quality refers to the degree to which the communication among team members is accurate and understood,” (Marlow, et al, 2017, p. 588).

High quality communication enables improved team performance by clarifying when, how and which task and by whom should be performed. According to Marlow, et al (2017) communication timeliness and closed-loop communication represent two aspects of communication quality.

Study performed by Marlow, et al (2017) suggests that communication timeliness is mostly fundamental to virtual team communication, as communication might be disorganized in teams working virtually. For example, if team members are working in different time zones, one team member might send a message to another team member expecting timely response, but another team member, working in a different time zone, might acknowledge the received message later. Real-time communication might also be complicated in such teams due to working hours’ differences, which can negatively impact

team's performance, as well as contribute to the frequent case when virtual team members' tasks implementation is slower in comparison to face-to-face working teams. Furthermore, interfered, delayed communication might have negative impact and complicate planning and management processes in virtual teams. According to Marlow, et al (2017) "virtuality moderates the relationship between communication timeliness and performance such that this relationship is stronger in more virtual teams than in less virtual teams" suggesting that communication timeliness is important factor in virtual teams' communication.

Besides need to receive and acknowledge information in timely manner, it is important to understand how the content of the communication is interpreted (Garro-Abarca, et al, 2020). A significant characteristic of communication quality is follow up and assurance that the message sent by the original sender was received and completely understood by the receiver. According to Marlow, et al (2017), "definition of closed-loop communication is comprised of three parts: "(a) a team member sends a message, (b) another team member receives the message, interprets it, and subsequently acknowledges its receipt, and (c) the original team member who sent the message follows up to ensures it was received and understood"". These parts are essential to reducing misinterpretation between team members and are particularly important to virtual teams, taking into consideration the challenges these teams encounter in communicating. The likelihood of misunderstandings is expected to increase in a more virtual environment, given the possible cultural differences and different values of team members that can lead to significant differences in understanding any problem. (Marlow, et al, 2017).

Virtual teams might face a spectrum of challenges, and one of these difficulties is that information during virtual communication is transferred, shared, and interpreted without the non-verbal communication (Garro-Abarca, et al, 2020). Usage of virtual tools, especially video calls might reduce the negative impact of lack of non-verbal communication, however, the challenges related to communication with virtual tools allows further communication problems to occur; virtual teams may face technological problems such as audio delays or difficulties in interpreting the text without hearing the associated verbal tone. Closed-loop connectivity can alleviate some of these problems related to virtuality. Provided that team members would assure that relevant information is received and understood by other team members, they will have more opportunities to explain communication and then improve team performance. Face-to-face teams can clear up misunderstandings because receiving information in the form of voice and nonverbal gestures can make it easier to figure out if communication is understandable. However, in highly virtual teams, explanations may be less common. As an example, in those cases where information is exchanged in a written form, it may be more difficult to understand if the information was understood correctly, as there are no nonverbal and verbal communication included. Closed-loop communication can lighten the problem of possible

miscommunication in virtual teams by giving an opportunity to explain and clarify if needed. In addition, ensuring that communication is correct and understood will improve the work of virtual teams (Marlow, et al, 2017). Therefore, Marlow, et al (2017) states that “virtuality moderates the relationship between closed-loop communication and performance such that this relationship is stronger in more virtual teams than in less virtual teams”.

1.2.3. Communication content

Communication content is another feature of communication which among communication frequency and communication quality is essential for a team to accomplish its intended results. It is argued that communication within teams typically takes two forms, depending on the content: task-oriented interaction (i.e., task completion-oriented communication) and relational interaction (i.e., interpersonal communication) (Marlow, et al, 2017). According to Garro-Abarca, et al (2020) the communication during and about projects must be clearly understandable and the information must be handled properly. While task-oriented communication is essential to exchange important details in order to complete a task, it has been argued that more interpersonal communication can encourage emotional states for example cohesion and trust. According to Marlow, et al (2017), even though media richness theory argues that media without hints that can convey information such as warmth (e.g., tone) might prevent relationship development, virtual teams are capable to share relational information using virtual tools that can enhance emotional states such as trust (Marlow, et al, 2017).

1.2.4. Communication tools (Information and communication technology)

It is evident that virtual meetings and the use of information and communication technology tools and collaborative electronic systems have improved processes of communication and human resource management and allow the collection of requirements when virtual teams are involved (Gallego, et al, 2021).

Information and communication technologies are a useful tool for project implementation, monitoring, and control, and offer solutions to many arising challenges when virtual teams are included in the project. Information and communication technology enables these processes by using shared and interconnected tools to enhance virtual communication based on the suitable combination of technologies and tools and it is used to mitigate project risks. However, the recent studies yet emphasize communication, cultural differences, human resources, or leadership (Larson & Dechurch, 2019; Nordbäck & Espinosa, 2019). Therefore, this is an area of research that need to be further explored, and developing a good project plan, that takes into consideration virtual teams as a part of project team, is an important element creating value during project implementation (Gallego, et al, 2021).

An important feature of virtual teams, that sets them apart from classical face-to-face teams is the cooperative usage of technology for work related communication. This is an outcome of the

development of information and communication technology in this digital age, together with the spread of globalization. Virtual team members are often scattered geographically, that is associated with arising cultural differences therefore creating strong social bonding is a challenge in virtual teams. In general, this causes complications in communication and in emotional relationships development between virtual team members (Garro-Abarca, et al, 2021).

The increased establishment of virtual teams is enabled by new technologies that allow team members to cooperate efficiently. Projects and teams now require this novel collaboration technology that includes more than video calls regularly used for remote meetings. The amount of communication tools and platforms has grown significantly recently (Garro-Abarca, et al, 2020).

The electronic task board, mainly created on basis of Toyota Kanban, is one of the good examples of an interesting adoption of technology for virtual and remote teams. Microsoft started to use Kanban for software development in 2004, however use of Kanban in software development is still a new field. Moreover, electronic task board currently is being increasingly used in other areas such as virtual and remote task management. Trello, Jira or Kanbanize are common examples of the electronic task board, based on Kanban method applied for virtual use. The core benefits of using the electronic task board are decreased task execution time, improved outputs quality, improved communication and coordination, better delivery consistency, and reduced customer-reported complaints (Garro-Abarca, et al, 2020).

Social networking software and messaging is another group of collaboration tools (such as instant messaging). These tools are very convenient for informal communication as well as urgent, prompt response requiring messages. Instant messaging tools like Messenger, WhatsApp, Telegram, and others contribute to improve coordination challenges in remote and virtual teams and projects (Garro-Abarca, et al, 2020).

Another group of tools is identified as social networking platforms, telecommunications platforms, or enterprise social software. To illustrate, examples of this group of tools are Microsoft Team, Slack, Yammer, and others. These applications enable better communication leading to collaboration and might be used in all organizational levels of companies, also they work on mobile devices such as phones and tabs and allows timely responses. Subsequently, this group of tools builds trust more efficiently in virtual teams unlike common communication via emails (Garro-Abarca, et al, 2020).

Despite the evident advantages provided by the communication tools, other reasons for continuous development of new communication and collaboration technologies can be found in recent studies. The research performed by Garro-Abarca, et al (2020) found that communication and collaboration inducing technologies have significant positive influence for the team, such as developing

sense of belonging to a team, growing use of informal communication, and therefore decreasing the need for e-mails.

1.3. Trust in virtual teams

Trust in workplace is important, especially in virtual teams (Feitosa & Salas, 2021). Recent study performed in software development field showed that trust-building is an important factor in improving performance virtual team, and additionally the study concluded that the mutual trust between members of the virtual team is significant to success in software development (Garro-Abarca, et al, 2021).

Trust could be defined as “the willingness of a party to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (Breuer, Hüffmeier, Hibben, & Hertel, 2020). Virtual teams are defined as teams that mainly depend on information and communication technologies when reaching shared goals (Breuer, et al, 2020).

According to Bond-Barnard, Fletcher, & Steyn (2018), trust is considered to be a significant factor contributing to project success. Trust in virtual teams is affected by team members communication behavior, response timeliness, communication openness, as well as shared feedback. It is expected that rapid trust will be developed through early communication and a positive communication tone and may affect team functioning as it improves members 'confidence and subsequent trust (Garro-Abarca, et al, 2021).

Trust development and team members ability to identify themselves with the team are two significant sources of concern. Actually, if team members are not familiar with each other, they are unaware if they can trust each other, subsequently first of all team members have to be able to know each other in order to become a highly functioning team. Garro-Abarca, et al (2020) defines trust as “a person's willingness to become vulnerable to the actions of others with the expectation that others will continue with their commitments”. Building trust in virtual teams is typically associated with the knowledge sharing. Furthermore, interpersonal trust and trust in technology have been identified as important factor in knowledge exchange, and on the contrary, if interpersonal and trust in technology is not sufficient, that can become obstacles (Garro-Abarca, et al, 2020).

The importance of trust has been mentioned in the literature on virtual teamwork much more than for face-to-face teams. Nevertheless, it is undecided whether trust importance in virtual teams is affected by the same factors of perceived trustworthiness as trust importance in face-to-face teams (Breuer, et al, 2020; Garro-Abarca, et al, 2020). According to Breuer, et al (2020) as practitioners argue that development of trust requires face-to-face communication, empirical research suggest that even though trust in virtual teams at initial point is lower, the level of trust rises gradually to levels similar to those in co-located teams even without any face-to-face interaction.

The recent study of Garro-Abarca, et al (2021) was performed with software developers who use agile practices and who have good IT skills. The results of the research suggested that the increased virtuality caused the Covid-19 pandemic may be an opportunity to transform communication to impact performance (Garro-Abarca, et al, 2021). The significant role of trust suggests that it should be considered as one of the key and most relevant variables, particularly due to increased virtualization and virtual work during the pandemic. According the author, businesses need to place more emphasis on trust and take into account that any tools that strengthen leadership, communication, cohesion must be developed considering the level of trust that is built. These tools may become more significant than leadership in the approaching years, depending on the results obtained during the pandemic (Garro-Abarca, et al, 2021).

As per study results of Garro-Abarca, et al (2021), in Virtual teams, leadership is based on personality and communication factors and can positively influence team's performance, common satisfaction and motivation in virtual teams. This suggests that leadership is significant factor for virtual teams.

Recent studies identified the main challenges for virtual teams (Garro-Abarca, et al, 2021): high volume projects, deficiency of face-to-face communication, time zone discrepancies, different working schedules, scope, and requirements coordination, contrasting reporting scheme for co-located and virtual teams, lack of feedback. Consequently, for the virtual team leader, the main challenges are: developing trust, implementing supportive team environment, recognizing skills and knowledge of team members, managing project guidelines, setting communication rules, monitoring team performance, identify team members' disengagement, and motivating the team (Baruch & Lin, 2012) (Gallego, et al, 2021).

As the essence of leadership in organizations is described as "influencing and facilitating individual and collective efforts to accomplish shared objectives." (Yukl, 2012), shared leadership allocates this process of influence over various individuals. Shared leadership has been identified to be critical for team effectiveness in virtual teams where members collaborate using information and communication technologies over geographical, time zone, and cultural differences, partially because these differences negatively impact communication. Simultaneously, leadership actions in virtual teams will less noticeable than in co-located teams, and possibly might influence greater occurrence of misunderstandings and uncoordinated actions. Consequently, it is necessary to improve an understanding of how virtual team leaders manage their shared leadership activities, which will help achieve effective teamwork and reach goals (Nordbäck & Espinosa, 2019).

Role of virtual team's leader is significant in a virtual team, particularly because leaders' impact how a team conquers difficulties and how the team adjusts to arise challenges, which is critical to

generating trust for the future. Therefore, a virtual team leader must implement a leadership style that builds trust as a mediating factor in the indirect impact it has on performance (Garro-Abarca, et al, 2021).

The connection between leadership and virtuality has been explored, and team members were found to be more satisfied with their team and leader, and that leader understands messages better when the leader is geographically distant from the team (Garro-Abarca, et al, 2021). In addition, virtual work has reduced the relationship between hierarchical leadership and team performance, together positively influencing the relationship between structural support and team performance (Garro-Abarca, et al, 2020).

Obviously, leadership in virtual teams is important. In principle, leaders can significantly influence the virtual team effectiveness, especially because leaders can make impact team's ability to cope with challenges and lead team during adjustment to changed. Garro-Abarca, et al (2021) suggests that these classic leadership styles are appropriate for a virtual team:

Democratic and **referee** leadership styles have several features that are proper and useful for a virtual team. One of the negative characteristics may be that it takes a lot of meetings to reach a consensus, as when working in a virtual team often it is problematic to set up meetings due to previously described time zone and schedule differences (Garro-Abarca, et al, 2021).

Operational leadership can be a good selection due to such a leadership style designates team members specific roles and tasks. Furthermore, the leader sets out the processes and structures with much clarity, which reduces the need of communication. The downside to this leadership style for virtual teams may be that the team members' input and responsibilities may be slightly behind of what team members seek (Garro-Abarca, et al, 2021).

Coaching leadership suites well virtual teams as this style provides high level of autonomy to team members, which means they becomes responsible for their performance and results, also team members can achieve their own established goals and thus improve personally. Nevertheless, this leadership style also has some challenges. Team management processes, structure, and roles sometimes can be indistinct because the leader enables team members to create themselves. As a result, the effectiveness of a virtual team can be somewhat negatively affected (Garro-Abarca, et al, 2021).

Leadership is important in project teams, as it is related to communication and trust according to Yue, Men, & Ferguson (2019) and different leadership, and leader communication, styles affect trust differently. Furthermore, successful internal communication fosters trust, which influences employee behavior and overall organizational performance. Trust has been empirically demonstrated as a mediator between leadership and employee attitudes, job satisfaction, and team performance (Yue, et al, 2019).

1.4. Project success and satisfaction

According to Bond-Barnard, et al (2018), the elements of project success have been extensively researched (Andersen, Birchall, Jessen and Money, 2006). The high interest in project success is caused by growing efforts and expenses that companies allocate to implement project management (de Carvalho, Patah, & de Souza Bido, 2015). Project management literature often connects project success with “iron triangle” – measures of cost, time and quality (Atkinson R., 1999; Berssaneti & Carvalho, 2015).

Bond-Barnard, et al (2018) suggest that the trust and collaboration of the project team has a diverse and overlapping connection with the success of the project. It is important to note, that success can be understood differently by different individuals. Every stakeholder of the project will have different and unique set of requirements, resulting to that their understanding of what successful result is will be different. The stakeholder’s satisfaction with the project Bond-Barnard, et al (2018) determines as “the difference between his perception of the project’s success vs his expectations thereof”. How the stakeholder perceive success can be influenced by various factors, as an example, team's reply to requests, communication, collaboration, trust in the team (Bond-Barnard, et al, 2018).

Difference between project success, which is measured by total project objectives, and project management success, measured by common and traditional performance measures in terms of cost, time, and quality, should be noted (Bond-Barnard, et al, 2018). Moreover, difference between the success criteria (measures by which the success of a project will be evaluated) and the success factor (contributions to project management system that directly or indirectly caused the success of the project) should be emphasized as well. Therefore, the success of a project relies not only on how the project meets the success criteria, but also on the understanding of stakeholders about the success of the project (Bond-Barnard, et al, 2018).

According to Bond-Barnard, et al (2018) project management success is measured by “object-related” criteria such as the “budget, schedule and quality of the project results” (project performance) and “human-related” “criteria (communication, trust and collaboration)” which sets the team feeling and stakeholder satisfaction in the project. In addition, author suggests that there is complementary design, knowledge integration and innovation that impacts project management success by filling the gap between the “object-related” and “people-related” factors. Other factors also affecting project management success consists of the acceptable level of risk, corresponding capabilities and project requirements, and project planning process (Bond-Barnard, et al, 2018).

As concluded in study of Henderson (2008), the results of the study validate the influence of project managers’ competency in decoding and encoding communication on team member satisfaction. In addition, team members may be more satisfied and tolerant when they are able to have some amount

of face-to-face contact with their project managers. At the same time, however, the geographic dispersion of the project team is negatively linked to team members' views of project productivity and their manager's communication competency.

The results of the Gallego, et al (2021) study identifies two processes in which virtual teams should be but currently are not completely taken into account: scope definition and collection of requirements. It suggests that named planning processes need be appropriately tailored to adapt to virtual teams inside the project team. Consequently, tools or methods are needed to inform the project manager of the possible effect of disregarding virtual teams in scope management and should be involved in the project management plan. Ignoring virtual teams in defining scope later requires additional effort in collecting requirements, and this is additionally influenced by the lack of work packages in WBS. To sum up, improved requirements collection by the inclusion of virtual teams, and the appropriate distribution of efforts across appropriate work packages will improve scope management planning and processes affecting project integration management (Gallego, et al, 2021).

Some practical insights provided by study of Bond-Barnard, et al (2018) for project management are that by establishing collaboration and trust in a project, the probability of successful project management could improve (Bond-Barnard, et al, 2018). In the same study of Bond-Barnard, et al (2018) it was determined that the level of trust in a project is “influenced by:

- the expectations that the project team have in each other;
- the knowledge exchange that takes place between them;
- the degree of trust that is imported from other familiar settings (imported trust).”

The described importance of trust, leadership, and communication highlights the importance of appropriate project and team management activities, noted to be important for successful project implementation when virtual teams are involved (Gallego, et al, 2021).

1.5. Communication, trust, project success and team satisfaction

Communication between team members and leaders are important to project success and team satisfaction. Communication skills of team leaders have a positive impact on team member satisfaction and productivity. According to Henderson (2008), team leaders play a major and substantial effect in team satisfaction and project productivity, both of which are critical determinants in performance and success (Henderson, 2008). According Marlow, et al (2017) communication aspects, such as frequency, tools and content may affect team performance in virtual teams as excess of unnecessary or delayed information may result in decreasing performance of the team members; also, communication quality is important too (Garro-Abarca, et al, 2020; Marlow, et al, 2017). According to Marlow, et al (2017), more

interpersonal communication can encourage emotional states for example cohesion and trust. Therefore, it is important to research how communication is related to project success, team satisfaction, and trust.

According to Yue, et al (2019), employee behavior and performance have both been connected to trust. Employee trust in leader and in organization is associated with good work satisfaction and performance, minimal employee turnover, and high organizational commitment (Yue, et al, 2019). Recent study showed that mutual trust between members of the virtual team is significant to success in IT projects (Garro-Abarca, et al, 2021). These two studies shows that trust between team members and trust in team is important to project success and team satisfaction.

Overall, trust and communication are considered to be important in project and virtual teams team management and for successful project implementation and emphasizes the need for further study in areas focused on virtual teams. It is estimated that in the post-COVID19 period most service and engineering companies will often include virtual teams into their project teams (Gallego, et al, 2021), therefore it will require more attention to proper virtual team management.

2. RESEARCH METHODOLOGY

This part of Master's Thesis describes scheme regarding a layout of the methodological process of this research. Objectives, research model, research questions, definition of variables are described and justified. Furthermore, selected methodological approach is justified, and research methodology explained, as well as sampling method, data collection and analysis methods.

2.1. Research objectives

Objectives of the empirical study:

1. To analyze evaluation of communication aspects, trust, team members' satisfaction with project, and project success;
2. To analyze relations between aspects of communication in virtual IT project teams, trust between team members, and team members' trust in leader;
3. To examine relations between aspects of communication in virtual IT project teams, evaluation of project success, and team members' satisfaction with project;
4. To determine relations between team members' trust in leader, evaluation of project success, and team members' satisfaction with project;
5. To identify relations between trust between team members, evaluation of project success, and team members' satisfaction with project;

The hypothetical research model and used variables are presented in Figure 1.

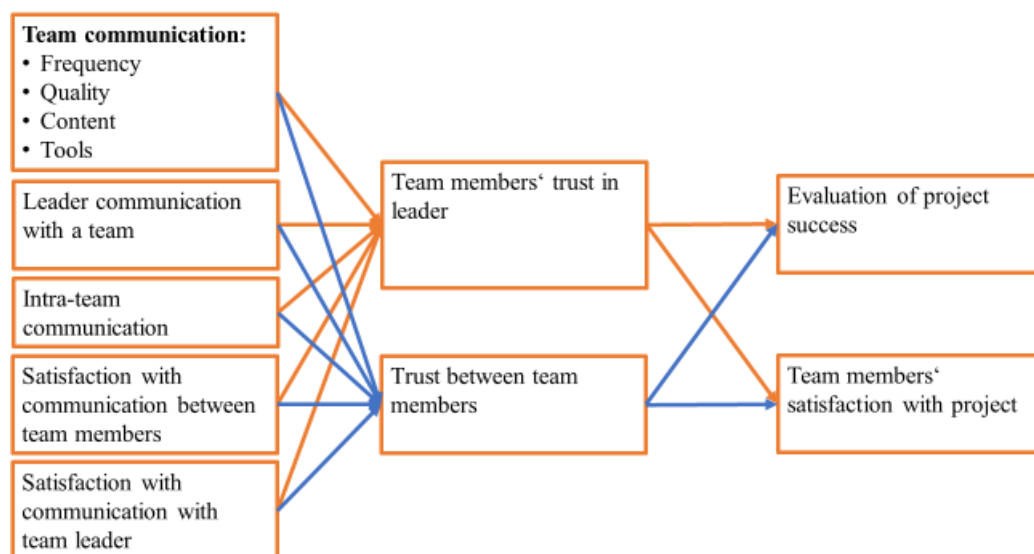


Figure 1. Research chart presenting research model

Source: Composed by the author

As shown in Figure 1, twelve separate variables were investigated. It was examined how aspects of communication (frequency, quality, content, tools), leader communication with a team, communication in team, team members' satisfaction with communication with a team, and team members' satisfaction with communication with a leader are related with trust between team members and team members' trust in leader. Further investigation included analysis of relations between trust between team members and team members' trust in leader with team members' evaluation of project success and their satisfaction with project.

2.2. Research plan and methods

The quantitative research design was chosen to achieve the aim and objectives of the study. To collect empirical data, a questionnaire was prepared, and an online survey has been performed, inviting project members and leaders from virtual IT project teams to participate in the survey. A lifecycle of the research is presented in Figure 2.



Figure 2. Research lifecycle

Source: Composed by the author

Research questionnaire was prepared on a basis of theoretical background review and contains original and adapted scales used by various authors. It is presented in Annex 1.

Seven demographic questions were included in the questionnaire to analyze sample of respondents according to their age, gender, education, position, working experience.

In order to measure communication aspects, scales by Muszyńska (2018) were adapted. Communication aspects were measured by three subscales, from three to seven questions each, and two separate questions. Communication frequency and communication quality subscales consisted of 3 questions each, communication content subscale included 7 questions. To analyze tools used for communication two questions were included: the first was the following: “Do you analyze what kind of messenger (person, tool) is the most appropriate to communicate with a specific stakeholder?” and the second was an open question: „Please write, what communication tools do you usually use while communicating between team members and leader?”. Respondents indicated their agreement with every item on the five-points Likert scale from *1 = never* to *5 = always*. Communication *frequency* subscale

item example: “How often do you check promptly if the recipient received and acknowledged the message you sent/provided?”; *quality* subscale item example: “How often do you formulate your messages in such a way that the receivers do not ask you to repeat/clarify them?”; *content* subscale item example: “Do you inform the recipients of the message about the goal you want to achieve?”. Subscales’ reliability was calculated using Cronbach’s alpha coefficients, for communication frequency - 0,77, communication quality - 0,56, communication content - 0,79.

To analyze intra-team communication scale consisted of 7 questions was prepared on the basis of scales created by Campion, Medsker, & Higgs (1993), & Mueller, et al (2002). Respondents indicated to what extent they agree with every statement on Likert 5 - point scale from 1 = *strongly disagree* to 5 = *strongly agree*. Intra-team communication item example: “Team members provide timely responses”. Scale’s Cronbach’s alpha – 0,81.

Scale to measure leader communication with a team consisted of 12 statements, 10 of them were adapted from Newman, Ford, & Marshall (2020) scale, and two questions were added by the author. Respondents were asked to mark their agreement with every statement on Likert 5 - point scale from 1 = *strongly disagree* to 5 = *strongly agree*. Item example: “I can expect prompt responses from my leader to my work-related questions”. Scale’s Cronbach’s alpha – 0,91.

To measure satisfaction with communication with team leader and satisfaction with communication between team members, two questions were prepared by the author: “Communication between team members during project implementation was satisfactory, adequate and comprehensive“ and „Team leader communication with a team during project implementation was satisfactory, adequate and comprehensive“. Respondents indicated the level of their agreement on Likert 5-point scale from 1 = *strongly disagree* to 5 = *strongly agree*.

Team members’ trust in leader was measured in a questionnaire created by Costa & Anderson (2011) and Roberts, et al (1974) and validated by Pais (2014). Respondents were asked to indicate to what extent they agree with eight statements in Likert 5 - point scale from 1 = *strongly disagree* to 5 = *strongly agree*. Team’s trust in leader question example: “Our team leader always keeps his/her word”. The scale’s Cronbach’s alpha – 0,87.

Trust between team members was evaluated with eight items scale: seven items were taken from the scale created by Costa & Anderson (2011) and validated by Pais (2014), one item (“Team members feel free to discuss with each other problems and difficulties they have in the job without jeopardizing their position or having it "held against" one or another team member later”) was added from Roberts & O’Reilly (1974). Respondents indicated their agreement with every statement on Likert 5 point scale from 1 = *strongly disagree* to 5 = *strongly agree*. Item example: “My team members always keep their word”. The scale’s Cronbach’s alpha – 0,85.

Project success measurement scale consisted of nine statements, which were prepared based on works of Dvir, Raz, & Shenhar, (2003) and Müller & Turner (2007). Respondents evaluated their opinion about results that were achieved after an implementation of the last project they have participated using Likert 3 - point scale from $1 = no$ to $3 = yes$. Project success statement example: “The project was completed in time”. Scale’s Cronbach’s alpha – 0,79.

Team members’ satisfaction with project was evaluated using five items’ scale, which was prepared by the author. Respondents were asked to indicate how satisfied they were with several aspects related with project implementation on Likert 5 - point scale from $1 = very\ unsatisfied$ to $5 = very\ satisfied$. For example – “How were you satisfied with teamwork during project implementation “? Scale’s Cronbach’s alpha – 0,86.

Reliability coefficients of scales used in the study are presented in Table 1.

Table 1. Reliability of scales used in the research

Study variables	Cronbach’s α	No. of items
Communication frequency	0,774	3
Communication quality	0,560	3
Communication content	0,785	7
Intra-team communication	0,809	7
Leader communication with a team	0,911	12
Team members’ trust in leader	0,873	8
Trust between team members	0,846	8
Evaluation of project success	0,792	9
Team members’ satisfaction with project	0,856	5

Source: composed by the author

Reliable Cronbach α is a 0,6 and do not exceed 0,96. As seen in Table 1, Cronbach’s α of Communication quality ($\alpha = 0,56$) is very close to 0,6, and taking into consideration the small sample size, is considered as reliable. Cronbach’s α of all other scales, except Communication quality, is between 0,6 and 0,96. Therefore, all scales used in the research are reliable.

The values of studied indicators according to each scale were calculated as an average of the answers to the statements of the scale.

Statistical package SPSS 26.0. was used to calculate means, correlation coefficients among variables and to perform regression analysis to establish prognostic relationships between variables.

2.3. Data collection

Quantitative research was performed in IT industry companies project teams. Both managers, team leaders and team members working in virtual teams were invited to participate in the survey. Respondents' age and work experience was not limited. Questionnaire was distributed in various size IT companies, providing programing and other data services, additionally it was shared through social networks. Respondents were asked while answering to questions to think about their participation in last finished project and keep in mind their experience when choosing the answer which best described their thoughts. It is common practice that some employees are included in the project only temporary in order to provide required resources or as a supplementary help when specific competencies are needed to implement specific project tasks. This type of employees usually leaves project team before its completion, and frequently do not receive information about project success and implementation outcomes, which is a variable in this research. The survey contains questions about outcomes of projects, therefore it is important that respondents would have participate in the project from beginning to end.

The survey was published 22nd of November 2021 and lasted for two weeks till 6th of December 2021. The survey was published on the internet pollmill.com platform. A link to survey together with research description was send to IT companies and their employees with request to share it with project teams, and their colleagues. Personal invitations to participate in the survey was send to partners, former colleagues, and other familiar persons working in IT companies. Additionally, link to survey was published in social networks, including closed groups, with request to participate in the survey and to share it with persons working in IT companies. The survey was anonymous, the response data was generalized and analyzed in aggregated form.

In total, responses from 98 participants were received and further analyzed.

2.4. Research sample

Survey contained questions about respondents' gender, age, education, work duration in the company, job position, type of employment, project team size.

Demographic characteristics of the sample (in general – 98 respondents): 51 % were male and 47 % female respondents (Table 2); 33 % worked as a team leaders (business development managers, assistants, technologists, production managers, scrum masters), 59 % were team members, 6 % of respondents selected option “Other” (Table 2).

Table 2. The distribution of respondents in groups by gender and position

	N	%
Gender		
Male	51	51
Female	47	47
Total	98	98
Position		
Team leader/manager	33	33
Team member	59	59
Other	6	6
Total	98	98

Source: composed by the author

Average respondents' age was 32,4 years, from 21 to 66 years of age (Figure 3), 10 participants did not disclose their age. Youngest male participated in the survey is 23 years old, oldest female respondent is 43 years old. Average female and male respondents age are distributed very similarly (Figure 4).

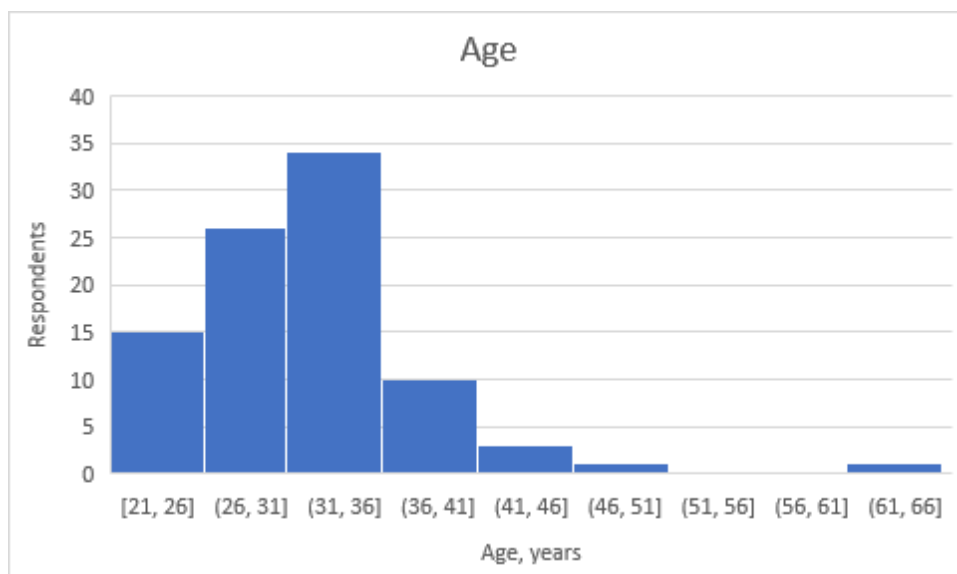


Figure 3. Respondents' age groups

Source: composed by the author

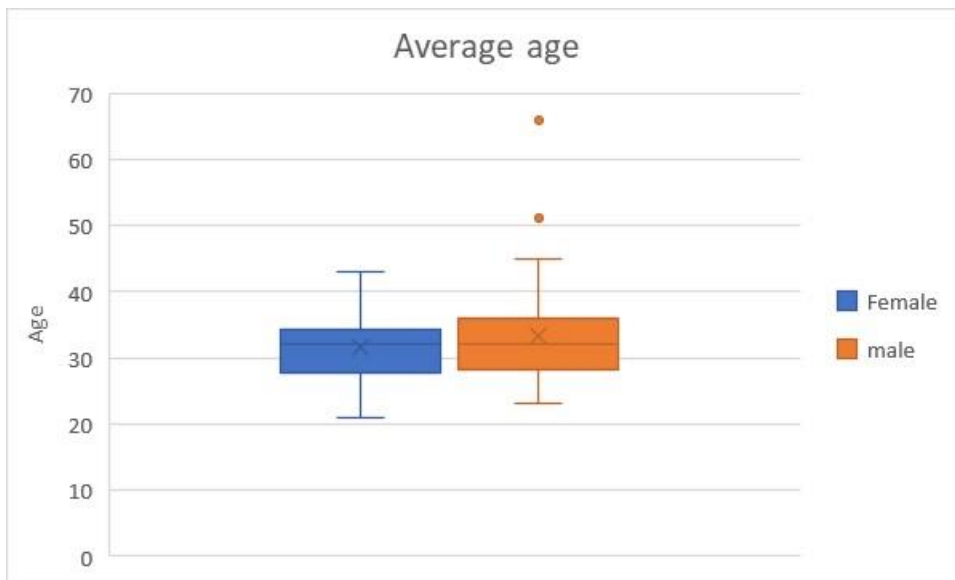


Figure 4. Respondents' age distribution

Source: composed by the author

Respondents' distribution according to work duration in their current company is presented in Figure 5. Respondents' answers to question about work duration in the current company show that majority of respondents work at their company from 2 to 5 years (44 %). 28 % of respondents work in current company from 5 to 10 years, 20 % of survey participants state work duration up to 2 years, and 8 % of all respondents answered that they work at the current company more than 10 years. In total, 80 % of respondents work at their companies more than 2 years.

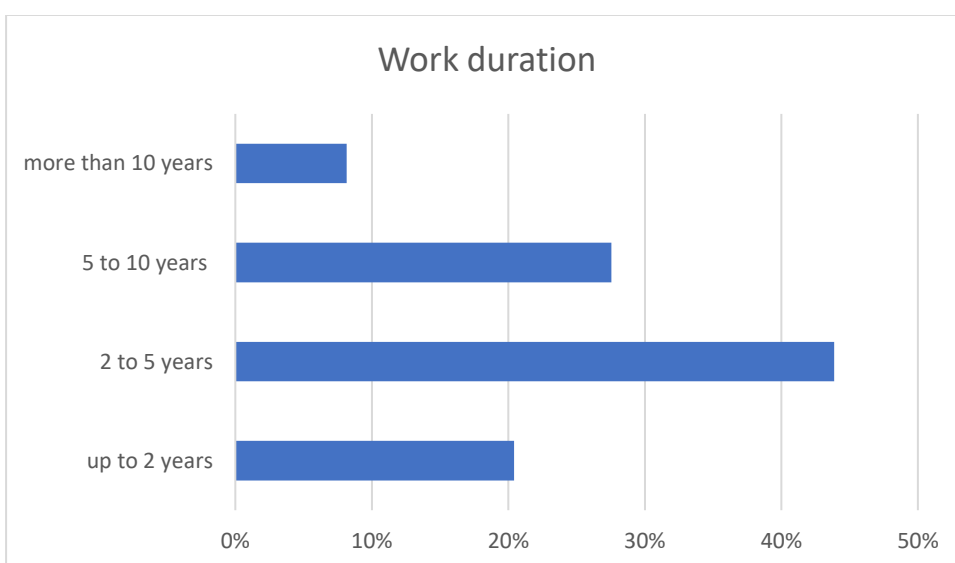


Figure 5. Respondents' distribution according to work duration in their current company

Source: composed by the author

Respondents were asked to answer question about their education. 84 % of respondents selected “Higher university”, 16 % of respondents selected “Higher non-university” answer in the survey (Figure 6).

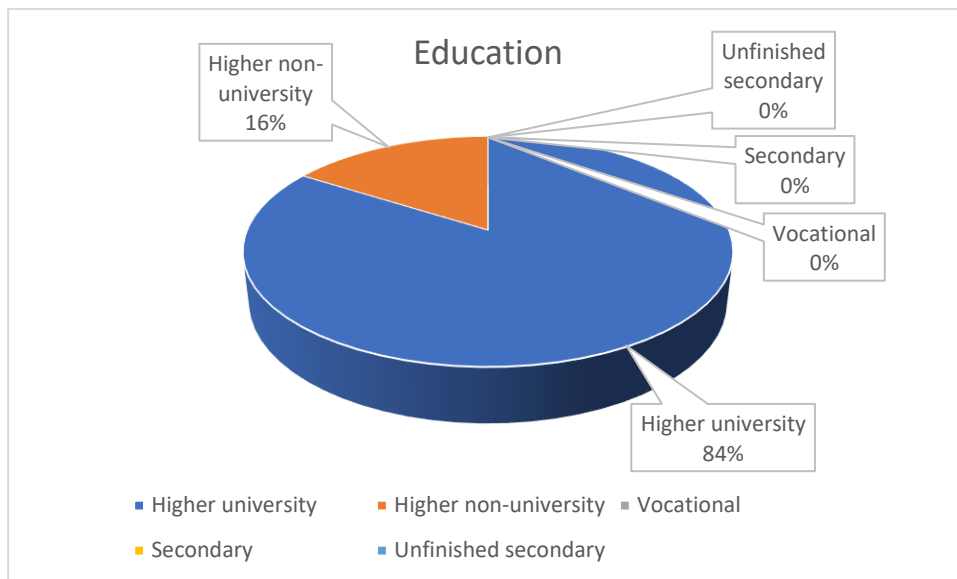


Figure 6. Respondents’ education

Source: composed by the author

While answering to survey questions respondents were asked to think about their participation in last already finished project (Figure 7). 17 % of respondents answered that they were working in small, up to 5 team members, teams. The majority, 45 % of all, answered that they were working in 6 to 10 members project team, 26 % worked in 11 to 20 members team, and 12 % of respondents during last finished project worked in big, more than 20 members having team.

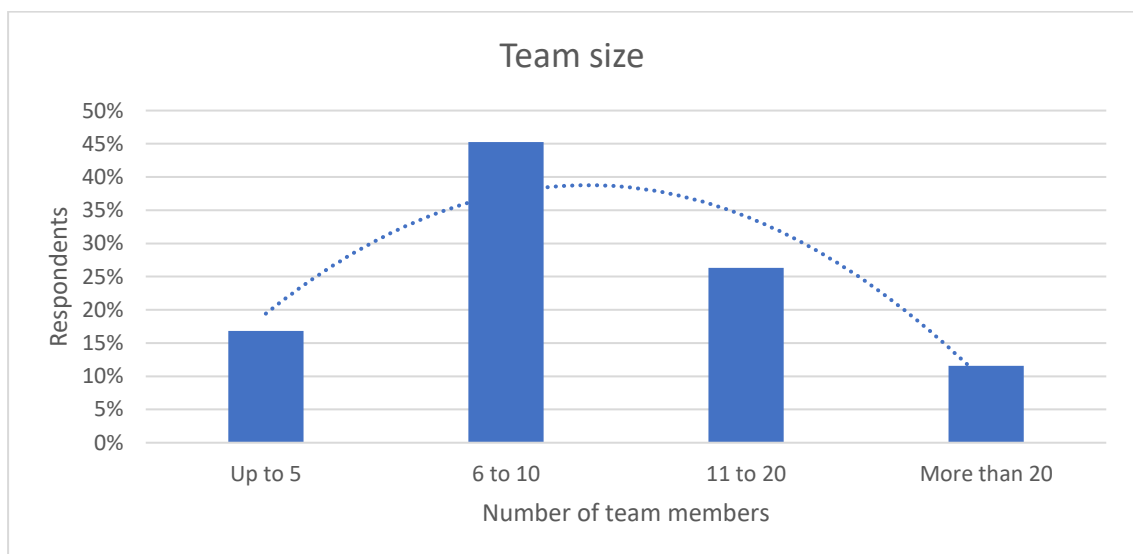


Figure 7. Team size, taking in the consideration respondents’ last finished project

Source: composed by the author

90 % of respondents worked in full time position and 10 % of respondents worked in part time position during project (Figure 8).

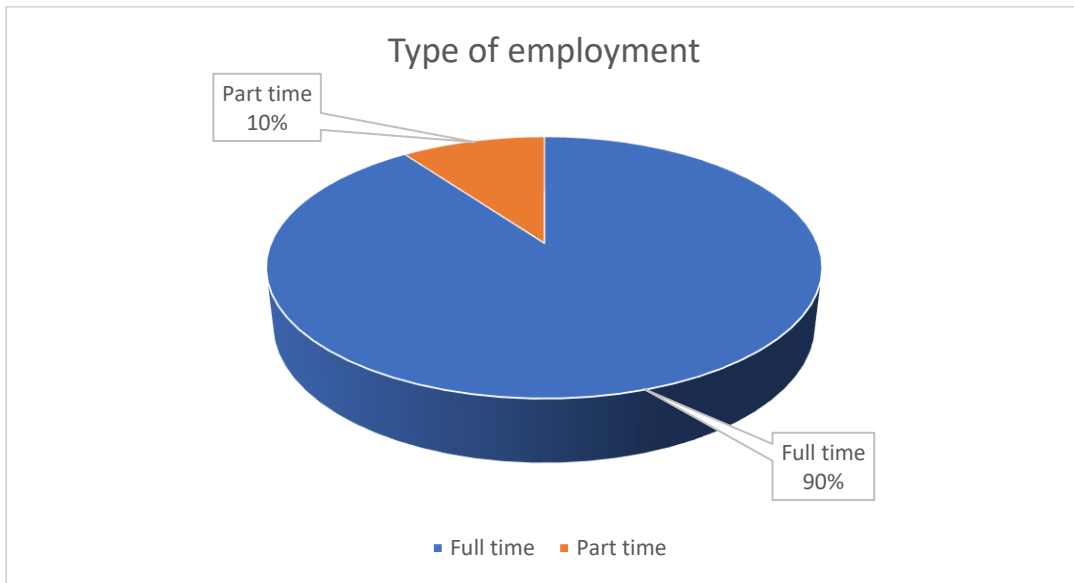


Figure 8. Respondents' type of employment

Source: composed by the author

3. RESEARCH RESULTS

The results are presented as listed:

1. Evaluation of communication aspects, trust, team members' satisfaction with project and success of the project is provided in the section 3.1;
2. Relations between aspects of communication in project team, trust between team members and trust in the leader are presented in section 3.2;
3. Relations between aspects of communication in project team, team members' evaluation of project success and satisfaction with project are provided in section 3.3;
4. Relations between team members' trust in leader, evaluation of the project success and team members' satisfaction with project are presented in section 3.4;
5. Relations between trust between team members, evaluation of the project success and team members' satisfaction with project are provided in section 3.5;

3.1. Evaluation of communication aspects, trust, team members' satisfaction with project and success of project

Descriptive statistics of the studied variables is presented in Table 3.

Table 3. Descriptive statistics

Variables	Mean	Standard Deviation	Minimal value	Maximal value
Communication frequency	4,17	0,731	2,00	5,00
Communication quality	4,04	0,555	2,00	5,00
Communication content	3,99	0,532	2,00	5,00
Communications tools	3,87	0,881	1,00	5,00
Intra-team communication	3,96	0,530	2,86	5,00
Leader communication with a team	4,02	0,545	1,42	5,00
Satisfaction with communication with team leader	4,05	0,694	2,00	5,00

Variables	Mean	Standard Deviation	Minimal value	Maximal value
Satisfaction with communication between team members	3,95	0,723	2,00	5,00
Team members' trust in leader	4,04	0,531	2,25	5,00
Trust between team members	4,04	0,480	2,75	5,00
Evaluation of project success	2,59	0,340	1,67	3,00
Team members' satisfaction with project	3,90	0,615	1,80	5,00
N = 98				

Source: composed by the author

There were no significant differences between communication content $M = 3,99$ points and communication quality $M = 4,04$ points, other communication factors have slightly bigger difference in mean values, communication frequency $M = 4,17$ and communication tools $M = 3,87$. Intra-team communication $M = 3,96$ and leader communication with a team $M = 4,02$ demonstrates no significant difference in their values. Similarly, satisfaction with communication with team leader $M = 4,05$ and satisfaction with communication between team members $M = 3,95$ does not have bigger difference than other variables. The smallest difference was identified in variables related to trust, where mean values for both variables are $M = 4,04$, and difference may be seen only if we add one more decimal: team members' trust in leader $M = 4,038$ and trust between team members $M = 4,036$. High means of all variables mean that the majority of respondents selected high point answers agree/satisfied and strongly agree/very satisfied. Evaluation of project success had a 3 points maximum scale, received point mean is $M = 2,53$. Last calculated variable, team members' satisfaction with project, $M = 3,90$ has a little different lower mean value than most of other variables, although it is similar with communication tools ($M = 3,87$). This concludes that there is no significance for the differences demonstrated in mean values of different variables in descriptive statistics.

Communication tools variable was observed using open question in the survey: „Please write, what communication tools do you usually use while communicating between team members and leader. In total respondents listed 282 answers, as majority of respondents named more than one tool. All tools were categorized according its type (Figure 9). 33 % of used tools is email, mostly Outlook.

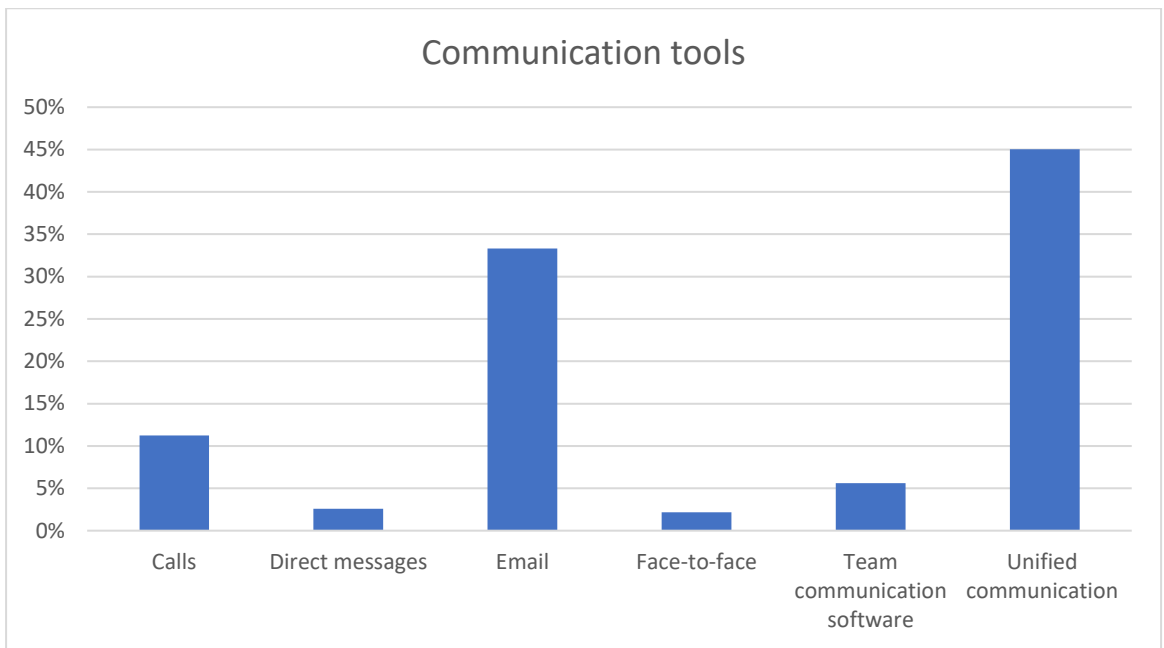


Figure 9. Communication tools

Source: composed by the author

The most frequently used tool according to survey is unified communication as a tool system (45 % of all named tools). The most popular named tool is MS Teams software (48 %) (Figure 10).

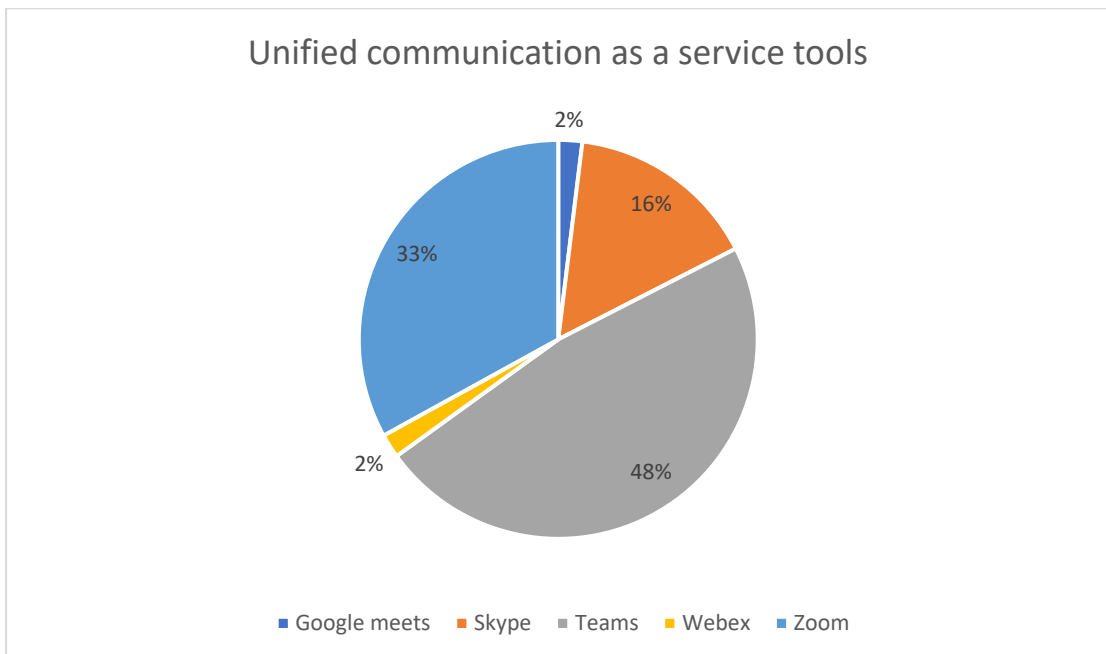


Figure 10. Unified communication as a service tool

Source: composed by the author

Interestingly, teams' communication software was rarely used (6 %). Slack was mentioned 8 times, Jira – 2 times, one time was mentioned Azure DevOps, Confluence, Sococo.

3.2. Relations between aspects of communication in project team, trust between team members and team members' trust in leader

To identify relationships between communication in virtual IT project team and trust between team members and team members' trust in leader, Pearson's correlations between communications aspects and trust between team members, and communications aspects and team members' trust in leader were completed. Regression models were applied to evaluate prognostic variables for trust, team members' satisfaction with project and project success.

Correlations between evaluation of communication variables and evaluation of **team members' trust in leader** are presented in the Table 4.

Table 4. Relations between communication and team members' trust in leader

Variable	Team members' trust in leader
Communication frequency	0,208*
Communication quality	0,305**
Communication content	0,375**
Communications tools	0,116
Intra-team communication	0,460**
Leader communication with a team	0,794**
Satisfaction with communication between team members	0,439**
Satisfaction with communication with team leader	0,522**

** $p \leq 0,01$ Correlation is significant at the 0,01 level (2-tailed)
 * $p \leq 0,05$ Correlation is significant at the 0,05 level (2-tailed)

Source: composed by the author

The Pearson coefficients marked with an asterisk (*) identifies which relations between variables are statistically significant. The strength of the correlation is determined by the magnitude of the value of the Pearson coefficient.

As seen from the Table 4, leader communication with a team has a strong positive linear relation with team members' trust in leader ($r = 0,794$, $p \leq 0,01$), and this variable value size standouts from other variables. Satisfaction with communication with team leader ($r = 0,522$, $p \leq 0,01$) has a little less strong positive correlation in comparison to leader communication with a team. Both variables' values

show that leader communication is important for team members' trust in leader. The majority of remaining variables show weaker positive relations however, correlations are significant: intra-team communication ($r = 0,460$, $p \leq 0,01$), satisfaction with communication between team members ($r = 0,439$, $p \leq 0,01$), communication content ($r = 0,375$, $p \leq 0,01$), communication quality ($r = 0,305$, $p \leq 0,01$), communication frequency ($r = 0,208$, $p \leq 0,05$). As variables show positive correlations, it means, that increasing value of communication variables, increases team members' trust in leader, only the level of relation is different, meaning the strongest relations between team members' trust in leader were received in leader communication with a team, and satisfaction with communication with team leader.

To determine, whether communication frequency, communication quality, communication content, intra-team communication, leader communication with a team, satisfaction with communication with team leader, satisfaction with communication between team members, team members' trust in leader, trust between team members, project success, team members' satisfaction with project variables predict team members' trust in leader, a linear regression was performed. Evaluation of communication tools was not included in regression model, because it was not related with team members' trust in leader (Table 5).

Table 5. Prognostic relationships between communication aspects and team members' trust in leader

Independent variable	Dependent variable		F	P	R ²	N
	Team members' trust in leader					
	Beta β	p	24,919	0,000	0,660	98
Communication frequency	-0,050	0,571				
Communication quality	0,106	0,154				
Communication content	-0,139	0,152				
Intra-team communication	0,038	0,646				
Leader communication with a team	0,737	0,000				
Satisfaction with communication with team leader	0,173	0,075				
Satisfaction with communication between team members	-0,007	0,936				

Source: composed by the author

Analyzing regression data presented in the Table 5, there is a high positive prognostic relationship ($\beta = 0,737$) between leader communication with a team and team members' trust in leader, regression model is statistically significant $F = 24,92$, $p = 0,000$, $R^2 = 0,66$. Regression is discovered to be significant and its relation coefficient is positive and strong: leader communication with a team explains 73,7 percent of team members' trust in leader variance. Other communication variables do not show significant prognostic relationships with team members' trust in leader.

Correlations between evaluation of communication variables and evaluation of **trust between team members** are presented in the Table 6.

Table 6. Relations between communication aspects and trust between team members

Variable	Trust between team members
Communication frequency	0,235*
Communication quality	0,203*
Communication content	0,342**
Communications tools	0,200*
Intra-team communication	0,709**
Leader communication with a team	0,537**
Satisfaction with communication between team members	0,524**
Satisfaction with communication with team leader	0,473**

** $p \leq 0,01$ Correlation is significant at the 0,01 level (2-tailed)

* $p \leq 0,05$ Correlation is significant at the 0,05 level (2-tailed)

Source: composed by the author

Intra-team communication has a strong positive linear relation with trust between team members, and this variable differs by its strength ($r = 0,709$, $p \leq 0,01$) from other variables (Table 6). Satisfaction with communication between team members ($r = 0,524$, $p \leq 0,01$) and leader communication with a team ($r = 0,537$, $p \leq 0,01$) has a slightly lower but still strong positive correlation with trust between team members. All remaining variables have weak positive relationship: satisfaction with communication with team leader ($r = 0,473$, $p \leq 0,01$), communication content ($r = 0,342$, $p \leq 0,01$), communication frequency ($r = 0,235$, $p \leq 0,05$). Communication quality ($r = 0,203$, $p \leq 0,05$) and communication tools showed the lowest values ($r = 0,200$, $p \leq 0,05$) as a weak positive relation however, correlation still is seen. As variables show positive correlations, it means, that increasing the value of communication variables, increases the trust between team members. The strongest relations between trust between team members were received in intra-team communication, leader communication with a team, and satisfaction with communication between team members.

As correlations are significant at 0,01 and 0,05 levels, it is possible to include all communication variables into further calculation of prognostic relationships, and to determine whether communication variables predict trust between team members (Table 7).

Table 7. Prognostic relationships between communication and trust between team members

Independent variable	Dependent variable					
	Trust between team members		F	P	R ²	N
	Beta β	p				
			15,371	0,000	0,580	98
Communication frequency	-0,100	0,349				
Communication quality	-0,010	0,902				
Communication content	-0,001	0,996				
Communication tools	-0,068	0,489				
Intra-team communication	0,583	0,000				
Leader communication with a team	0,136	0,158				
Satisfaction with communication with team leader	0,086	0,428				
Satisfaction with communication between team members	0,176	0,111				

Source: composed by the author

Analyzing the regression data presented in the Table 7, there is a high positive prognostic relationship ($\beta = 0,583$) between intra-team communication and trust between team members, the regression model is statistically significant $F = 15,37$, $p = 0,000$, $R^2 = 0,58$. Regression is discovered to be significant and its relation coefficient is positive and strong: intra-team communication explains 58,3 percent of trust between team members variance. Other variables did not show significant prognostic relationships with trust between team members.

Based on results presented in both regression models, prognostic relations between communication aspects and trust variables are presented in the Figure 11.

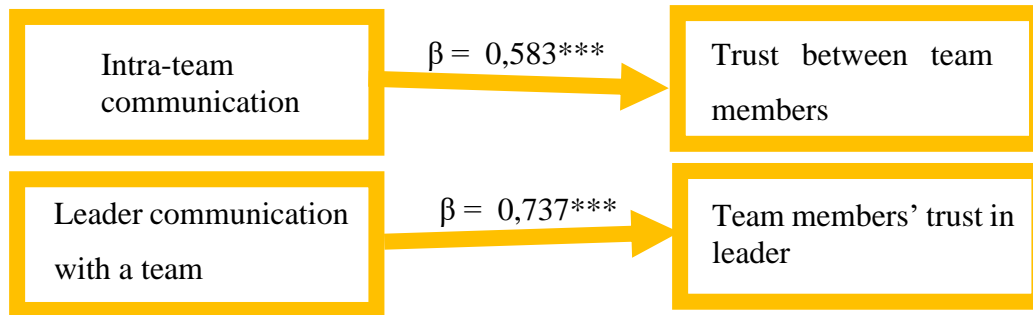


Figure 11. Communication variables predicting trust between team members and trust in leader
 *** $p \leq 0,001$; β – beta standardized coefficients

Source: composed by the author

To summarize, leader communication with a team is the most important variable in enhancing trust in team leader, as well as intra-team communication enhances trust between team members.

3.3. Relations between aspects of communication in project team, evaluation of project success and team members' satisfaction with project

To identify relationships between communication in virtual IT project team with evaluation of project success and team members' satisfaction with project, the Pearson's correlations and regression between communications aspects and evaluation of project success, and communications aspects and team members' satisfaction with project were completed.

Correlations between evaluation of communication variables and **evaluation of project success** are presented in the Table 8.

Table 8. Relations between communication and evaluation of project success

Variable	Evaluation of project success
Communication frequency	0,076
Communication quality	0,021
Communication content	0,293**
Communications tools	0,180
Intra-team communication	0,155
Leader communication with a team	0,304**
Satisfaction with communication between team members	0,141
Satisfaction with communication with team leader	0,293**

** $p \leq 0,01$ Correlation is significant at the 0,01 level (2-tailed)

Source: composed by the author

As seen from the Table 8, leader communication with a team has a positive linear relation ($r = 0,304$, $p \leq 0,01$) with evaluation of project success. Satisfaction with communication with team leader ($r = 0,293$, $p \leq 0,01$) and communication content ($r = 0,293$, $p \leq 0,01$) has a slightly lower positive correlation in comparison to leader communication with a team. As these variables show positive correlations it means, that increasing the value of variable, increases evaluation of project success, and prognostic relationships are calculated to determine whether these variables predict evaluation of project success, and data is presented in the Table 9.

Table 9. Prognostic relationships between communication and evaluation of project success

Independent variable	Dependent variable					
	Evaluation of project		F	P	R ²	N
	Beta β	p				
Communication content	0,468	0,011	4,608	0,005	0,128	98
Leader communication with a team	0,156	0,206				
Satisfaction with communication with team leader	0,136	0,262				

Source: composed by the author

Analyzing regression data presented in the Table 9, there is a high positive prognostic relationship ($\beta = 0,468$) between communication content and evaluation of project success, the regression model is statistically significant $F = 4,608$, $p = 0,005$, $R^2 = 0,128$. Regression is discovered to be significant, and its relation coefficient is positive and strong: communication content explains 46,8 percent of evaluation of project success variance Other communication variables do not show significant prognostic relationship with evaluation of project success.

Correlations between evaluation of communication variables and **team members' satisfaction with project** were calculated. Calculated correlations are presented in the Table 10.

Table 10. Relations between communication and team members' satisfaction with project

Variable	Team members' satisfaction with project
Communication frequency	0,047
Communication quality	0,042
Communication content	0,265**
Communications tools	0,181
Intra-team communication	0,291**
Leader communication with a team	0,396**
Satisfaction with communication between team members	0,403**
Satisfaction with communication with team leader	0,595**

** $p \leq 0,01$ Correlation is significant at the 0,01 level (2-tailed)

Source: composed by the author

As seen from the Table 10, satisfaction with communication with team leader ($r = 0,595$, $p \leq 0,01$) has a strong positive linear relation with team members' satisfaction with project, and this variable value size standouts from other variables. Satisfaction with communication between team members ($r = 0,403$, $p \leq 0,01$) has a slightly less strong positive correlation in comparison to satisfaction with communication with team leader. Both variables' values show that satisfaction with communication is important aspect in team members' satisfaction with project. Leader communication with a team ($r = 0,396$, $p \leq 0,01$) value differs insignificantly from satisfaction with communication between team members and shows positive correlation. Intra-team communication ($r = 0,291$, $p \leq 0,01$) and communication content ($r = 0,265$, $p \leq 0,01$) demonstrates weaker positive relations, however the correlation still is seen. As variables show positive correlations that means, that increasing the value of variable, increases the team members' trust in leader, only the level of relation is different. Subsequently, the most significant relation on team members' trust in leader can be seen in satisfaction with communication with team leader, satisfaction with communication between team members and leader

communication with a team. Prognostic relationships are calculated to determine whether correlating variables predict evaluation of project success, and data is presented in the Table 11.

Table 11. Prognostic relationships between communication and team members' satisfaction with project

Independent variable	Dependent variable		F	P	R ²	N
	Team members' satisfaction with project					
	Beta β	p	10,928	0,000	0,373	98
Communication content	-0,119	0,264				
Intra-team communication	0,049	0,648				
Leader communication with a team	0,135	0,233				
Satisfaction with communication with team leader	0,347	0,002				
Satisfaction with communication between team members	0,616	0,538				

Source: composed by the author

Analyzing regression data presented in the Table 11, there is a high positive prognostic relationship ($\beta = 0,347$) between satisfaction with communication with team leader and team members' satisfaction with project, the regression model is statistically significant $F = 10,93$, $p = 0,000$, $R^2 = 0,37$. Regression is discovered to be significant and its relation coefficient is positive and strong: satisfaction with communication with team leader explains 34,7 percent of team members' satisfaction with project variance. Other variables do not show significant prognostic relationship with team members' satisfaction with project.

Based on results presented in both regression models, prognostic relations between communication aspects and trust variables are presented in Figure 12.

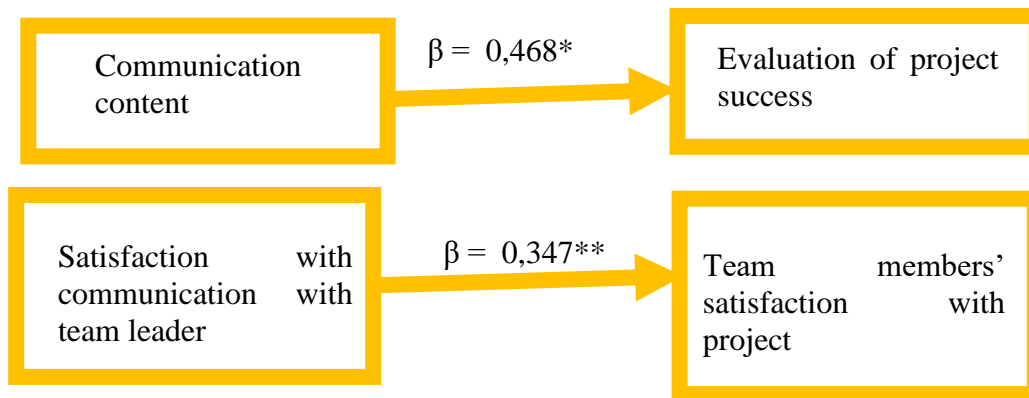


Figure 12. Communication variables predicting evaluation of project success and team members' satisfaction with project

* $p \leq 0,05$; ** $p \leq 0,01$; β – beta standardized coefficients

Source: composed by the author

To summarize, communication content is the most important variables in enhancing evaluation of project success, as well as satisfaction with communication with team leader enhances team members' satisfaction with project.

3.4. Relations between team members' trust in leader, evaluation of project success and team members' satisfaction with project

To identify relationships between team members' trust in leader, evaluation of project success, and team members' satisfaction with project, the Pearson's correlations, and regressions between team members' trust in leader and evaluation of project success, and team members' trust in leader and team members' satisfaction with project were completed.

Correlations between team members' trust in leader and **evaluation of project success** were calculated. Calculated correlations are presented in the Table 12.

Table 12. Relations between team members' trust in leader and evaluation of project success

Variable	Evaluation of project success
Team members' trust in leader	0,242*

* $p \leq 0,05$ Correlation is significant at the 0,05 level (2-tailed)

Source: composed by the author

As seen from the Table 12 linear correlation calculation results show that team members' trust in leader has significant positive correlation with evaluation of project success ($r = 0,242$, $p \leq 0,05$) and regression model can be evaluated and is presented in Table 13.

Table 13. Prognostic relationship between team members' trust in leader and evaluation of project success

Independent variable	Dependent variable					
	Evaluation of project success		<i>F</i>	<i>P</i>	<i>R</i> ²	<i>N</i>
	<i>Beta</i> β	<i>p</i>				
Team members' trust in leader	0,242	0,016	5,974	0,016	0,059	98

Source: composed by the author

Analyzing regression data presented in the Table 13, there is a positive prognostic relationship ($\beta = 0,242$) between team members' trust in leader and evaluation of project success. Regression is discovered to be significant: team members' trust in leader explains 24,2 percent of evaluation of project success variance.

Correlations between team members' trust in leader and **team members' satisfaction with project** were calculated. The calculated correlations are presented in the Table 14.

Table 14. Relations between team trust in leader and team members' satisfaction with project

Variable	Team members' satisfaction with project
Team members' trust in leader	0,427**

** $p \leq 0,01$ Correlation is significant at the 0,01 level (2-tailed)

Source: composed by the author

As seen from the Table 14 linear correlation calculation results show that team members' trust in leader has significant positive correlation with team members' satisfaction with project ($r = 0,427$, $p \leq 0,01$) and regression model can be evaluated and is presented in Table 15.

Table 15. Prognostic relationship between team members' trust in leader and team members' satisfaction with project

Independent variable	Dependent variable					
	Team members' satisfaction with project		F	P	R ²	N
Team members' trust in leader	Beta β	p	21,360	0,000	0,182	98
	0,427	0,000				

Source: composed by the author

Analyzing regression data presented in the Table 15, there is a positive prognostic relationship between team members' trust in leader ($\beta = 0,427$) and team members' satisfaction with project, the regression model is statistically significant $F = 21,36$, $p \leq 0,000$, $R^2 = 0,18$. Regression is discovered to be significant: team members' trust in leader explains 42,7 percent of variance of team members' satisfaction with project.

Based on results presented in both regression models, prognostic relations between team trust in leader and team members' satisfaction with project and evaluation of project success are presented in Figure 13.

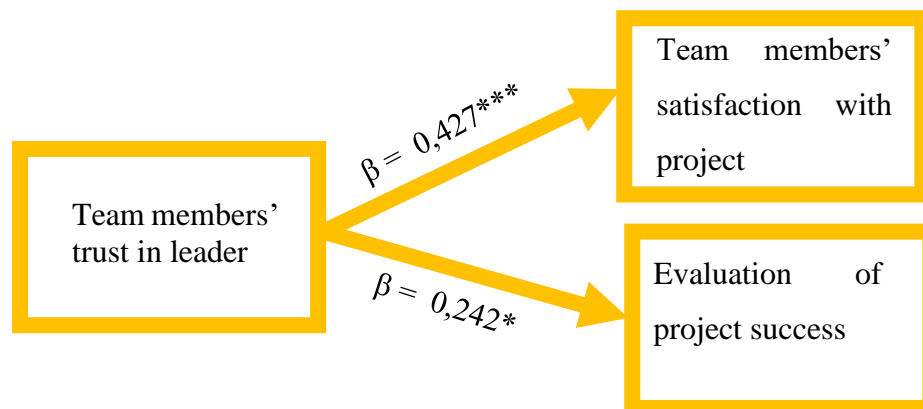


Figure 13. Team members' trust in leader predicting evaluation of project success and team members' satisfaction with project

*** $p \leq 0,001$; * $p \leq 0,05$; β – beta standardized coefficients

Source: composed by the author

To summarize, team members' trust in leader correlates and predicts team members' satisfaction with project and evaluation of project success.

3.5. Relations between trust between team members, evaluation of project success and team members' satisfaction with project

To identify relationships between trust between team members, evaluation of the project success, and the team members' satisfaction with project, the Pearson's correlations, and regression between trust between team members relationship and evaluation of project success, and trust between team members relationship and team members' satisfaction with project were completed.

Correlations between trust between team members and evaluation of project success were calculated. Calculated correlations are presented in the Table 16.

Table 16. Relations between trust between team members and evaluation of project success

Variable	Evaluation of project success
Trust between team members	0,220*

* $p \leq 0,05$ Correlation is significant at the 0,05 level (2-tailed)

Source: composed by the author

As seen from the Table 16 linear correlation calculation results show that trust between team members has significant positive correlation with evaluation of project success ($r = 0,220$, $p \leq 0,05$) and regression model can be evaluated and is presented in Table 17.

Table 17. Prognostic relationship between trust between team members and evaluation of project success

Independent variable	Dependent variable					
	Evaluation of project success		F	P	R ²	N
	Beta β	p				
Trust between team members	0,220	0,030	4,881	0,030	0,048	98

Source: composed by the author

Analyzing regression data presented in Table 17, there is a positive prognostic relationship ($\beta = 0,220$) between trust between team members and evaluation of project success. Regression is discovered to be significant: trust between team members explains 22,0 percent of evaluation of project success variance.

Correlations between trust between team members and **team members' satisfaction with project** were calculated. Calculated correlations are presented in the Table 18.

Table 18. Relations between trust between team members and team members' satisfaction with project

Variable	Team members' satisfaction with project
Trust between team members	0,512**

** $p \leq 0,01$ Correlation is significant at the 0,01 level (2-tailed)

Source: composed by the author

As indicated in the Table 18, linear correlation calculation results show that trust between team members in the team has significant positive correlation with team members' satisfaction with project ($r = 0,512$, $p \leq 0,01$) and regression model can be evaluated and is presented in Table 19.

Table 19. Prognostic relationship between trust between team members and team members' satisfaction with project

	Dependent variable					
	Team members' satisfaction with project		F	P	R²	N
Independent variable	Beta β	p	34,096	0,000	0,262	98
Trust between team members	0,512	0,000				

Source: composed by the author

Analyzing regression data presented in Table 19, there is a positive prognostic relationship between trust between team members ($\beta = 0,512$) and team members' satisfaction with project, the regression model is statistically significant $F = 34,096$, $p = 0,000$, $R^2 = 0,262$. Regression is discovered

to be significant and strong: trust between team members explains 51,2 percent of team members' satisfaction with project variance.

Based on results presented in both regression models, prognostic relations between trust between team members and team members' satisfaction with project and evaluation of project success are presented in Figure 14.

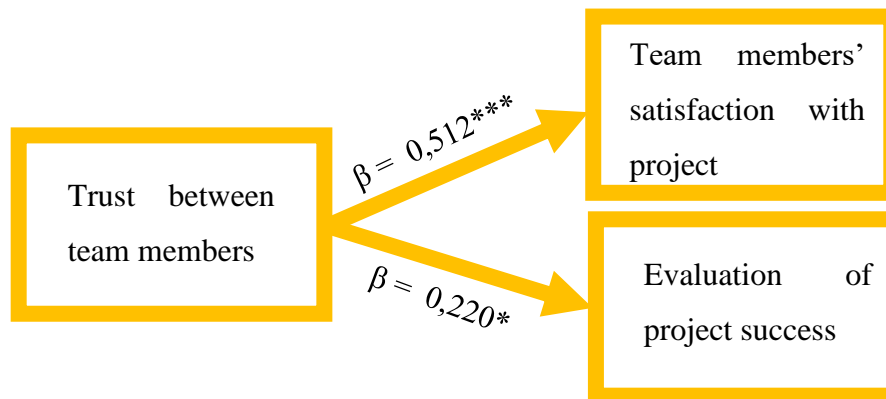


Figure 14. Trust between team members predicting evaluation of project success and team members' satisfaction with project

*** $p \leq 0,001$; * $p \leq 0,05$; β – beta standardized coefficients

Source: composed by the author

To summarize, trust between team members correlates and predicts team members' satisfaction with project and evaluation of project success.

3.6. Summary of research results

Communication variables, intra-team communication and leader communication with a team, relate with trust variables. Intra-team communication predicts trust between team members ($\beta = 0,583$), and leader communication with a team predicts with team members' trust in leader ($\beta = 0,737$). Both trust variables showed prognostic relationship with team members' satisfaction with project and evaluation of project success. Team members' satisfaction with project predicts trust between team members ($\beta = 0,512$) and team members' trust in leader ($\beta = 0,427$). Additionally, team members' satisfaction with project has prognostic relation with satisfaction with communication with team leader ($\beta = 0,347$). Trust between team members ($\beta = 0,220$) and team members' trust in leader ($\beta = 0,242$) predict evaluation of project success. Furthermore, evaluation of project success has prognostic relation

with communication content ($\beta = 0,468$). Summary of relations between study variables is presented in the Figure 15 and consists of study results.

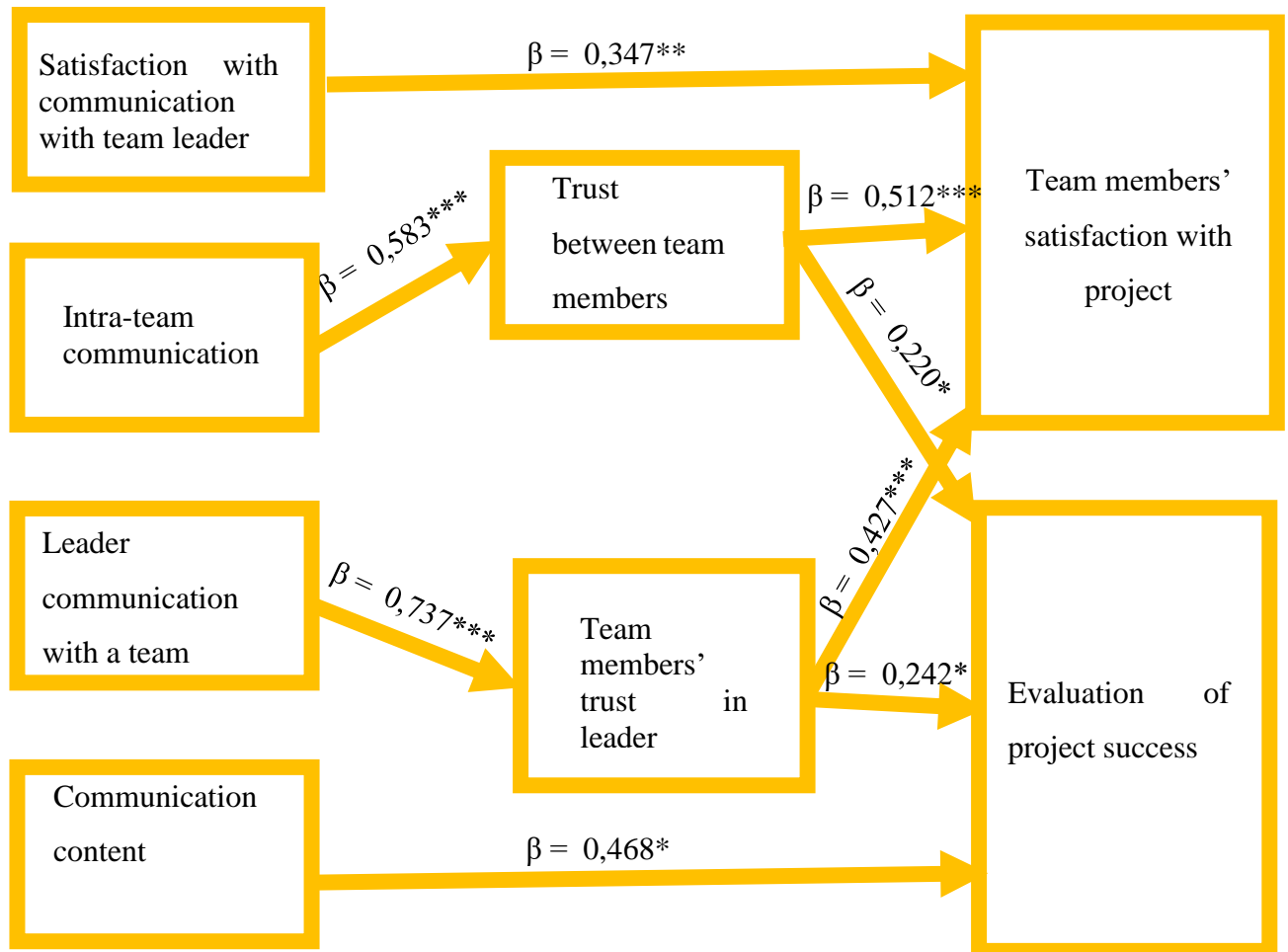


Figure 15. Summary of the prognostic relations between study variables

*** $p \leq 0,001$; ** $p \leq 0,01$; * $p \leq 0,05$; β – beta standardized regression coefficients

Source: composed by the author

3.7. Research limitations

Several limitations were encountered in conducting the study and analyzing the information collected. They are as follows:

- In further studies it would be useful to examine the importance of team communication and trust in project implementation in larger samples of targeted research in specific organizations.

- The survey was conducted in IT sector, but virtual teams are involved in not only with IT related projects: marketing, consulting, business development, human resources, etc. Therefore, the in further studies, it would be useful to include other sectors or projects not limited to IT.
- Additional communication aspects could be further researched to find out their relationships with trust, evaluation of project success, and team members' satisfaction with project.

CONCLUSIONS AND RECOMMENDATIONS

The quantitative research has been performed to analyze relations of communication and trust in virtual IT project teams with project success and team members' satisfaction with project. Relationships between communication variables, trust between team members, team members' trust in leader, evaluation of project success and team members' satisfaction with project were identified by calculations of the Pearson's correlations and regression.

The Pearson's correlations showed that all communication related variables, except communication tools, has significant positive correlation with team members' trust in leader. The strongest relation with team members' trust in leader was identified in leader communication with a team and satisfaction with communication with team leader. Correlating variables were included in regression calculation.

The strongest relation with trust between team members was identified in intra-team communication, satisfaction with communication between team members, and leader communication with a team. The Pearson's correlations showed that all communication related variables correlate positively with trust between team members and have significant relation. Therefore, all variables were included in regression calculation.

The Pearson's correlations showed that the strongest relation with evaluation of project success was identified in leader communication with a team, and communication content. Significantly correlating variables were included in regression calculation.

The strongest relation with team members' satisfaction with project was identified in satisfaction with communication with team leader, and satisfaction with communication between team. Both variables' values show that satisfaction with communication is important aspect in team members' satisfaction with project. The Pearson's correlations showed significantly correlating variables were included in regression calculation.

The Pearson's correlation showed that team members' trust in leader correlates positively with evaluation of project success, and with team members' satisfaction with project. For both variables the regression was calculated. Also, team members' trust in leader correlates positively with evaluation of project success, and with team members' satisfaction with project. Both variables were included in regression calculation.

The following conclusions are drawn from the results of the regression analysis. This analysis helps to reveal specific aspects of communication that predict the dependent variables being analyzed –

trust between team members, team members' trust in leader, team members' satisfaction with project, and evaluation of project success.

Calculating regression for **communication variables** revealed that leader communication with a team has significant prognostic relationship with **team members' trust in leader** and intra-team communication has significant prognostic relationship with **trust between team members**. Furthermore, communication variable communication content has significant prognostic relationship with **evaluation of project success**. Also, regression calculation showed that satisfaction with communication with team leader has significant prognostic relationship with **team members' satisfaction with project**.

Regression was calculated for both **trust variables** (team members' trust in leader and trust between team members) and showed that team members' trust in leader has significant prognostic relationship with **team members' satisfaction with project and evaluation of project success**, and trust between team members has significant prognostic relationship **with team members' satisfaction with project and evaluation of project success**.

Summarizing relationships between communication variables, team members' trust in leader, trust between team members, evaluation of project success and team members' satisfaction with project, both trust variables, trust between team members and team members' trust in leader, as well as satisfaction with communication with team leader predict team members' satisfaction with project. Trust between team members, team members' trust in leader, and communication content predicts evaluation of project success. Results of this study correspond with in scientific literature observed importance of communication and trust to project success described in works of Henderson (2008), Garro-Abarca, et al (2020), Garro-Abarca, et al (2021). As detailed above, communication related variables, satisfaction with communication with team leader and communication content, predict with evaluation of project success and team members' satisfaction with project, also, communication variables, intra-team communication and leader communication with a team, predict with both trust variables. Results correspond well with previous studies of Marlow, et al (2017) results analyzed in theoretical background part of this thesis.

Based on results of this work, IT companies should encourage intra-team communication to enhance trust between team members, which is significant to achieve higher team members' satisfaction with project.

Result of this work showed that importance of communication content should be emphasized in virtual IT project teams communication to achieve successful project results evaluation. Team members' trust in leader formation should also be taken in consideration in order to enhance evaluation of project success.

Importance for team leaders to establish better communication with their teams should be also emphasized in virtual IT teams companies, as satisfaction with communication with team leader is important for team members' satisfaction with project. Additionally, leader communication with a team enhances team members' trust in leader, which is important factor for evaluation of project success.

The further research more detailed scale could be used in order to more extensively analyze which communication and trust related variables correlates with project success and team members' satisfaction with project. Furthermore, the sample size could be larger for further research of the study.

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ANNEXES

Annex 1. Quantitative research questionnaire used during survey

Dear Participant,

My name is Ieva Galvonaitė. I'm a student of International Project Management program at Vilnius University Business School and I'm inviting you to participate in my research. The goal is to determine the role of communication and trust in virtual project teams for project implementation. Please think about your **participation in the last finished project** and keep in mind your experience when choosing the answer which is best for you. Answering questions should take about 10 – 15 minutes.

The survey is anonymous, the response data will be generalized and analyzed only in aggregate form. Please answer all questions with the choices that suit you.

Sincerely thank you in advance for your kindness and your time.

Q1 How many years have you worked in this company? Please write the number of years:

Q2 What is the type of your employment in this organization:

- Full time
- Part time
- Other (please write): _____

Q3 What was your position in this project?

- Team leader
- Team-member
- Other (please write): _____

Q4 Your gender:

- Female
- Male

Q5 Your age: please write the number of years: _____

Q6 Your education:

- Higher university
- Higher non-university
- Vocational
- Secondary
- Unfinished secondary

Q7 What size was the project team? Please write the number of team members: _____

A. Please answer to the following questions about communication in a project team and mark up your agreement with the statements presented below (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always):

Frequency	
1. How often do you make sure to send/provide only up-to-date information?	1 2 3 4 5
2. How often do you check promptly if the recipient received and acknowledged the message you sent/provided?	1 2 3 4 5
...	1 2 3 4 5
Quality	
4. How often do you double-check messages sent/information provided regarding its logic and linguistic correctness? (to avoid mistakes, ambiguity, etc.)	1 2 3 4 5
5. How often do you formulate your messages in such a way that the receivers do not ask you to repeat/clarify them?	1 2 3 4 5
...	1 2 3 4 5
Content	
7. Is a communication plan developed for the projects you realize? (to avoid inconsistency, chaos, omissions, etc.)	1 2 3 4 5
8. Is a meeting agenda prepared for each meeting?	1 2 3 4 5
...	1 2 3 4 5
Tools	
14. Do you analyse what kind of messenger (person, tool) is the most appropriate to communicate with a specific stakeholder?	1 2 3 4 5
15. Please write, what communication tools do you usually use while communicating between team members and leader?	

B. Please indicate to what extent do you agree/disagree with the following statements (1 = strongly disagree, 2 = disagree, 3 = neither disagree, nor agree, 4 = agree, 5 = strongly agree):

1. Team members give substantive feedback to each other	1 2 3 4 5
2. Team members engage in frequent communication / Team members have established predictable communication patterns	1 2 3 4 5
...	1 2 3 4 5

C. Please think about the communication you typically received from your team leader. Please indicate the extent to which you agree with the following statements (1 = strongly disagree, 2 = disagree, 3 = neither disagree, nor agree, 4 = agree, 5 = strongly agree):

1. My team leader effectively uses the appropriate communication technology to provide work-related information to our team.	1 2 3 4 5
2. My team leader mostly speaks to us using “live” communication techniques (e.g., phone calls or meetings) when communicating with our team.	1 2 3 4 5
...	1 2 3 4 5

D. Please indicate to what extent do you agree/disagree with the following statements (1 = strongly disagree, 2 = disagree, 3 = neither disagree, nor agree, 4 = agree, 5 = strongly agree):

1. Communication between team members during project implementation was satisfactory, adequate and comprehensive	1 2 3 4 5
...	1 2 3 4 5

E. Please indicate to what extent do you agree/disagree with the following statements (1 = strongly disagree, 2 = disagree, 3 = neither disagree, nor agree, 4 = agree, 5 = strongly agree):

1. Our team leader does not hesitate to help a team member in need.	1 2 3 4 5
2. Team leader speaks out for what he believes in.	1 2 3 4 5
...	1 2 3 4 5

F. Please indicate to what extent do you agree/disagree with the following statements (1 = strongly disagree, 2 = disagree, 3 = neither disagree, nor agree, 4 = agree, 5 = strongly agree):

1. Most team members do not hesitate to help a person in need.	1 2 3 4 5
2. In this team most people speak out for what they believe in.	1 2 3 4 5
...	1 2 3 4 5

G. What is your opinion about the results that were achieved after the implementation of the project? Please, answer the statements below and enter your answer (yes = 3, partially = 2, No = 1):

1. All planned project objectives were achieved	3	2	1
2. The project was completed within the budget	3	2	1
...	3	2	1

H. In general how were you satisfied with the following aspects of your work in this project? Please mark up your answer (very unsatisfied = 1, unsatisfied = 2, neither satisfied, nor unsatisfied = 3, satisfied = 4, very satisfied = 5):

1. Satisfaction with your participation in this project	1	2	3	4	5
2. Satisfaction with project management and leadership	1	2	3	4	5
...	1	2	3	4	5

Thank you for the answers!