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Faculty of Economics and Management System



Master's thesis

**Analyzing role of Project Management in Virtual Team
Management in IT department**

Karnav Chauhan

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Ing. Karnav Anilbhai Chauhan, BSc

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Thesis title

Analyzing role of Project Management in Virtual Team Management in IT department

Objectives of thesis

The aim of the thesis is to examine the role of project management in virtual team management in multinational corporations, especially in the IT field.

The broad objectives of the thesis rely on the two aspects comprised of evaluating the challenges face by the organization to manage diverse teams virtually and success factors that are responsible for effective communication.

Specific objectives of the thesis are as follows:

- To evaluate the role of communication management in virtual team
- To identify the hurdles faced by the IT sector for collaborating with the huge team
- To explore the role of the HR management during the project execution

Methodology

The thesis implements the qualitative research design with the primary data collection method. The data is majorly collected based on the closed-ended questionnaires and survey. This approach facilitates the opinions-based analysis of the role and management of cultural issues in the IT industry. Moreover, the data is being analyzed and demonstrated in the graphical format for deriving the findings. Then, the conclusion and recommendations are outlined in the last chapter of the thesis, fulfilling the research objectives.

The proposed extent of the thesis

80

Keywords

Virtual team, Project management, Collaborative team, Communication management, Traditional team

Recommended information sources

- KAUR, KOMALPREET; KAUR, ARSHDEEP. A survey of working on virtual private networks. 2019.
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The Diploma Thesis Supervisor

Ing. Petra Pavlíčková, Ph.D.

Supervising department

Department of Systems Engineering

Electronic approval: 10. 3. 2022

doc. Ing. Tomáš Šubrt, Ph.D.

Head of department

Electronic approval: 10. 3. 2022

doc. Ing. Tomáš Šubrt, Ph.D.

Dean

Prague on 31. 03. 2022

Declaration

I declare that I have worked on my master's thesis titled "Analyzing role of Project Management in Virtual Team Management in IT department" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 31.03.2022

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Abstract

As a result of globalization and technical improvements in communication and information technology, virtual teams in business have become increasingly common over time. Companies are under pressure to achieve more rapidly, effectively, and efficiently to thrive in a competitive environment. To reach the aim, they must bring together a wide range of skills and services, which can only be achieved via cooperation between vendors and distributors, telecommunications companies, and research institutes. This ensures that the firm's goal is realized with excellent quality. Switching from serial to simultaneous and parallel processes inside an organization has become more common in recent years. Collaboration has been established to be a meta-capability for firms in the literature. This research defines a virtual team and its qualities, explores virtual settings and their relationship with numerous obstacles that organizations must deal with, such as management and organizational concerns, and finishes with reading recommendations.

Finally, management should concentrate on virtual teams to generate knowledge and innovation performance to encourage incremental improvements in present technologies to acquire a competitive advantage in the future. Companies must educate all employees, not just virtual workers, on the virtual team culture. A modular and customizable complete system is one of the primary advantages of agile virtual teams. Virtual R&D teams with remote members face tight schedules and the requirement to start and conclude projects quickly. Virtual teams, on the other hand, reduce time to market. One of the most critical success criteria is believed to be time to market.

Keywords: Virtual team, Project management, Collaborative team, Communication management, Traditional team

Abstraktní

V důsledku globalizace a technických vylepšení v oblasti komunikace a informačních technologií se virtuální týmy v podnikání postupem času stávají stále běžnějšími. Společnosti jsou pod tlakem, aby dosáhly rychleji, efektivněji a efektivněji, aby prosperovaly v konkurenčním prostředí. K dosažení cíle musí spojit širokou škálu dovedností a služeb, kterých lze dosáhnout pouze spoluprací mezi prodejci a distributory, telekomunikačními společnostmi a výzkumnými ústavy. To zajišťuje, že cíl firmy je realizován ve vynikající kvalitě. Přejít ze sériových na simultánní a paralelní procesy uvnitř organizace se v posledních letech stal běžnějším. V literatuře se ukázalo, že spolupráce je pro firmy meta-schopností. Tento výzkum definuje virtuální tým a jeho kvality, zkoumá virtuální prostředí a jejich vztah s četnými překážkami, s nimiž se organizace musí vypořádat, jako jsou záležitosti managementu a organizace, a končí doporučeními pro čtení.

A konečně, management by se měl soustředit na virtuální týmy, aby generoval znalostní a inovační výkonnost, aby podpořil postupné zlepšování současných technologií, aby získal v budoucnu konkurenční výhodu. Společnosti musí vzdělávat všechny zaměstnance, nejen virtuální pracovníky, o kultuře virtuálních týmů. Modulární a přizpůsobitelný kompletní systém je jednou z hlavních výhod agilních virtuálních týmů. Virtuální výzkumné a vývojové týmy se vzdálenými členy čelí napjatým harmonogramům a požadavku na rychlé zahájení a ukončení projektů. Virtuální týmy na druhou stranu zkracují dobu uvedení na trh. Za jedno z nejdůležitějších kritérií úspěchu se považuje čas uvedení na trh.

Klíčová slova: Virtuální tým, Projektový management, Kolaborativní tým, Řízení komunikace, Tradiční tým

Table of Contents

List of Figures	12
List of Tables	12
1 Introduction.....	13
1.1 Statement of the problem	13
1.2 Significance.....	14
2 Objectives and methodology.....	15
2.1 Objectives	15
2.2 Methodology	15
3 Literature review	17
3.1 A Virtual Team	17
3.1.1 Evolution of Virtual Teams	17
3.1.2 Virtual Team Meaning:.....	18
3.2 Virtual Team Research Trends 2004–2012	19
3.2.1 Forms of Virtual Team:	21
3.3 Virtual team management.....	24
3.4 Challenges and Performance Measures in Virtual Teams	25
3.4.1 Derived Problems.....	25
3.5 Achievement factors	26
3.5.1 Leadership of Communicating.....	27
3.5.2 Holding Teams Involved.....	28
3.6 Standards and techniques for meeting have been enhanced	29
3.6.1 Create a Strong Relationship	29
3.6.2 Human Resource Administration.....	29
3.6.3 Staffing a Workforce.....	30

3.6.4 Supporting Policies and Career Progression.....	30
3.6.5 Administration of Procurement.....	31
3.6.6. Resources in the Technological Field.....	31
3.6.7 Resources for the Workplace.....	31
3.6.8 Administration of the Scope	32
3.6.9 Limited Scope and Easily Outlined Goal.....	32
3.7 Virtual Collaboration: A Technology Perspective.....	32
3.7.1 Selection.....	32
3.7.2 Location	34
3.7.3 Training.....	34
3.7.4 Security	34
3.8 Virtual Collaboration: Human Perspective.....	35
3.8.1 Building a team.....	35
3.8.2 Remuneration:.....	35
3.8.3 Pre-Meeting:	35
3.8.4 Define Goal:.....	36
3.9 Operating as a Virtual Team: Operational Perspective:	36
3.9.1 Configuration:	36
3.9.2 Schedule of the Meeting:	36
3.9.3 Performance Evaluation:.....	37
3.9.4 Mentoring of the team:.....	37
3.9.1 How to utilise virtual team project management techniques	37
3.9.2 The function of process improvement in a virtual team	39
3.9.3 Purposed future strategy for project management	40
3.9.4 Virtual team formation and administration.....	42

3.10 Project management in the IT industry	45
3.10.1. 1 Administration of Projects	46
3.10.1.2 Diversity.....	46
3.10.1 Role of project management in IT sector.....	47
3.10.2 IT virtual team management interaction evaluation	49
3.10.2.1 Interaction between organization.....	50
3.10.2.2 Connections with technology.....	50
3.10.2.3 Communicating platforms	50
3.11 Framework for managing projects with a virtual team.....	51
3.11.1 Characteristics of a productive virtual team	53
3.12 Virtual team interaction	54
3.13 Implementation of successful virtual team management in IT sector	56
3.13.1 Plan includes certain criteria.....	58
3.14 Responsibilities at the corporate level in IT sector.....	58
3.14.1 Introduction of new technologies in IT industry.....	59
4.Practical Part	61
4.1 Introduction.....	61
4.2 Research questions.....	61
4.3 Interview questionnaires	61
5 Result and discussion.....	84
5.1 Result	84
5.2 Discussion.....	85
5.2.1 Managing distributed projects issues	85
5.2.2 Outsourcing challenges.....	85
5.2.3 Information sharing in virtual teams.....	88

6 Conclusion	89
Reference list	91
Appendix.....	95
Closed ended questionnaires.....	95
Responses.....	99

List of Figures

Figure 4: Strategy for Virtual team management	31
Figure 5: IT virtual teamwork assessment	49
Figure 6: Communicating platforms in Virtual team management	51
Figure 7: individuality of a productive virtual team	54
Figure 8: Major elements in virtual team management	55

List of Tables

Table 1: Factors of virtual team	19
Table 2: Forms of virtual team.....	22
Table 3: Requirements of Collaborative Networked Organizations.....	23
Table 4: Tools and description for virtual team management	33
Table 5: Effective model for virtual team management	34
Table 6: Use of techniques in virtual team management.....	37
Table 7: Purposed future strategy for project management	40
Table 8: Implementation of virtual team management in IT sector.....	56

1 Introduction

In the current rapidly changing business environment, a company's ability to collect and disseminate information is essential to building and retaining a competitive edge in today's fast-changing business environment. This has not only enabled additional linkages and conversations to be built throughout the world, but people have also used this advancement for other reasons. Because even though people opt to cooperate with others from all over the globe, regardless of geographical restrictions. Virtual teams have evolved as an essential component of many large and small enterprises worldwide. A significant number of people cooperate in remote teams to achieve specific objectives.

Virtual teams have enhanced communication, but they have also created a variety of new business opportunities for people all over the world. Working with virtual teams broadens your company's exposure in terms of both knowledge and culture. This increasing complexity has resulted in a rise in virtual teams (VTs) usage across all project sizes and sectors. Consequently, this inquiry focuses on the features of knowledge areas after working with VTs in project-oriented organizations throughout the project planning phase to enhance the project management plan.

1.1 Statement of the problem

In recent years, the increased use of collaborative technologies for remote project management has generated new opportunities for offshore outsourcing and joint development projects (Aanbari and Kwak, 2018). The bulk of project management techniques and practices, on the other hand, is aimed at establishing long-term ties on the ground and developing procurement strategies at a time when inter-organizational contacts are growing more dynamic and geographically distributed. Organizational growth leads to the sale of goods or services in other markets and the consumption of commodities and services offered in other markets. Businesses can no longer depend on functioning at the local level to fulfill their aims and objectives if they want to reach their full potential. Companies might attain the required expansion by broadening the scope of their activities.

Virtual teams have gained a lot of attention over the decades, but there is still a paucity of knowledge available on managing them efficiently (Aanbari and Kwak, 2018). This shows an

opportunity to examine the factors that lead to virtual team success. Ineffective project management may lead to the failure of a project. As a result, to ensure the success of their virtual projects, a company should spend on improving the complexity of their project management practices. This research aims to assess the link between virtual team performance and the usage of telecommunications and information technologies, as well as risk management maturity levels (Aanbari and Kwak, 2018). The primary factors of virtual team performance addressed in this research include, among other things, leadership, communication, and trust. A strong leader must communicate effectively to organize a virtual workforce properly. Trust must be created for the virtual team to communicate honestly with one another.

Face-to-face engagement is minimal to non-existent in virtual teams, which has a detrimental impact on the virtual team's effectiveness and the virtual team members' confidence and leadership (Aanbari and Kwak, 2018). In addition, it affects both the amount of trust and accountability within virtual team members. Virtual teams rely on information and communication (ICT) tools for communication, and new ICT tools are produced regularly. The goal of this research is to see whether keeping up with further information and communication technology (ICT) technologies may help virtual team members communicate better, which will enhance their productivity.

1.2 Significance

Project management maturity is a procedure that an organization goes through to improve how it manages projects (Aanbari and Kwak, 2018). The more the organization progresses in the process, the more proficient they become in project execution. However, process management in a virtual environment is challenging. This research aims to determine if product development competence may lead to better continuous improvement in a virtual environment, hence enhancing the productivity of a virtual team.

The goal of this study is to offer information to organizations on the impact of virtual tools and program management expertise on the effectiveness of their team members (Ahmed, 2018). Improved virtual team performance may lead to more excellent organizational knowledge and capacities and enhanced innovation and commercial development on a bigger scale. Businesses that use information and communications technology (ICT) skills and program management capabilities may help maximize the virtual performance of the team.

2 Objectives and methodology

2.1 Objectives

A virtual team is a group of physically separated individuals who work together to accomplish a single objective for a shared company, regardless of their location. So, the concept of global project management has formed due to this evolution. In this context, the purpose of the thesis is to investigate the role of the managing the project particularly in the Information technological sector with the diverse workforce. So, the research employs background study and accessing the existing research. Furthermore, thesis adopt the Qualitative research method with primary data collection approach.

The aim of the thesis is to examine the role of the project management in the virtual team management in the multinational corporation especially in the IT Filed.

The study has been conducted based on two main objectives:

- a) Broad
- b) Specific

The broad objectives of the thesis rely on the two aspects comprises of evaluating the challenges face by the organization to manage diverse team virtually and success factors that are responsible for effective communication.

Specific objectives of the thesis are as follows:

- To evaluate the role of the communication management in virtual team
- To identify the hurdles, face by the IT sector for collaborating with the huge team
- To explore the role of the HR management during the project execution

2.2 Methodology

The thesis implements the Qualitative research design with the primary data collection method. The data is majorly collected based on the closed ended questionnaires and survey (Ahmed, 2018). This approach facilitates the opinions-based analysis of the role and management of the cultural issues in the IT industry. Moreover, the data is being analyze and demonstrated in the graphical

format for derive the findings. Then, the conclusion and recommendations are outline in the last chapter of the thesis, fulfilling the research objectives.

3 Literature review

3.1 A Virtual Team

3.1.1 Evolution of Virtual Teams

Teamwork and improvement activities were first widely employed in the United States during the Total Quality Management movement in the 1980s (Ahmed, 2018). Still, they had been used in the country as early as the 1960s. Self-managing or empowering team members were deployed in large firms throughout the late 1980s and early 1990s. Line level personnel took up judgement and issue activities that had previously been designated for upper-level management to eliminate complexity, shorten processing times, and enhance service.



Figure 1: Theoretical framework of virtual team

The team idea began to be exported to international subsidiaries in Asia, Europe, and Latin America by the mid-1990s, as businesses such as Goodyear, Motorola, Texas Instruments, and General Electric sought to combine international human resource processes across borders. Virtual teams are becoming more popular across the globe, thanks to advancements in communication technology and the ongoing globalisation of the workforce (Ahmed, 2018). Virtual team arrangements in corporations are becoming more common in this day and age.

When Martin and colleagues (2004) conducted an extensive study of the literature on virtual teams, they concluded that 'with few exceptions, all organizational teams are online to a significant degree (Ahmed, 2018). Researchers have shifted the focus away from helping individuals who are physically in the immediate vicinity and toward dealing with folks worldwide.

3.1.2 Virtual Team Meaning:

The descriptions of virtual teams in the literature indicated a lack of complexity in the concepts (Angée et al., 2018). Virtual cooperation is a current issue in the literature on international companies but defining what "**virtual**" implies across various organizational settings has proven to be a difficult task.

Team members are defined as a small group of individuals with complementary talents who are similarly devoted to a mutual objective, objectives, and working method for which they are held jointly and severally liable (Angée et al., 2018). It is important to note that team members are often created in order to address geographic or chronological distances.

Virtual teams may collaborate across time and geographical barriers by employing contemporary computer-driven technology (Angée et al., 2018). The phrase "**virtual team**" is used to refer to a broad number of activities and kinds of technology-assisted working that are enabled by technology. Virtual teams are made up of people who are spread across several different geographical locations. Because of this team attribute, there has been widespread adoption of a range of computer-mediated communication channels, allowing geographically distant individuals to synchronize their efforts and contributions.

In a virtual team, the level of the wide spectrum may range considerably, from having one person who is situated in a different place than the entire team to possessing every participant who is situated in a separate nation from the other members (Bartsch et al., 2020). Following Bal and Teo (2001a), it is possible to infer that a group is becoming virtual if it fits four critical basic needs and other features.

Using geographically distributed teams, firms can recruit and retain the most exemplary individuals, regardless of their location (Bartsch et al., 2020). Although some authors, such as Bal and Teo (2001a), Paul et al., 2005, Wong and Burton, 2000, and others have would include the term "transitory" in their definitions of virtual teams, others, such as Gassmann and Von Zedtwitz

(2003b), have used the term "**ephemeral**" to refer to some teammates who are on a temporary contract.

Table 1: Factors of virtual team

Characteristics of virtual team	Descriptions
Common criteria	<p>Inspired by a shared goal and directed by a common goal</p> <p>Modulation schemes make this possible.</p> <p>Geographically distributed over many time frames</p> <p>Participating in cross-border cooperation</p>
Other characteristics	<p>It is not a permanent group</p> <p>Group size is small</p> <p>Team members are experts in their fields</p> <p>Group members could be from various companies</p>

A term methodology of a virtual team is as follows: relatively small organizations of skilled employees who are locationally, institutionally, and time distributed who collaborate their work primarily through digital communication and technologies to effectively achieve one or more tasks (Bartsch et al., 2020).

3.2 Virtual Team Research Trends 2004-2012

Individuals discovered 254 academic journals and research articles throughout the five leading online databases using the selection method outlined in the Methodology section even without any additional constraints, notably using the secondary term "case study" as a research methodology (Bartsch et al., 2020). Their articles were included in the following journals: IEEE Transactions on Professional Communications (20 articles, or 8% of the total), Group Decision and Mediation

(9 articles, or 4%), Litigation of the American Conference on Information Systems (AMCIS) (8 papers, or 3%), Behaviour and Information Technology (5 articles, or 2%), Business & Information Systems Engineering (5 articles, or 2%), Information Systems Frontier (5 articles, or 2%), Journal of Business Ethic (five articles, or 2%), Journal of Business Ethic (five articles (197, or 78 percent).

The general trend of Virtual team research published throughout the nine years from 2004 to 2012 is shown in Figure, a bar graph (Bartsch et al., 2020). The frequency analysis of these reported VT studies for each of the five databases is shown in the bar graph. Springer is the most prolific publisher of case studies among the five databases analysed, with 90 case studies published in total. SCOPUS (66), Web of Science (52), IEEE (29) and AIS (17).

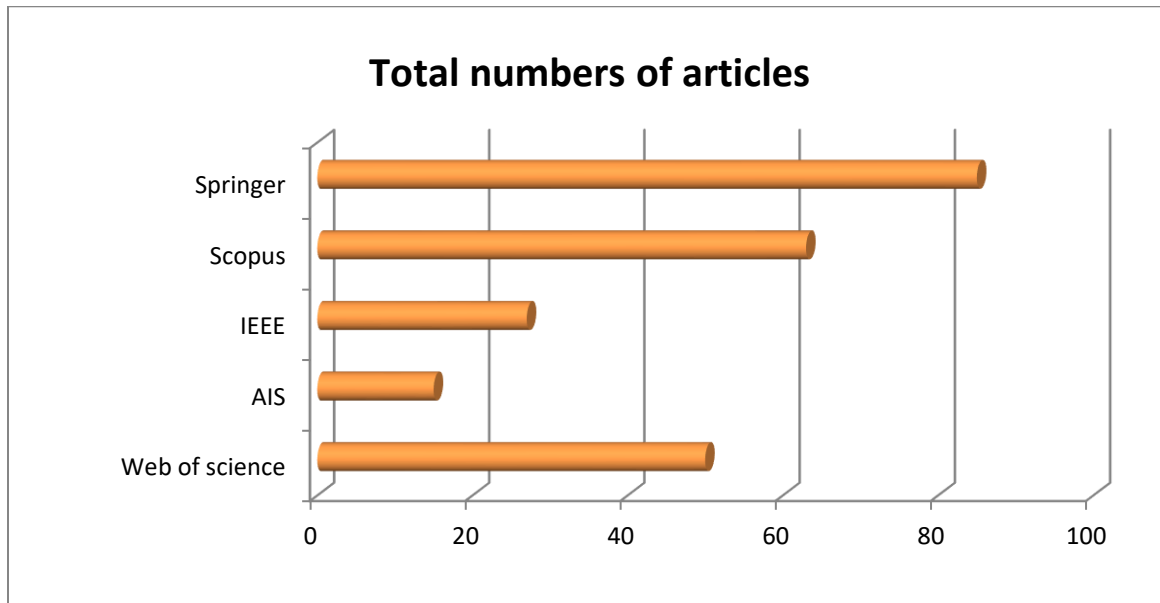


Figure 2: Virtual Team Research Trends 2004–2012

Data source: (Aanbari and Kwak, 2018)

Figure 2 depicts a data set plot for rapidly adjusted patterns during the same timeframe all across five sources (Boton, 2018). In contrast, Figure 1 depicts a standard statistical chart for static tendencies during the same period. The graph demonstrates that the general field of study in virtual reality (VT) is increasing, with three out of five databases (Springer, SCOPUS, and IEEE) publicising more research in the current history (2011-2012) compared to the previous year (2004), even though perceptions and meanings of VT are indeed innovative and arising in the literature.

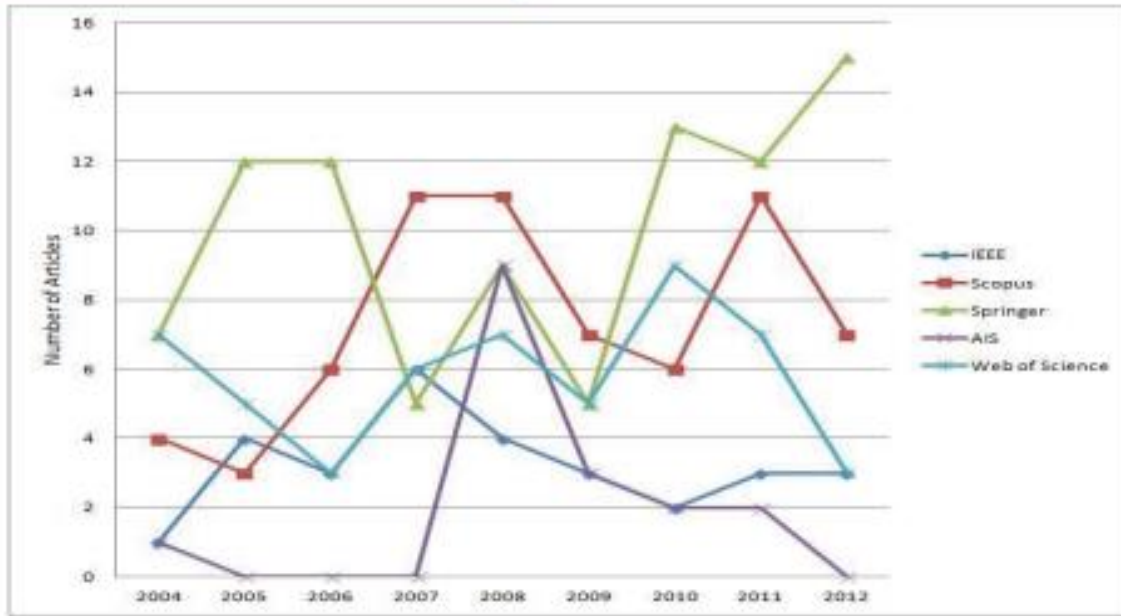


Figure 3: Virtual Team Research Trends 2004–2012

Image source: (Aanbari and Kwak, 2018)

3.2.1 Forms of Virtual Team:

In general, individuals can distinguish between different types of "virtual" employment based on the number of participating people and the level of engagement they have with one another (Boton, 2018).

Working remotely (also known as **telecommuting**) is a kind of work that may be done partly or totally beyond the main firm office with digitalization assistance. In the case of a virtual group, numerous Teleworkers are brought together, but every participant contributes to the same management team (Boton, 2018). A "**virtual team**," on the other hand, a virtual team is formed when the participants of a team assignment communicate with one another to achieve similar objectives.

For the last category of dispersed labour, "**communication networks**" are more immense structures of dispersed work in which individuals engage over the web, directed by shared goals, responsibilities, and standards (Boton, 2018). In opposition to virtual teams, virtual communities are not established inside an organizational framework but are instead created by some of its members, as opposed to all of them.

Open-Source software projects, for instance, are models of virtual communities (Breuer et al., 2019). Teleworking is an alternate method of organizing work that incorporates the total or partial use of information and communications technology to allow employees to access their employment operations from varied and distant places.

Workers save money on transportation costs by removing the need to travel to and from corporate headquarters (Breuer et al., 2019). Telecommuting also allows staff to balance their work and family duties actively (Aanbari and Kwak, 2018). It is defined the differences between virtual teams and traditional teams by categorizing them according to two key variables including the range of locations and the number of supervisors.

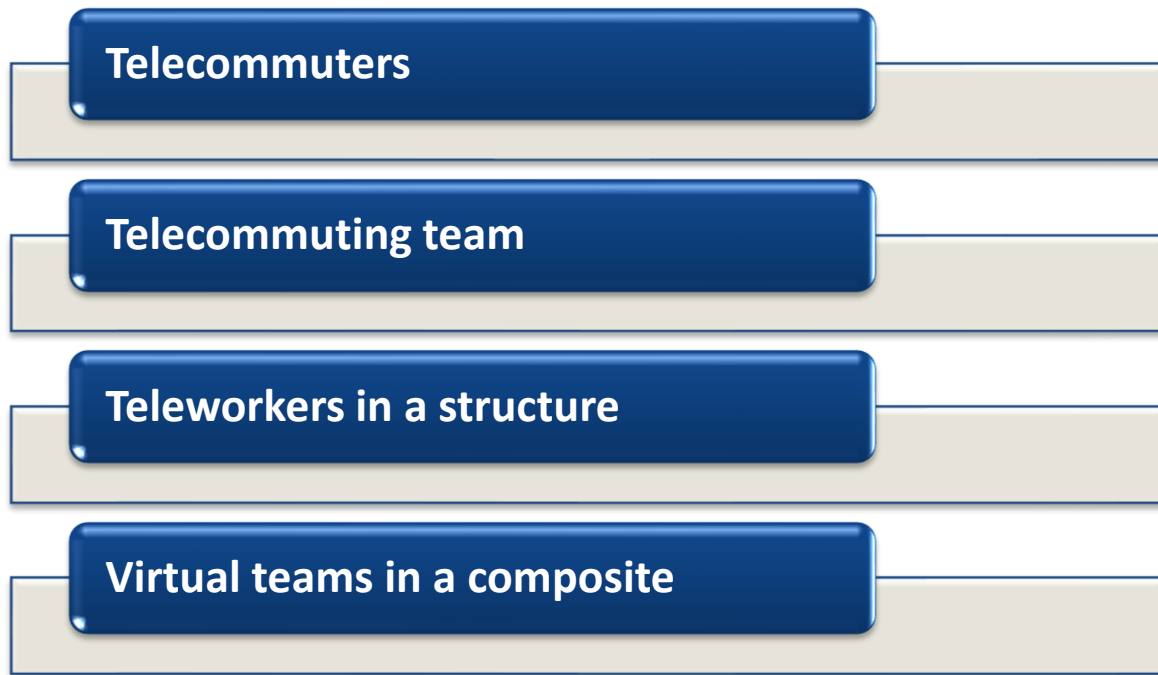


Figure 4: Types of virtual team management

Table 2: Forms of virtual team

		Managers	
		One	Multiple
Locations	One	Teleworkers	Matrixed Teleworkers
	Multiple	Remote team	Matrixed remote teams

Computer-mediated collaborations (CMC) are defined as intermittent interactions that occur in a collaborative workplace and simultaneous interactions in a platform that combines windows pc conferencing, a sharing workstation, email, and other capabilities, among other things (Breuer et al., 2019).

On the other side, the enterprise-wide idea, which runs concurrently, is with simultaneous venturing, searches for ways to offer the best value by leveraging skills and knowledge from all partners in the industry value chain (Breuer et al., 2019). The correct understanding, development, deployment, and administration of collaborative networked organization (CNOs) need the combination of many modelling viewpoints.

Table 3: Requirements of Collaborative Networked Organizations

Instance of virtual teamwork	Description	Physically alienated?	Separated by instance?	Separated by purpose?
Organizational Risk Evaluation	Identification. Director is from in business, with two other members.	Yes	Yes	No
Project Teams (System-related)	The risk assessment procedure was the emphasis of cross-site collaboration. Several multi-site groups collaborate on quality management systems initiatives.	Yes	Yes	No
Procedure Training	A functional organization with workers have employed three 12-hour shifts a week and a manager performing the day shift five days a week.	No	Yes	No

Project Teams (Product-related)	Teams of people from different locations work together to attain a common purpose (e.g., product launch).	Yes	Yes	Yes
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3.3 Virtual team management

Virtual team management is a collection of tasks that includes the steps of gathering, constructing, coordinating, managing, and overseeing the virtual cooperation that takes place online (Breuer et al., 2019). When working on a project with a team, teamwork is critical.

3.3.1 Composing

When it comes to establishing a remote collaboration organization, the first metrics to be implemented are probationary periods (Burrell, 2020). It is the team leader's responsibility to choose those individuals who satisfy all of the standards of the probationary term.

3.3.2 Instruction

As part of that effort, the team leader establishes the potential for future virtual teaming (Burrell, 2020). The team leader then designs and implements a group exercise approach to instruct the teammates on satisfying those goals.

3.3.3 Management

This procedure involves using network technologies to manage the continuous duties and occupations of group members who are located in different locations (Burrell, 2020).

3.3.4 Administering

The team leader establishes performance indicators to examine the organization's progress critically (Burrell, 2020). This individual is responsible for determining if the organization is on the right track and will meet project objectives on time.

3.4 Challenges and Performance Measures in Virtual Teams

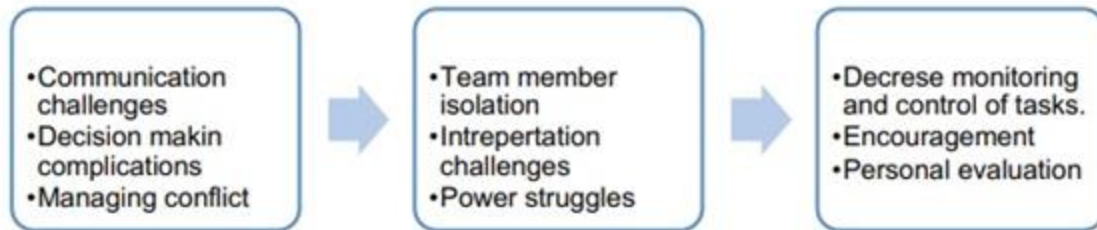


Figure 4: Challenges of virtual team

Image source: (Ahmed, 2018)

3.4.1 Derived Problems

Teamwork and improving communication effectiveness are always challenging tasks, but when it comes to remotely situated teams, these difficulties demand special attention and continue to be a source of worry (Chan et al., 2018). Individuals understand that continuous communication between employees in a company is crucial and essential. Still, it is becoming more challenging to remain in contact with group members and other people in most firms in today's world. Another development that is becoming more frequent nowadays is exporting; employees or interested sector experts are included as project team members, even if they are not average workers of the parent company.

They are recruited and become team members because they are competent or have the experience required by the development team but are not presently accessible or is not accessible on a timely basis within the company (Chan et al., 2018).

Another tendency is to include employees in multiple working groups simultaneously and to have them work concurrently on multiple software projects at the same time (Chan et al., 2018). It has become usual for initiatives that are huge, variable in character, and need adaptation and modification throughout the project's development life cycle to use this method.

Today, the majority of workgroups are confronted with these challenges. On top of that, participants have the theory of remote teams, which can include people working from multiple

portions of the same nation, foreign countries with multiple time zones, and people speaking diverse ethnic or business languages, among other things (Chan et al., 2018). Observers may see how the complexity degrees of virtual or remote teams are constantly increasing, resulting in difficulties and challenges when operating virtual or remote teams.

Some of the most prevalent obstacles that online communities have encountered, as identified by studies, are covered in this section (Chan et al., 2018).

- Because of the absence of face-to-face connection, it isn't easy to establish trust among remote workers.
- Virtual team members have a sense of isolation and detachment due to their lack of physical participation in the social operation of the firm.
- The development of positive group interactions and their long-term durability is becoming more challenging and complicated in any online communication.
- Because it is difficult to establish clear requirements and duties, virtual teams will have to work more cohesively than their physical counterparts.
- Virtual communications cannot be used instead of traditional communication methods such as telephones. No one can dispute the significance of face-to-face meetings, and no amount of innovation will ever be able to replace them entirely.
- The evaluation and monitoring capabilities of the project are restricted because managers must create improved techniques so that feedback and assistance can be provided to the virtual team.

Participants have raised several difficulties; nonetheless, these problems do not make the project development any less significant or less vital; instead, they make things more challenging (Chan et al., 2018). And in addition to making virtual teams more effective and efficient, it is necessary to address the difficulties that have been raised severely. For managers working with virtual teams, they may rely on the following critical success elements for performance.

3.5 Achievement factors

To make virtual teams more effective, as previously stated, there can be some areas that need improvement; however, these problems are not entirely responsible for the loss of the entire

process (Eisenberg, Post and DiTomaso, 2019). As a result, several success criteria have been identified in the context of the Project Management knowledge domains discussed above.

Contributors have classified the success elements into information areas to be more explicit about what they are looking for (Eisenberg, Post and DiTomaso, 2019). This sort of categorization is usually beneficial for putting those success criteria into action. The performance standards for Project Management are thus classified into the following categories based on their relevance to the planning and management domains.

3.5.1 Leadership of Communicating

When it comes to the effectiveness of Virtual Teams, this has been the most important knowledge area to understand. Individuals understand communication is a vital occurrence for achieving the goal they are involved in (Eisenberg, Post and DiTomaso, 2019). Consequently, participants might divide it into two groups based on the various teams that a project manager may be in charge of managing.

- Interaction with co-located teams is essential
- Interaction with Virtual Teams (VTEs)

It goes with the territory that, while interaction with founder teams necessitates excellent communication skills and sophisticated techniques for dealing with the team, it also creates more opportunities for face-to-face conferences, which are always beneficial in obtaining a better reaction from the team (Feitosa and Salas, 2020). It also encourages more cooperation among the members of the team. On the other hand, interaction in virtual teams is more dependent upon technology than in traditional teams.

All of the interaction activities are carried out and completed with the assistance of essential tasks to the team's achievement (Feitosa and Salas, 2020). The teams will be updated frequently to ensure the program's outcomes are being created. To improve their performance in technical advances, it is the project manager's responsibility to keep the team informed, to maintain them implicated and committed in their responsibilities, and to retain them implicated and committed in their duties so that they can enhance their productivity in technical advances which do not show much of involvement by the team.

The project manager is also devoid of any idea about their comments and replies (Feitosa and Salas, 2020). The differences are in communication styles between the two kinds of groups. a. As a result, to interact more effectively with virtual teams, people must first attempt to eliminate as many discrepancies as feasible.

There are also other issues raised that may assist users in bridging the gap between participants and the Virtual Teams and communicating more effectively with them (Feitosa and Salas, 2020).

3.5.2 Holding Teams Involved

One of the most crucial responsibilities is to keep the team motivated and interested in the program, the firm, and their respective roles in the team's achievement (Gruden and Stare, 2018). The groups will be informed frequently to ensure the program's outcomes that are being created. It is the projects manager's responsibility to keep the team informed and keep them committed and interested in their jobs and responsibilities so that their productivity may be improved more efficiently.

Each virtual team member is significant, and the program manager must remember this while communicating with them (Gruden and Stare, 2018). As a result, he must interact with all virtual team members. The employees will perform much better due to this change in environment.

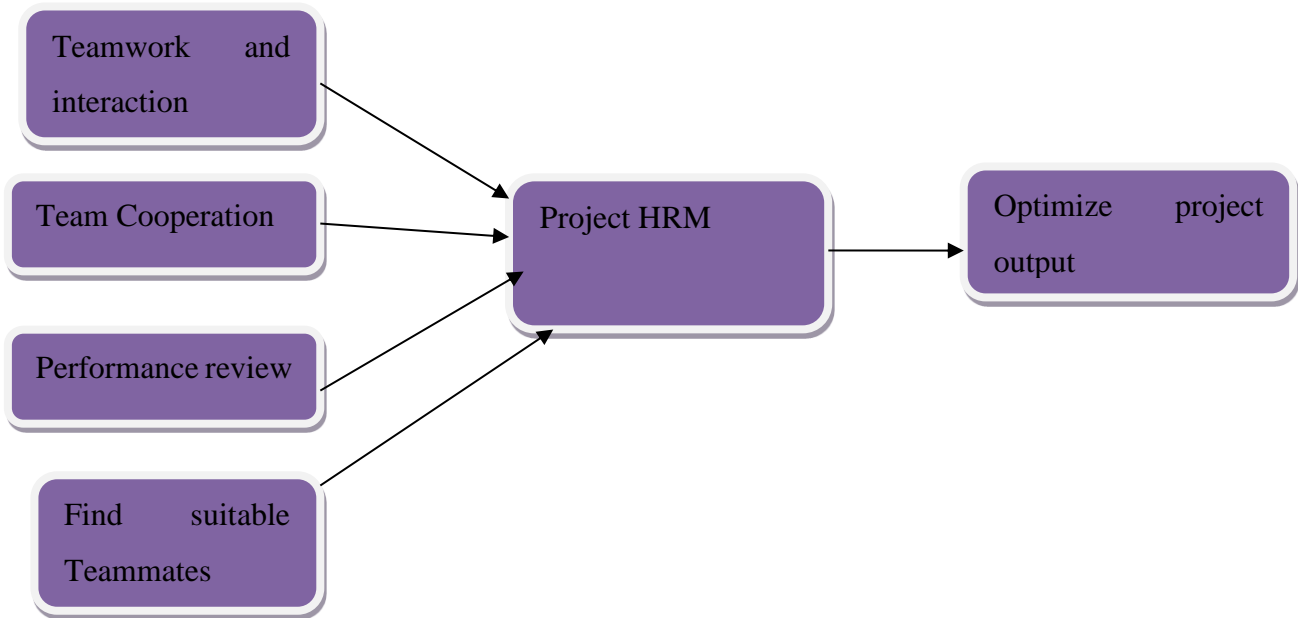


Fig 3: Team involvement in management

3.6 Standards and techniques for meeting have been enhanced

Meetings are an essential part of the communication process. To produce good meeting results, it is necessary to set appropriate meeting standards (Gruden and Stare, 2018). Meetings have always been a critical aspect of communication amongst virtual teams, and they continue to be so today.

This has been such a problem because there have been no sufficient procedures in place to ensure that suitable meetings are held in most cases (Gruden and Stare, 2018). In most circumstances, a simple video conference between a project leader and any part of the group is regarded to constitute a meeting in the traditional sense. These are, without a doubt, not entirely effective. To raise the overall quality of conferences, the following considerations should be considered.

- Establish meeting arrangements that are appropriate for the situation.
- Establish meeting rules following the policies of the company or the requirements of the project manager.
- If feasible, have face-to-face discussions once a month to keep everyone on the same level.

3.6.1 Create a Strong Relationship

The lack of confidence is a significant factor contributing to the downfall of virtual teams. As a result, specific goals can be reached to establish confidence between virtual team members, as people are aware that co-located organizations do not have to deal with this scenario to the same extent as virtual teams must (Gruden and Stare, 2018). The following considerations should be taken into consideration by the team leaders.

- Make chances for social contact available.
- Different activities are used to break the barrier amongst participants.
- Ensure that they are clear regarding their specific responsibilities.

3.6.2 Human Resource Administration

When handling virtual teams, human resource management is a significant responsibility (Hacker et al., 2019). To build effective virtual teams, the project manager must ensure that is successfully managing his people resources. To create a successful task of organizing virtual human resources, the following considerations must be considered.

3.6.3 Staffing a Workforce

The work of hiring a development team is, without a mistake, quite significant, and the program manager will need a great deal of expertise and excellent understanding to do it successfully (Hacker et al., 2019). The project manager needs to consider the following aspect to lead a successful team.

- Hire the most qualified candidate for the position
- Hire dependable individuals.
- The employment process should begin with a trial period.
- Look for self-motivated persons.
- Look for individuals with a strong technology background while hiring.

3.6.4 Supporting Policies and Career Progression

Project managers should aim to develop procedures for virtual teams that will encourage them to work more effectively (Hacker et al., 2019). Virtual teams are becoming more popular. Furthermore, there will be more options for virtual team members, which will motivate individuals to stay with the company and not search for other employment opportunities elsewhere. The following considerations will be considered.

- Make rewards available to the members of the virtual team.
- Make available a variety of job opportunities
- Motivate workers by emphasizing their contribution to the organization's project.
- Offer perks and funding to employees of virtual teams, as appropriate.
- Offer specific training sessions comparable to those provided to co-located teams.
- To enable flexibility and independence, a non-bureaucratic atmosphere must be created.



Figure 1: Strategy for Virtual team management

Image source: (Boton, 2018)

3.6.5 Administration of Procurement

In most circumstances, there may be some scenarios in which it is critical to managing company assets properly for the team to deliver the most of those available resources to customers (Hacker et al., 2019). Consider the following considerations to make the most of the assets.

3.6.6. Resources in the Technological Field

As a project director, it is project leader responsibility to ensure that the team has access to appropriate technology resources (Hacker et al., 2019).

- Offer collaborative tools that facilitate improved cooperation, for example, wikis. Asana
- Make workshop discussions and videoconferencing more productive by providing better tools.
- Provide participants with resources that will help them improve their product highly as they go through the programme.
- Provide tools to ensure that the project's other procedures run smoothly and efficiently.

3.6.7 Resources for the Workplace

Virtual teams can work from their homes in most circumstances. However, this often results in a demoralized state of mind since a person needs conducive working atmosphere in order to produce a successful conclusion (Henderson, Stackman and Lindekilde, 2018). As a result, the project manager must meet the following criteria.

- Provide the staff with an appropriate work environment/office.
- Provide staff with the necessities they want, such as WIFI, power, and so on.
- Make leisure materials available in the workplace.

3.6.8 Administration of the Scope

The administration of scope may be very critical for the success of virtual teams, yet it is often overlooked (Henderson, Stackman and Lindekilde, 2018). Follow these guidelines to ensure that the team's scope remains within acceptable limits.

3.6.9 Limited Scope and Easily Outlined Goal

The project manager must keep the project scope as restricted as possible. It will be beneficial to the achievement of the objective and the performance of the virtual teams (Henderson, Stackman and Lindekilde, 2018). Keep the following points into consideration.

- Remove any extraneous information to facilitate better comprehension.
- Clearly define the goal for completing to-the-point activities before beginning.

These are the critical success factors that have been identified in the context of the project management knowledge areas discussed before (Henderson, Stackman and Lindekilde, 2018). The successful indicators have been verified via polls and the calculation of findings from those interviews, both of which are explained in further detail in the next section of the study.

3.7 Virtual Collaboration: A Technology Perspective

3.7.1 Selection

The straightforward conveyance of data from point A to point B is no longer sufficient; the virtual world creates significant obstacles to efficient communication in many ways (Hidalgo, 2019). Having even the most cutting-edge technology at one's disposal is insufficient to make a digital team successful because the inner teamwork and available support systems necessary for a team to be successful in the virtual environment must also be represented. The most important factor for system planning appeared to be the amount of information available. The most significant hindrance to the success of virtual teams appeared to be the deployment of technologies. Virtual groups are composed of individuals from various disciplines who collaborate on a similar objective

via technology. The method in which the technique is deployed seems to influence the likelihood of a virtual team's success or failure (Hidalgo, 2019). The virtual team moderator may use the matrix in below table to identify the most suitable technique for the conference depending on the goal of the session.

Table 4: Tools and description for virtual team management

Tool	Uses and benefits	Immediacy	Sensory modes	Examples
Remote Control and Accessibility	<ul style="list-style-type: none"> • User controls a PC without being onsite • Cost varies • Setup varies 	Synchronous	<ul style="list-style-type: none"> • Visual • Audio • Tactile 	<ul style="list-style-type: none"> • NetMeeting • WebEx • Remote Desktop • Pc Anywhere
Web conferencing	<ul style="list-style-type: none"> • Real-time audio • Video that moves • Chalkboard • Sharing of apps 	Synchronous	<ul style="list-style-type: none"> • Visual • Unlimited graphics • Optional audio 	<ul style="list-style-type: none"> • NetMeeting • WebEx • Meeting Space • GoToMeeting
Conversation and Instant Messaging	<ul style="list-style-type: none"> • Real-time communication • Not as invasive as a telephone conversation • Determine who is accessible. • Low price 	Synchronous or asynchronous	<ul style="list-style-type: none"> • Visual • Text and limited graphics 	<ul style="list-style-type: none"> • Yahoo Messenger • MSN Messenger • AOL Instant Messenger • Skype
Collaboration tools Services	<ul style="list-style-type: none"> • Calendars • Contact Lists • Arrange meeting 	Asynchronous	<ul style="list-style-type: none"> • virtual 	<ul style="list-style-type: none"> • Lotus Notes • Microsoft Exchange • Novell GroupWise

E-mail	• Send msg or document	Asynchronous	• Visual • Audio file	• Free application
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3.7.2 Location

Virtual teams enable firms to acquire the best-qualified personnel for a specific task irrespective of their location (Hidalgo, 2019). They allow the people operating from office or travel to have more freedom. In virtual teams, the link between the technology, the period, and the location is shown in below table.

Table 5: Effective model for virtual team management

	Same space	Different space
Same time Synchronous	Chat, white board, Face-to-face meeting, Vote, and Projector	Video-conference, Audio-conference, shared application, Chat, telecommunication
Different time Asynchronous	E-mail, workflow, project management, Record management system, team room	Version control meeting time, discussion form, teamwork, E-mail, workflow

3.7.3 Training

In the literature, there are recommendations for training online executives and forming virtual teams. Anderson and colleagues' rigorous lab research, published in 2007, confirms many of the discoveries, including detailed knowledge and training for remote workers as a means of working cooperatively (Hidalgo, 2019). Anderson et al. Fully developed computerized communal effectiveness, as shown by Fuller et al. (2006b), may be influential in developing virtual team efficiency when computer training is combined with more sophisticated areas of expertise. According to the findings of Hertel et al. (2005), the training resulted in greater team cohesion and fulfilment.

3.7.4 Security

Because virtual teamwork involves the sharing and modifying of confidential information via the Web, cyber security is always a significant source of worry (Jitpaiboon, Smith and Gu, 2019).

Team leaders should determine the specific technology and security requirements of the virtual team and the participants of the virtual team before proceeding.

3.8 Virtual Collaboration: Human Perspective

3.8.1 Building a team

Team selection is critical in determining the difference between successful and failed organizations (Jitpaiboon, Smith and Gu, 2019). Virtual teams may be created to include just those most qualified individuals for a given project's requirements.

Virtual department heads, rather than being responsible for ensuring that the project is defined correctly, that result priorities are identified, and that a collaborative and supportive atmosphere exists, are responsible for selecting team members who possess the appropriate qualifications. Because of the geographically and organizational distances involved, selecting virtual teammates may be highly challenging (Jitpaiboon, Smith and Gu, 2019).

3.8.2 Remuneration:

Another significant thing to consider when starting a virtual team is implementing a reasonable and motivational compensation structure (Kim, Chang and Castro-Lacouture, 2020). The accomplishments of virtual teams must be acknowledged and acknowledged. In an attempt to uncover the elements that lead to the improvement of a virtual team, Lurey and Raisinghani (2001) conducted a poll and discovered that incentive system rated highly among the available support structures for virtual teams.

3.8.3 Pre-Meeting:

Bal and Gundry (1999) found a considerable decline in performance as soon as both groups came online with the software, even though the company offers teams with minimal and thorough training (Kim, Chang and Castro-Lacouture, 2020). However, the latter's performance increased faster than the former in the following months. Training is an essential component that cannot be overlooked when it comes to team development.

Virtual team members need different training than members of traditional groups (Kim, Chang and Castro-Lacouture, 2020). Self-management abilities, interaction and conference instruction, organizational skills, development training, and other aspects of the training are covered.

3.8.4 Define Goal:

Even if authoritarian leadership tactics are available in traditional organizations, individuals of remote workers may be handled more successfully by empowering them and assigning management tasks to individuals (Laitinen and Valo, 2018).

A team manager's responsibility is shifts from conventional directing to more mentoring and regulating roles due to such a theory of management (Laitinen and Valo, 2018).

While keeping the team focused on accomplishing essential performance standards and providing a clear framework for recognizing team achievement, virtual team managers should create similarities among participants from the start of the collaboration (Laitinen and Valo, 2018).

3.9 Operating as a Virtual Team: Operational Perspective:

3.9.1 Configuration:

The company's procedures must be re-aligned with the capability of virtual teams rather than face-to-face workgroups to be successful (Laitinen and Valo, 2018). This requires a thorough grasp of the virtual team procedures and the operating methods.

However, it is not just the gear and software that are important in information sharing, but also the capacity and desire of teammates to directly participate in the information exchange procedure (Laitinen and Valo, 2018).

3.9.2 Schedule of the Meeting:

Team members may participate in informal employment since they are close to one another (Laitinen and Valo, 2018). Remote workers are more inclined to treat one another formally and are less likely to acknowledge applications submitted by their colleagues.

A study conducted by Shin (2005) found that the absence of physical encounters and knowledge on the relationship within virtual teams reduces the cohesion of virtual teams (Lee et al., 2018).

According to research, official processes and procedures meant to organize the activity officially were shown to lead to higher production from virtual teams. The lack of good leadership in the physical sense perpetuates a lack of innate drive (Lee et al., 2018). When working with virtual teams that seldom encounter in person, top managers are often forced to create a formalized coaching system. Virtual teams were capable of overcoming issues related to spoken language thanks to the use of simultaneous paper communication, which allowed groups to overcome adversity connected with delayed and compact written correspondence.

3.9.3 Performance Evaluation:

Kirkman and Rosen (2004) researched the effectiveness of virtual teams and discovered a favourable relationship between empowering and virtual team effectiveness (Lee et al., 2018). Teams with high-performance levels are characterized by their intense commitment to their objectives, identification with and emotional connecting, and ability to strike a balance between unification and particular variances.

3.9.4 Mentoring of the team:

Members of a virtual team must be aware of their respective roles and responsibilities (Lee et al., 2018). The inability to see outcomes may lead to remote workers feeling less responsible for their contributions; consequently, explicit encouragement of cooperation is particularly relevant for virtual teams in general. Time-based coordination strategies, such as achieving targets and regulating work speed, are suggested for improving vigilance and responsibility.

3.9.1 How to utilise virtual team project management techniques

Table 6: Use of techniques in virtual team management

<p>Establish a work plan</p>	<p>As a project manager, the first step is to regularly retrieve and comprehend the work done by teammates. After having a specific notion, the manager will choose which activities they are accountable for and which activities the project management may assign to the team.</p>
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	<p>Set aside time to flesh out the tasks; after the project manager has a manageable list of activities, the leader may enter them into the project management tool and assign them to the workforce.</p>
<p>Offer clearly directions</p>	<p>When operating with a virtual team, the project manager must be exceedingly explicit in the responsibilities and directions they provide. Team members need to comprehend how to complete a work that the leader believes should be done precisely. This may be accomplished by recording a video or audio tutorial, drilling down in images, or documenting it in a step-by-step method that everyone can comprehend. Because the virtual assistant does not think in the same manner as the supervisor, it is essential to communicate clearly with team members about what they want them to perform from the beginning.</p> <p>Assigning tasks to virtual teams in the project management application requires managers to provide highly explicit step-by-step directions to the remote workers. For a digital assistant to be practical, teammates cannot just leave one or two generic phrases describing the assignment and expect the digital assistant to take up the slack and fill in the blanks without specific instruction from the team.</p> <p>Instructing the Virtual team in a complete and precise manner guarantees that the duties are completed correctly and that the output desired by the management and team members is achieved.</p>
<p>Emphasize</p>	<p>Establish a realistic quantity of commitments that can be completed at any given period. If activities and work keep tabs on the team carries, do not simply assign the new additional tasks to team members and anticipate them to complete them along with everything else inside the allocated time indicated. This could start causing overpower and stop or slow down the actual work progress.</p>

	To avoid overloading the plate with additional work with much the same timeframes, define which activities the leader and team members want to be accomplished first. The Virtual team is informed on what to focus on during that particular period.
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3.9.2 The function of process improvement in a virtual team

Because virtual team members work from various geographically diverse places, interaction becomes an increasingly vital aspect in the operation of virtual teams (Lee et al., 2018). Their communication techniques might include the cell phone, conferencing, message, mail, skype, and other similar technologies.

As contrasted to conventional face-to-face conversation, the absence of verbal or non-verbal indications in all browser telecommunications is a significant disadvantage for all of these technologies (Lee et al., 2018).

However, non-verbal signals such as facial expression, bodily position, and mood and verbal cues such as tone of voice, vocal hesitancy, and loudness are essential information sources while processing information from teammates for assignments (Lee et al., 2018). The lack of "social connection, interaction, and emotional responses" that virtual teams experience compared to face-to-face teams is one of the most significant issues.

Virtual teams with high productivity, strong commitment, high collaboration, and high interaction must be managed on both the technical and human levels to ensure success (Lee et al., 2018). According to survey results from earlier research, persons who work in virtual environments suffer from the lack of informal interactions, and many participants believe that cross-border knowledge should be used as a possible competitive advantage to succeed.

According to Lee (2013), nonverbal communication constitutes a significant portion of communication in the virtual world; as a result, communication becomes a significant concern for effective virtual project management (Lee et al., 2018). According to the analyst, face-to-face meetings are the primary way of communication in the conventional construction project. In this environment, Project Managers can interact and achieve results with teammates who are in the

same based on geographic place as them (Lee et al., 2018). However, in digital leadership, these conventional techniques of 25 interactions are often missing from the equation.

Involved parties cannot read the body posture of Project Managers and peers until a teleconference is held, according to Plazas (2012) (Lee et al., 2018). When e-mail, texting, and Online Chatting are the primary modes of communication, they also have restricted access to listening to the inflexion in the conversation.

In other words, when there is no person behind the phrases, it is much easier to assign incorrect sentiments and ideas to the speaker (Lee et al., 2018). Because of this, there is a growing interest in learning how Project Managers handle interaction within online team environments.

Even though organization s and construction project professionals should be fully aware of the difficulties involved with successfully managing remote workers, recognising these difficulties might not be evident to individuals (Lee et al., 2018).

3.9.3 Purposed future strategy for project management

Before deciding, it is essential to carefully consider the many options offered as a result of our research (Ma et al., 2018). An assessment of the associated risks and the timeline connected with the implementation of a new approach and the response of various stakeholders must all be taken into consideration.

Table 7: Purposed future strategy for project management

Strategy 1	Motivate and make it easier for people to use virtual teaming more often. A surge in the usage of collaborative technologies to promote work practices and cooperation has been seen across all industries and all levels of management. Therefore, using this technology is a rational course of action to take. A more formalized, organized approach, on the other hand, is essential to guarantee that teams that depend on digital to connect and share information work as efficiently as feasible.
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Strategy 2	Analyze the techniques that are already accessible and develop recommendations for selecting the most appropriate system from among those that are presently accessible. This approach is a development of the initial strategy that was offered. To successfully implement a comprehensive and proactive strategy for virtual teaming, it is essential to provide team managers with the information and skills they need to pick the most relevant technologies for the work at hand.
Strategy 3	<p>Identify and create a framework to appropriately support remote workers, incorporating best-practice guidelines, suitable technology, and training opportunities. This plan will address the flaws found during the study of virtual teams presently operating inside the organization.</p> <p>The prospects demonstrate that the business is prepared to enhance the use of virtual teams in its operations. Nonetheless, to do this effectively, significant changes must be made in how virtual cooperation is now perceived and promoted inside the business.</p>
Strategy 4	Businesses may save money on trip expenses by promoting and supporting virtual collaboration. Increasing the use of virtual team structures and accompanying capabilities and promoting and supporting the use of these structures and innovations may help reduce the rising costs of business purposes.
Strategy 5	Personnel should be relocated to the significant project site permanently. A scenario in which key teammates must dedicate 100 percent of their time to a significant project would make this method feasible. Unfortunately, as a company's rules, it is not possible to implement.

To formalize the usage is of virtual teams in the company, project management should adopt an organizational-wide strategy that includes adjustments at the highest levels of management and

staff (Ma et al., 2018). As part of this, helpful advice and training should be provided on creating and managing virtual teams and choosing and deploying the most effective technologies for these teams.

As a result, categorized under four techniques described may be undertaken simultaneously due to their interdependence and mutual dependence (Ma et al., 2018). It has been discovered via a review of present virtual teaming practises in the corporate world that there is a high degree of dissatisfaction with virtual collaboration, indicating that there would be strong support for attempts to enhance its effectiveness.

The constant advancement of technology, together with advances in infrastructure, ensures that the procedures of virtual teams are continually enhanced (Marlow et al., 2018). As a result, the timeframe of the deployment of these techniques is optimal at this point.

3.9.4 Virtual team formation and administration

The team manager must possess the necessary attributes and abilities to manage a virtual team environment effectively (Marlow et al., 2018). These are some descriptions: The capacity to handle communication successfully; build connections with teammates while acknowledging their perspectives and recommendations; and detect and solve low enthusiasm and disagreement within the organization.

They should also foster personality and be able to identify emerging leaders, build and sustain team trust and cohesiveness, and meticulously monitor team results (Marlow et al., 2018). The virtual team's leaders must also guarantee that proper tools are accessible for all elements of the work to be completed by the virtual team.

Leaders maintain high standards in terms of adhering to team procedures and using software solutions (Marlow et al., 2018). To be successful in a virtual team environment, it is essential that the team members picked possess the necessary abilities. These are some explanations:

- Personal responsibility, self-management, and self-discipline are essential.
- Adaptability to new technologies and technological development.

- The ability to operate in a team and have previous experience in teamwork, especially when it comes to utilizing technology to interact, is essential.
- A propensity to trust—that is, to have faith in the ability of other teammates to do their jobs and act reliably and transparently.
- Personality attributes appropriate for this position include compassion, tenacity, determination, intolerance, adaptability, and comprehension.

Also important is that coworkers get the same amount of training, including how to operate successfully in a virtual team, irrespective of where they are physically located (Nordbäck and Espinosa, 2019). Included in this should be ruled on how to properly use communication methods such as email, phone, audio- and multimedia, and instructions on intercultural competence for global teams. Furthermore, team members must be aware of their roles and responsibilities inside the team and their team's position within the company as a whole.

To aid in the development of connections and confidence between teammates, it is advised that virtual groups meet face-to-face at least once during the team's original construction (Nordbäck and Espinosa, 2019).

In addition to regular gatherings, teams should be provided with the opportunity to connect informally (Nordbäck and Espinosa, 2019). This has been demonstrated to contribute to more incentive to innovate since it helps develop credibility and generate a common identity among members.

In addition, during the team's creation, it is essential to set clear ground rules for involvement. These must include the following:

- The construction of a system with equitable availability of information for all participants.
- Encourage team members to communicate with one another constantly.
- The team manager provides feedback regarding the firm's success.
- The formation of standards governing the use of communication technology, including the development of terminology to facilitate the transmission of knowledge; and

In addition to forming a defined standard of ethics, which includes criteria for accessibility and recognition, norms for gatherings and debates should be established to prevent minor conflicts from escalating (Nordbäck and Espinosa, 2019).

To operate efficiently, it is necessary to create clear objectives and duties. The team manager should keep track of whether or not these are being followed (Nordbäck and Espinosa, 2019). The team duties allocated mustn't clash with the team members' obligations to other work units since this might result in severe consequences.

It is necessary to underline the significance of the job completed by the department about the broader organization (Scott-Young, Georgy and Grisinger, 2019). When team members are separated throughout a large geographical area, it is critical for the team manager to personally visit distant team members to alleviate any sense of isolation that may develop.

A comparison of the virtual team model to the existing research is made (Scott-Young, Georgy and Grisinger, 2019). Carter et al. (2015) have discussed the need for human resource policies that recognize, assist, and recompense virtual team members and leaders.

Other journals, including Germain and McGuire (2014) and Carter et al. (2015), have emphasized the importance of training, an open organizational culture, ongoing process management, the availability of necessary supporting organization 's, and encounter with collaborative effort innovation (Scott-Young, Georgy and Grisinger, 2019).

These problems are dealt with communally in the '**organizational level**' and '**circumstances for improvement**' sections, where concerns such as possession, top management support, collaborative effort innovations, and mentoring are discussed (Shafiq et al., 2018). The organizational level and circumstances for outcome sections of the model are divided into two categories.

Additionally, the '**creation/management level**' includes specific support for aspects such as '**team procedures**' and '**virtual environmental factors**,' which are both defined as follows: It is recommended that beneficial communication possibilities in digital teamwork, virtual team accessibility, assist for various work mechanisms along with the combining of face-to-face and virtual team conferences, and the requirement of comprehensive service surroundings for the

execution of the digital workplace, including the prevention of 'intercultural miscommunication', be provided by Zakaria and Yusof (2015) (Shafiq et al., 2018).

Additionally, the model considers team empowering and collaborative incentive systems, which are addressed in the development of public for each component of the group task and the actual operational virtual environment themselves (Shafiq et al., 2018).

Also taken into consideration is the relationship of the members of the virtual team and their support structure, since it is widely accepted that if the collaboration is to be a success, the relationship of the members of the virtual team and their support system must be considered (Spiegel et al., 2019). According to Johnson et al. (2001), the model provides strong support for the following principles: self-discipline among teammates, personal accountability for outcomes, an emphasis on team involvement abilities, and concerns of trust.

In particular, the problem of virtual team trust is addressed at the '**creation/management level**' of the framework, as is the problem of creating a feeling of cultural understanding in all participants of a virtual team (Spiegel et al., 2019). Additionally, techniques for dealing with personal attributes and behavioral testing of teammates, building a squad with proper qualifications, and the role of management in team creation are all discussed in the '**organizational level**' portion of the virtual team framework, as well as the 'creation/management level' section of the virtual team prototype, in the '**technology section**,' the virtual team addresses the critical success factors associated with the implementation of emerging innovations.

These include visualization innovations against current organizational connectivity to make sure an acceptable model, planning and implementing emerging innovations, reconciling emerging technologies with available technology in the organization, offering incentives for the technological innovations, offering technical advice, and developing guidelines for utilization (Spiegel et al., 2019).

3.10 Project management in the IT industry

IT initiatives have a longstanding experience of becoming premature, going over budget, and producing results that are less than stellar in terms of performance (Spiegel et al., 2019). The creation of complex techniques to process improvement and the use of formalized **project**

management (PM) methodologies to organize, analyze, and manage costs, schedule, and performance have all been proposed as solutions to this challenge.

Recent initiatives have been to merge software process improvement methodologies with more general project management methods (Spiegel et al., 2019). With the expansion of project teams into increasingly varied, global, and geographically distributed contexts, conventional project management methodologies face new problems.

3.10.1.1 Administration of Projects

While project requirements are similar to on-going operations in that they are momentary, they are characterized by the fact that they have a variety of distinct goals to achieve, that they have a particular beginning and end schedule, and that people necessitate a diversified set of human resources, which together carry particular necessary knowledge and expertise to the entire project (Wu et al., 2021).

Project leaders develop and execute communication skills and coordinate methods containing both undertaking and procedure information to obtain project objectives (Wu et al., 2021).

3.10.1.2 Diversity

Diversity is measured by several criteria, including color, gender, nationality, and experience, investigated by a diverse group of scholars across a broad range of disciplines (Wu et al., 2021). These diversification characteristics are classified as high awareness in the management literature, while poor visibility characteristics include beliefs, dispositions, training, respondent, abilities, and knowledge, among other things.

Other terms used to describe various sorts of variety include lesser and more employment diversification, surface level and profound level difference, and viewable and non-observable variability (Wu et al., 2021).

According to most academics, more apparent qualities are likely to be correlated with less apparent characteristics (Wu et al., 2021). Two theoretical frameworks —the characteristic and the assumptions — support this position, but differently.

Several extensive evaluations have shown conflicting findings regarding the impact of diversification on teamwork methodologies, indicating that their involvement is complicated and

moderated by organizational and social circumstances and that further research is needed (Wu et al., 2021). Diversity may exacerbate conflict and, therefore, result in process failure.

Contrary to this, when conflict is brought to the surface and addressed, it may lead to more innovation and understanding and improved decision-making since it encourages the generation of more and improved options and increases internal and external interaction (Xie et al., 2018).

In some instances, increasing certain forms of diversity on IT project teams, notably various technological and social viewpoints, may help lower project risk (Xie et al., 2018).

Lilian (2013) states that to operate a virtual team, a solid and effective communication strategy and management amongst all team members are necessary (Xie et al., 2018). It is also the program manager's or e-role leaders to oversee human resources management in the virtual team. According to Papadopoulos (2015), most software project managers in virtual environments use the Agile approach as a project management technique.

Agile project management is a procedure carried out with the active participation of all stakeholders in the project (Xie et al., 2018).

3.10.1 Role of project management in IT sector

Work is accomplished via information and communication technology (ICT). Aside from the communication within the group, "**information exchange, transmission, procurement, incorporation, and archiving**" are all accomplished via the use of information and communication technology (ICT) platforms (Xie et al., 2018). As a result of bringing together individuals with various knowledge and skills, Virtual Teams can create even more significant improvements in processes and deliver high-quality products.

According to the observations of Cosmina (2015), the following are the problems that influence the functioning of the Virtual Team:

- Catapulting the objective
- Structuring the team
- Developing members' qualifications

- Creating a cooperative environment
- Establishing a standard of quality
- Obtaining additional assistance
- Providing leadership

Agile methodologies may be readily applied to virtual teams as well. In a virtual environment, teammates may be placed anywhere globally, regardless of their physical location (Zhang et al., 2018). To put it another way, “**monitoring the team members**” achievements provide them with appropriate feedback, allowing them to resolve their burning concerns and optimize the project outcomes.

Only a few industries have had such a significant influence as the information technology industry (Zhang et al., 2018). Decades ago, the PC (personal computer) was transforming workplaces throughout the world as a low-cost alternative to traditional methods of communication.

Since then, the growth of the internet has resulted in a significant increase in the wide variety of computer networks and the number of internet sites (Zhang et al., 2018). It doesn't take much to claim that the internet made globalization a viable possibility. Even though they had formerly hosted global corporations, they retained a distinctively local flavor.

Within a few decades, other sectors of activity arose, including technological, economic, suppliers, telecommunications, consultancy, and so on, producing what is known as the "**changing economy**" or "**dot-com financial system**," characterized by rapid growth (Zhang et al., 2018).

It is noteworthy that information technology businesses invented the technology for accessing the internet, which comprises desktops (hardware and software) (Zhang et al., 2018). Because those businesses operate globally, they all have the same desire to expedite their initiatives.

It is usual to employ virtual teams to carry out project implementation. To put it another way, individuals have direct knowledge of the production of this innovation (Zhang et al., 2018). Since they are the initial users, it is constantly being reinvented and expanded rapidly.

It is in this manner that the virtual teams arrive on the scene. It describes a "**virtual team**" as a set of individuals united by a similar goal and who communicate with one another via the performance of interdependent activities (Aanbari and Kwak, 2018). In contrast to a co-located company, whose employee works geographically intimate to one another, a virtual team collaborates across geographical distances, time zones, and organizational borders that have been reduced and enhanced due to technological advancements in communication.

A virtual team are groups of individuals who connect using machines and who may never meet in person for the first time (Aanbari and Kwak, 2018). Internet and telecommunications equipment and hardware and software are all included in the field of information technology (IT), which also covers computer science (providers and facilities) (Aanbari and Kwak, 2018). The analysis of virtual teams is intriguing for a variety of reasons.

- The usage of communication technologies, which is the technical side of the situation
- The second is international incorporation in terms of the human component.
- Its dynamic nature necessitates project management focused on cost containment, timelines, and effectiveness in terms of organizational factors.

3.10.2 IT virtual team management interaction evaluation

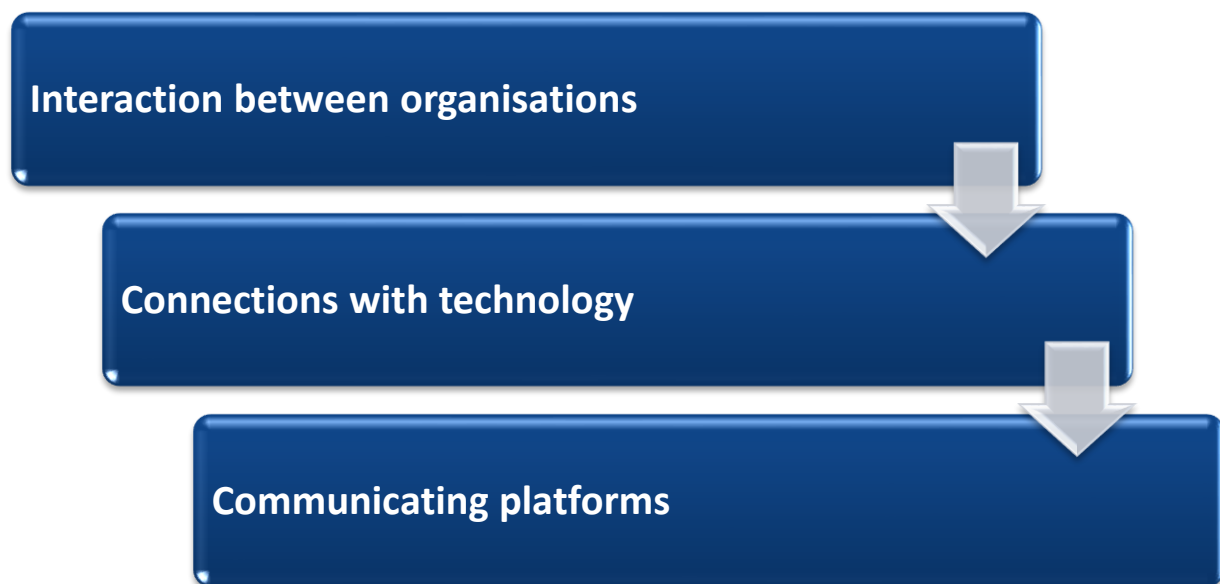


Figure 2: IT virtual teamwork assessment

3.10.2.1 Interaction between organization

Relationships between distinct organizational units those are either official or unstructured (Aanbari and Kwak, 2018). Depending on the situation, organizational interfaces may be either primary or quite complicated. For instance, building a complicated telecommunications system may need the management of a large number of contracts over a long period, maybe years.

However, rectifying an issue in software deployed in a single location may need more than short notice to the customer and the employees of the production company (Aanbari and Kwak, 2018).

3.10.2.2 Connections with technology

Relationships between distinct technical disciplines, whether informally or formally (Aanbari and Kwak, 2018). In a venture, technical interfaces can occur either within the stage of the process, for illustration, when a constitutional technician's sketch must be consistent with an institutional architect's layout, or between the stages of the project, for instance, when an automotive vehicle creative team transfers the outcomes of the project to the technicians who will build the machine.

3.10.2.3 Communicating platforms

Members of the project team may have formal or informal contact with one another (Ahmed, 2018). The usage of IT in both national and international enterprises is highlighted in the diagram ahead since they assume both organizations have IT as their primary business due to their dual role as innovators who create and consumers of cutting-edge technologies.

As a result, it becomes a point of comparison for other businesses operating across many industries and using IT (Ahmed, 2018). According to some experts, IT-based innovation is likely to be adopted by the global economy in the future. This paper's findings might be helpful, and a benchmark for other sectors is increasingly adopting virtual teams into their technique and practice.

The achievement of international IT projects, including virtual teams, may be influenced by organizational, technological, and human interfaces (Ahmed, 2018). It is necessary to consider the various lengths and degrees of intricacy involved.

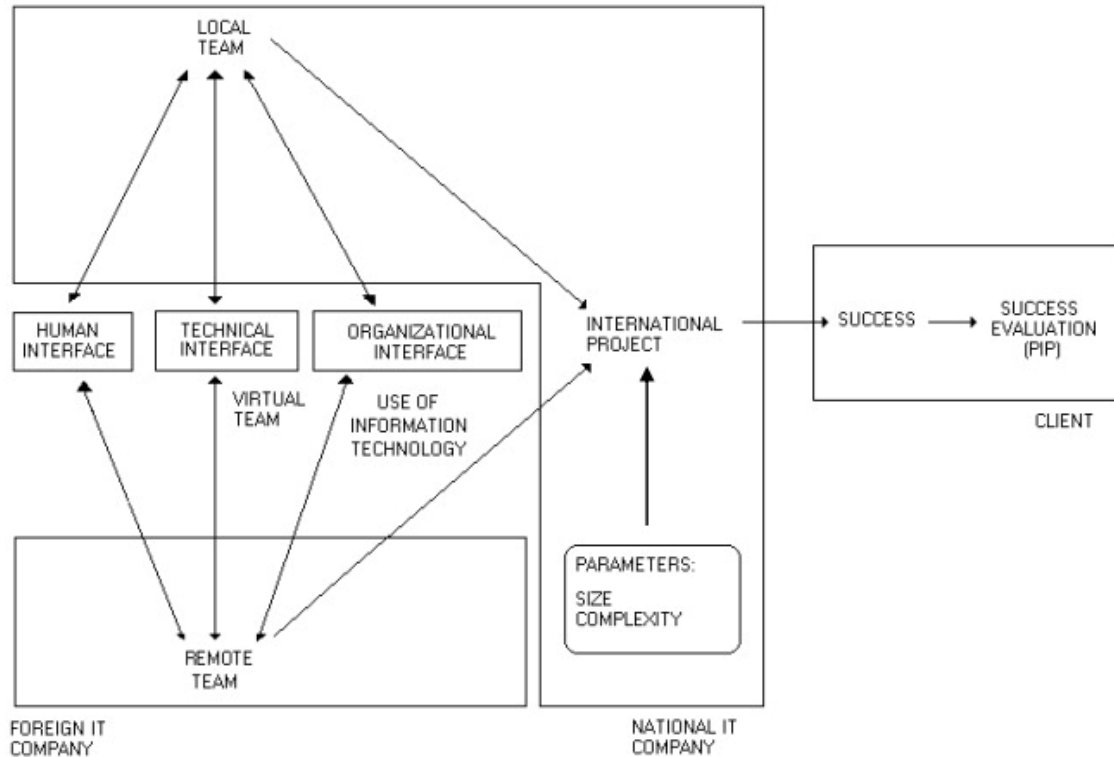


Figure 3: Communicating platforms in Virtual team management

Image source: (Ahmed, 2018)

The varying degree of connection among the individuals is reflected in the various systems (Ahmed, 2018). Administrative interfaces connect two organizations, both local and distant, in this way. Interaction between the regional and distant technical staff on development is connected to a technical interface; interaction between the locally and remotely members of the team is tied to a Human interface.

3.11 Framework for managing projects with a virtual team

Even though many project management ways are available, none of the currently available methodologies is adequate for directing work requiring virtual teams (Ahmed, 2018). When working in a remote environment, **Traditional Project Management (TPM)** lacks adequate monitoring and controlling of projects continuously. As a result, projects may quickly deviate from their intended path. This may occur due to the ambiguities created by team mobility and the

extensive use of less-than-ideal communication channels. TPM cannot quickly reduce such ambiguities and adapt to rapid changes appropriately.

In unpredictable, imprecise, and fast-changing situations, an incremental strategy reduces risks and maximizes economic value while minimizing costs (Angée et al., 2018). A continuous approach to problem-solving characterizes agile techniques. The agile methodology encourages little preparation restricted to a single, upcoming iteration phase.

The lack of preparation in virtual settings may result in a drop in complete project knowledge, leading to an increase in the amount of work necessary for project monitoring and management. It is also possible to significantly enhance the necessity for team members to engage with one another (Angée et al., 2018). Agile project teams have regular, most commonly daily, face-to-face discussions.

As a result, team members must be physically present in the same place at the same time in terms of managing changes and creating increments (Angée et al., 2018). Because agile methodologies must be used in dispersed contexts, much transition work is required, as is extensive continuous communication between team members.

The successful implementation of a project management method is critical to the project's success (Aritz, Walker and Cardon, 2017). According to the authors, the standard management techniques should be supplemented with a more adaptable approach.

A hybrid development methodology, which incorporates both conventional and agile approaches, may prove to be the most effective way in the long run (Aritz, Walker and Cardon, 2017). Most people believe this is particularly true for projects carried out in virtual team situations. Thus, the methodological approach for virtual team project management that is presented incorporates the most appropriate components of current methods and the inclusion of tool and technological support.

The following characteristics characterize it:

- More comprehensive cooperative trying to plan to mitigate risks and enhance cultural procedures.
- Iterative project stages for minimizing risk in digital realities.

- Tool-supported continuous monitoring with systematic and standardized inputs and outputs, unifying work packages and composites.
- Customer approaches appropriate for online worlds.
- Amplified use of information and communication technologies, competitive advantages in the virtual environment.

3.11.1 Characteristics of a productive virtual team

The productivity and profitability of a virtual team outweigh the characteristics of its members as individuals and as a group (Aritz, Walker and Cardon, 2017). Technology, as well as administration, information dissemination, and human resources, are all critical considerations.

The fundamental elements of a well-functioning virtual team are the following: However, how they are applied is critical to a virtual team's overall efficacy and efficiency (Aritz, Walker and Cardon, 2017). In virtual communication, technologies are the foundation; consequently, it has the most significant influence on the productivity and efficacy of a virtual team's performance.

The amount and variety of media available and the reliability of the innovation are all contributing to increased team performance and quality (Bartsch et al., 2020). Furthermore, knowledge of technology is beneficial in achieving performance in virtual teams.

However, although technology is at the heart of virtual teams' performance, other aspects contribute to their success, including administration, training, and information exchange (Bartsch et al., 2020). An essential rule of thumb for a productive digital workplace is to broaden the scope of the team's emphasis. It is not just a change for a person or a group, but also a change for society. It represents a significant shift for the whole corporation, and maybe even more. When it comes to virtual teams, organization know that they are a strategic shift and that change brings new advancements.

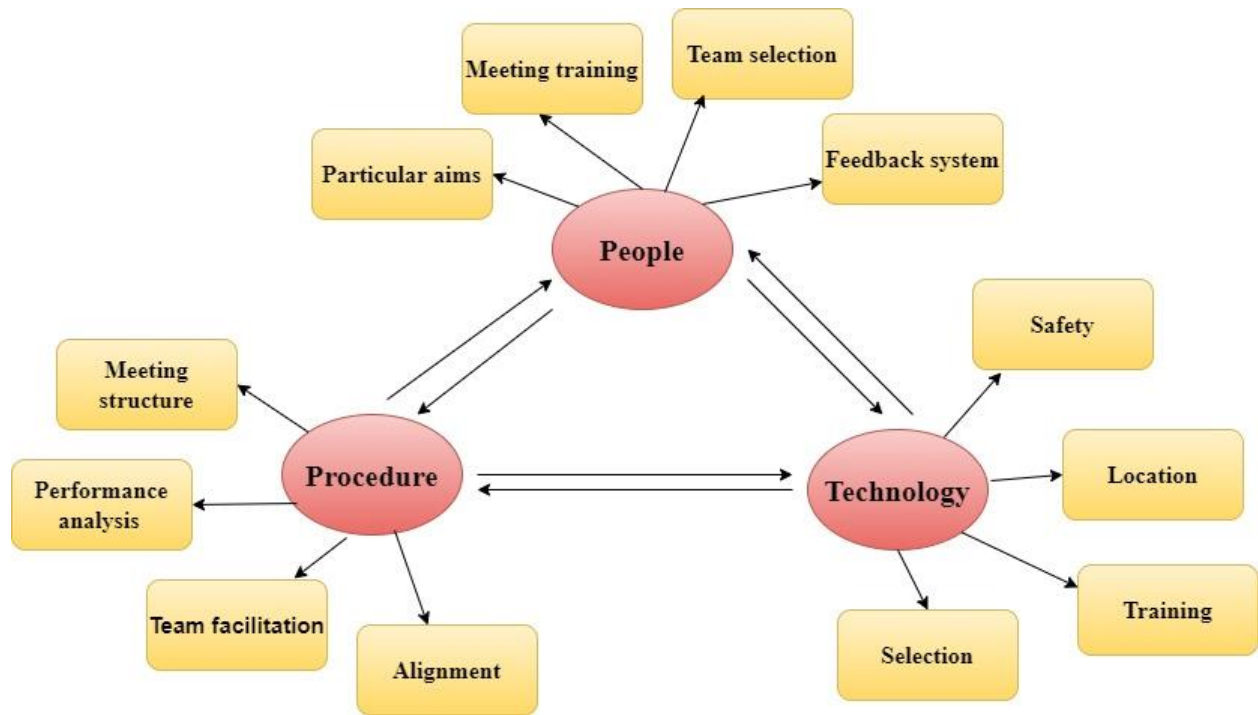


Figure 4: individuality of a productive virtual team

Image source: Self-created

A collaborative leadership framework in the manner of top management is required for the overall growth of an organizational structure (Bartsch et al., 2020). In addition to management concerns in the top levels of the organization, it is also a subject of administration at more profound levels of the organizational structure. A shared leadership model brings assistance near virtual teams, which is essential for creating trust in virtual teams, leading to good results.

3.12 Virtual team interaction

The last part addressed how virtual teams connect using information and communication technology (ICT), such as email, online meetings, and telephone, to overcome regional dispersion and chronological asynchrony (Bartsch et al., 2020). Because of the absence of in-person connection, virtual teams' communication differs from collaboration in conventional teams.

Mediating and moderating in this volume discuss various forms of language in remote workers and comparisons between communication strategies in established companies and those in virtual

teams (Boton, 2018). The use of employee retention as an internal communication strategy is also discussed in detail.

As shown by the significant level of participation in research of communication and interaction in virtual teams, interaction in virtual teams is crucial for a functional, productive, economical, and profitable virtual team (Boton, 2018).

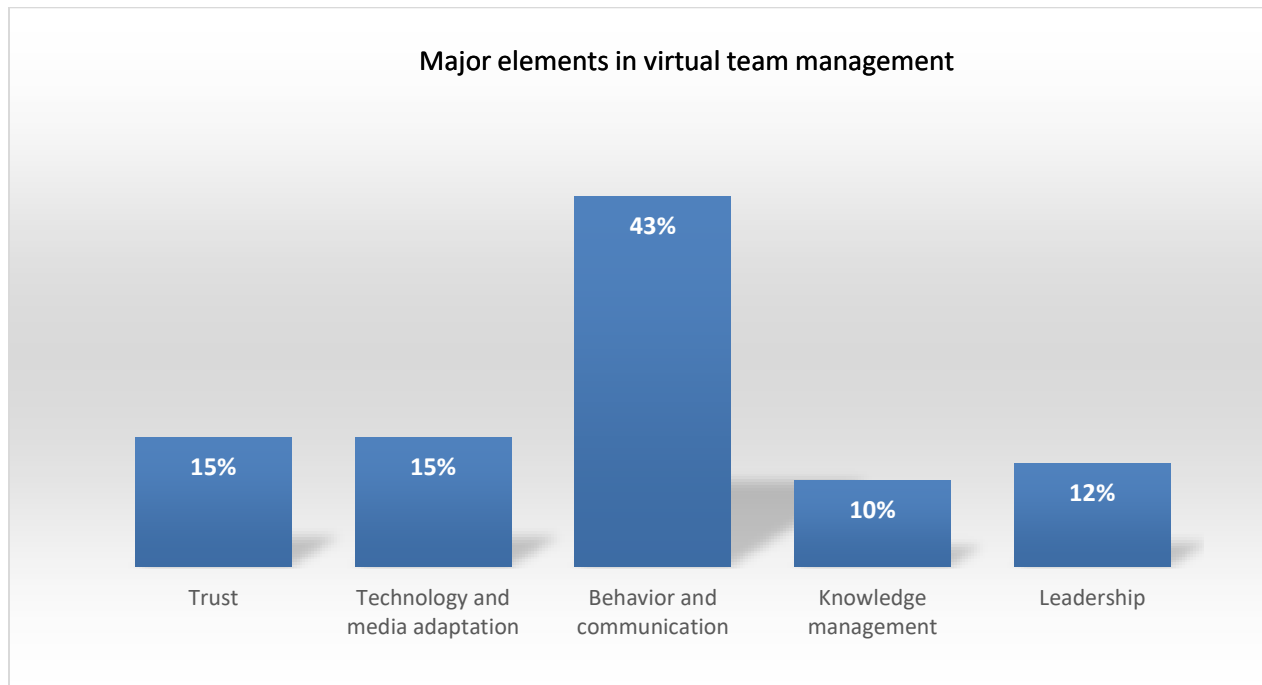


Figure 5: Major elements in virtual team management

The exchange of information in virtual teams is comprised of several aspects, with communication being the most important of them (Boton, 2018). The first element to consider is team diversity, which is subsequently developed into communication. Communication is not simply one independent component but also a mix of equally weighted characteristics: regularity, reliability, and substance, to name a few.

According to the study results, communicating impacts trust and intelligence, which in turn has an impact on results such as sustainability, productivity, and fulfillment. Marlow, Lacerenza, and Salas (2017, 577) explain that virtual teams that underachieve in the first sector of interaction would ultimately have negative consequences for their results since measured performance declines in direct proportion to levels of communication (Boton, 2018).

3.13 Implementation of successful virtual team management in IT sector

As shown by the study outlined above, a global firm must adopt a strategy that facilitates the establishment and administration of virtual teams in an organized and systematic way (Boton, 2018).

A number of the most significant issues recognized during this study include the absence of application virtual team training, the lack of proper knowledge and techniques, the lack of an appropriately organized methodology to virtual team formation, and the nonappearance of particular, comprehensible knowledge of what virtual teams can bring to an organization (Boton, 2018). Further considerations raised by the case study include the increased difficulty of exchanging information digitally compared to in-person and the extreme difficulty of establishing agreement owing to the differential in attitude, methods, and procedures among the participants.

It has also been shown that the absence of human connection in virtual teams increases the likelihood of misunderstanding and feelings of isolation and overall discontent among virtual team members (Boton, 2018). Aiming to solve these difficulties within a cohesive, organized framework for the effective installation and maintenance of virtual teams, the model provided here consists of the following components:

- Essential circumstances for achievement
- General organizational duties
- The development of innovative technology
- The formation and administration of virtual teams

The model is shown in the following table as a conceptualization.

Table 8: Implementation of virtual team management in IT sector

Performance Prerequisites	Admin Responsibilities	New Technology Introduction	Administration of Virtual Teams
----------------------------------	-------------------------------	------------------------------------	--

<p>The endorsement of higher leadership</p> <p>Strong IT Network</p> <p>Cultural Advancement in the Workplace</p>	<p>Manage the virtual team's help desk</p> <p>Collaborative tools that are already in use should be identified.</p> <p>The best way to find effective virtual teams is to look for them.</p> <p>Create a virtual team toolset</p> <p>Training programme for tools should be developed</p> <p>Develop and introduce new technologies in accordance with established standards.</p> <p>Adopt HR rules that encourage the use of remote workers.</p> <p>Set up a framework for forming and overseeing virtual teams</p>	<p>Comprehensive analysis to guarantee that equipment is compatible.</p> <p>Prospective consumers should be involved in the design of new technologies.</p> <p>Existing technology should be integrated into newer models wherever feasible.</p> <p>New technology's advantages and advantages should be stressed.</p> <p>Advanced inventions should be well supported.</p> <p>Instruction and guidance will be given</p>	<p>VT management requires specialized training for the team manager.</p> <p>Select staff members who have the right talents for the job.</p> <p>Training on how to operate in a virtual team, including technology, should be provided.</p> <p>Specified reporting structures for teams.</p> <p>Give people a chance to get to know one another and build trust.</p> <p>Develop a set of rules of conduct.</p> <p>Decide on company objectives and assign tasks for achieving them.</p>
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	<p>Understanding of virtual teaming should be raised.</p>		<p>Educate the team on how their job contributes to its overarching objectives.</p> <p>Virtual team members should be visited often by their manager.</p>
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3.13.1 Plan includes certain criteria

To effectively facilitate the introduction of virtual teaming and related technologies, an organization must possess several key features (Breuer et al., 2019). First and foremost, top management assistance is needed: not only are they expected to endorse using virtual teaming, but they are also expected to drive the required reforms to company programs and procedures that are required and make sure that the material requirements are provided.

A fully updated and shared information technology infrastructure must also be in place for all team members to guarantee that advanced inventions and increasing system traffic can be compensated and that widely dispersed team members can have equivalent input into and availability of information and possibilities (Breuer et al., 2019).

In the end, the organization must be adaptable and open to new ideas. It would be ideal if the organization had a language or culture of understanding or at the very least a high level of acquaintance with and comfort with using tools and applications (Breuer et al., 2019).

3.14 Responsibilities at the corporate level in IT sector

The company must now shift its focus to developing rules and procedures to facilitate the formation and administration of virtual teams, assuming the prerequisites outlined above have been satisfied (Breuer et al., 2019). To give focus for upkeep efforts, handle feedback, and assist virtual

teams located at various business locations, accountable group must be defined at the organizational level.

Large businesses need to have a centralised owner for the virtual team effort to ensure a disciplined approach is preserved across the company and that a consistent language is utilised when dealing with virtual teams (Breuer et al., 2019).

It is critical to identify established teams within an organization that are already effectively utilising collaborative effort innovations at the beginning of an official virtual teaming proposal, as their techniques and the application sharing they use could serve as the foundation for the best system for the organization and serve as a '**tool-kit**' for professional teams (Breuer et al., 2019).

The development of corporate-wide training materials is also essential to guarantee that the tools chosen are fully employed consistently, allowing for full participation by all team members despite the diversity and different geographical regions (Breuer et al., 2019). To guarantee that any risks related to new technologies are evaluated systematically, standards should be created at the business level. This will also allow for the proper sharing of lessons gained from one location to another.

Human resource policies about selecting the appropriate virtual team managers and representatives should also be formed, and learning should be supplied to make people aware of the appropriate behaviours affiliated with telecommunications instead of face-to-face interactions, as well as requirements for recognising and satisfying effective virtual teams should be developed (Breuer et al., 2019).

3.14.1 Introduction of new technologies in IT industry

Having a well-structured strategy is very important to success when it comes to technological innovations (Breuer et al., 2019). It is necessary to conduct a thorough assessment of the current techniques in use within the organization as well as the encounter of the potential recipient, as well as the possibility of the IT connectivity, before implementing a new collaborative project technology to make sure innovation "**fits**" the needs of the employee and the company.

Before beginning this mapping process, it is critical to know the functions that the technologies in question will accomplish (Breuer et al., 2019). For any advanced innovation or framework to be developed or customized to meet the requirements of an organization, it is essential that contribution is decided to seek from both future and overall usability of the product, and that the assistance of various stakeholders, such as the organization's culture, be developed early in the project's lifecycle.

There should be a clear identification of system specialists and advocates to assist in adopting the new technologies and understand the incentives and advantages connected with them (Breuer et al., 2019). For any emerging innovations to be helpful and practical, they should be designed to function with current technologies, platforms, and work processes rather than on their own.

For emerging innovations, continuous engineering support should be made accessible. Their effectiveness should be analyzed both before and after installation to set criteria for determining whether or not they are successful (Breuer et al., 2019).

Finally, appropriate training resources should be produced for all emerging technologies, in addition to guidelines and regulations controlling the usage of the system, and the system's adoption should be carefully planned to coincide with the organization's requirements (Breuer et al., 2019).

4. Practical Part

4.1 Introduction

This chapter contains the research findings and serves as a link between the conceptual framework required to comprehend the actual investigation's conclusions. It is divided into two sections: The analytical approach, as previously indicated, starts in a nutshell. The information in this categorization has been separated into a few separate categories to present a more overall understanding and make building an explicit model more straightforward. In order to identify and examine the role of project management in virtual team management MNCs, especially in the IT field. The report aims to investigate the challenges faced by the organization in managing such a diverse team, so the study employs quality analysis. It is showing the quality analysis is done through the formulating close-ended questionnaires circulated via email. Furthermore, the data collected and presented in the graphical format.

4.2 Research questions

- What are the different project management method for managing virtual team in IT project?
- What are the challenges faced by the MNC diverse workforce?
- What are the obstacles that virtual team need to overcome for complete effective virtual project?

4.3 Interview questionnaires

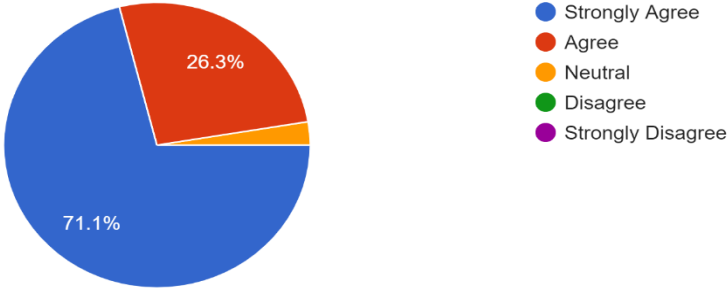
The followings section examines and calculate the frequency and cumulative frequency response form the participant. It is generally identifying with the graphical representation.

Question 1

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	27	71.1	71.1	71.1
Agree	9	26.3	26.3	26.3
Neutral	2	2.6	2.6	2.6

Disagree	0	0	0	0
Strongly Disagree	0	0	0	0
Total	38	100	100	100

Do you agree behavior of employee and communication with manager impact virtual team management?
 38 responses



In the above graph, employee behaviour and communication with supervisors have an influence on virtual team management is shown. 71.1 percent of respondents who strongly agree, poor communication has an impact on virtual management. Many digital solutions are available to help remote teams stay connected, yet these technologies may lack the personalization seen in face-to-face connections. To be good leaders in the era of virtual work, managers must understand how this cultural shift affects their employees' relationships with management. Based on replies to a survey of employee working in a variety of virtual and conventional environments, an actual profile of employees and leaders was constructed using a comprehensive measure of virtual status. A more in-depth assessment of the selected categories demonstrates that one's level of trust in one's boss and impression of management support vary across different types of work partnerships. To be more precise, the data reveals that virtual relationships have lower levels of trust and support when compared to traditional partnerships and even lower levels of trust in free-agent virtual relationships when compared to standard employee virtual connections. In light of the findings, further study and management practise are being considered. According to 26.3 percent of respondents, delegation concerns have an impact on virtual administration. Failures in

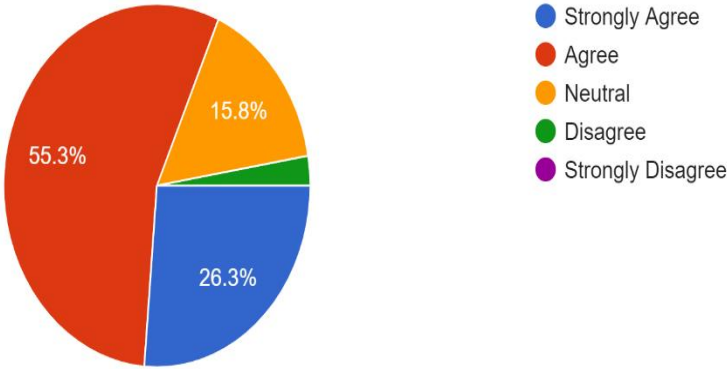
communication can also lead to uncertainty among staff about their duties. Workingethic differences, as well as a lack of personal connection The remaining 2.6 percent is neutral.

Question 2

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	9	26.3	26.3	26.3
Agree	21	55.3	55.3	55.3
Neutral	6	15.8	15.8	15.8
Disagree	2	2.6	2.6	2.6
Strongly Disagree	0	0	0	0
Total	38	100	100	100

Do you agree virtual project management is different from conventional project management?

38 responses



In the given graph, the distinction between virtual project management and conventional project management is that 26.3 percent strongly agree with the statement, since we know that if the pandemic stops soon, millions of enterprises will be pressured into becoming virtual companies.

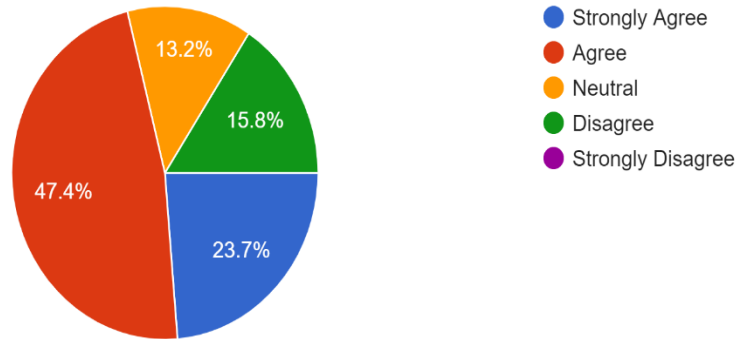
It was not by choice, but it did deliver many valuable lessons to the firm's owners in the process. The technique used by a manager or person in charge to manage a virtual or remote team of individuals is referred to as "virtual project management." Traditional teams, also known as conventional, co-located, or collocated teams, are made up of people who work in close proximity to one another, whereas virtual teams are made up of people who are separated by physical distance but are united by a similar goal. Because businesses all over the world are trying to cut costs to the last penny, the graph shows that 55.3 percent of respondents believe there would be no bills to pay in terms of office space, utility, or other equipment prices. Furthermore, businesses will save a large amount of money that can be used to improve other elements of their operations. In the above case, 15.8 percent is still neutral. There is some disagreement among the 2.6 percent who feel that virtual project management is the same as traditional project management.

Question 3

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	9	23.7	23.7	23.7
Agree	18	47.4	47.4	47.4
Neutral	5	13.2	13.2	13.2
Disagree	6	15.8	15.8	15.8
Strongly Disagree	0	0	0	0
Total	38	100	100	100

Do you think the function of a virtual project manager differs from that of a normal project manager?

38 responses



As shown in the above graph, 23.7% of respondents strongly agree that a virtual project manager is distinct from a normal project manager in several ways. Project management via virtual teams is a technique for managing any project remotely via the use of technology. Normal project managers have a restricted focus, assuring the delivery of limited deliverables, whereas remote project managers monitor and track the work as well as other responsibilities regardless of time zone differences. However, programme managers are also architects who plan and supervise the production of numerous projects in order to ensure that they all work together to further the company's goals of expansion. Aside from those two factors, there's the daily communication that is so critical to the success of a project. Making sure people are paying attention to the communications channel is critical. I need something that is more instantaneous than email. 47.4% of those polled believe the two play distinct roles in the organization. In the meantime, 13.2 percent are undecided. As seen in the graph, 15.8 percent of respondents disagree.

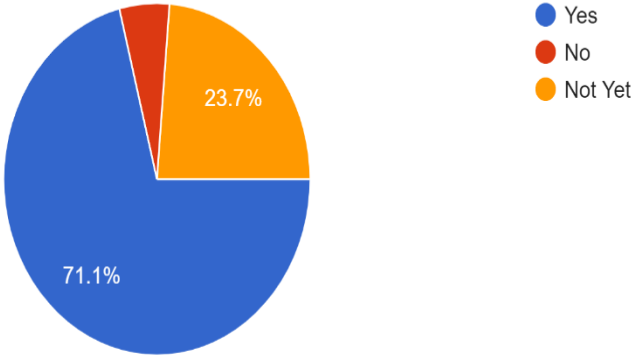
Question 4:

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	27	71.1	23.7	23.7

No	2	5.2	5.2	5.2
Not yet	9	23.7	23.7	23.7
Total	38	100	100	100

Do you implement different project management methods for managing virtual team in IT project?

38 responses



As mentioned in the above graph, 71.1 percent of the respondents said they could use a variety of project management methodologies to manage virtual teams in IT projects. Gathering as much information about the project as possible during the setup phase in order to fully appreciate its complexity, the customer's expectations, and the company's aims When distributing work, keep employees' availability in mind. When working with virtual teams, we must keep in mind the existence of different time zones and how they can affect communication, as well as national holidays and personal days off, not to mention hourly availability, which is especially important when working with part-time employees and freelancers. The shared schedule may help maintain optimal project flow by bringing all of this information together in one location. Furthermore, they will be able to prevent delays caused by the absence of some team members who were not involved in the process from occurring. While in charge of the project, devise a strategy for maintaining a comparable meeting schedule with the team. The use of daily conference calls that include everyone involved in the project might help to determine the current status: what has been

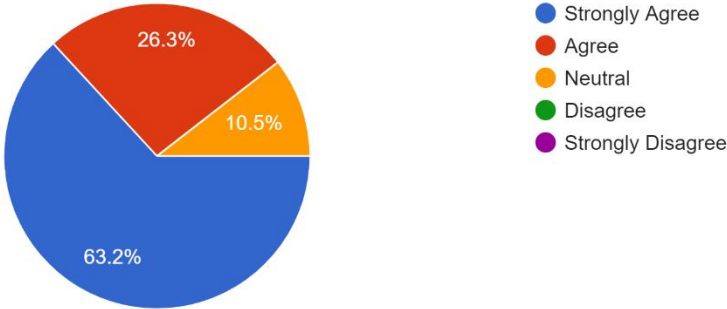
accomplished, what needs to be finished, and how to achieve it. Only 5.2 percent said they would not use new methods in virtual IT projects, and 23.7 percent said they had not started at all.

Question 5:

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	24	63.2	63.2	63.2
Agree	9	26.3	26.3	26.3
Neutral	5	10.5	10.5	10.5
Disagree	0	0	0	0
Strongly Disagree	0	0	0	0
Total	38	100	100	100

Do you agree that basic IT understanding is necessary for managing virtual team?

38 responses



As shown above, 63.2 percent of respondents strongly agree that a basic understanding of information technology is critical for managing a remote workforce. The ability to communicate effectively is crucial for virtual team leaders because they don't always get to meet their team

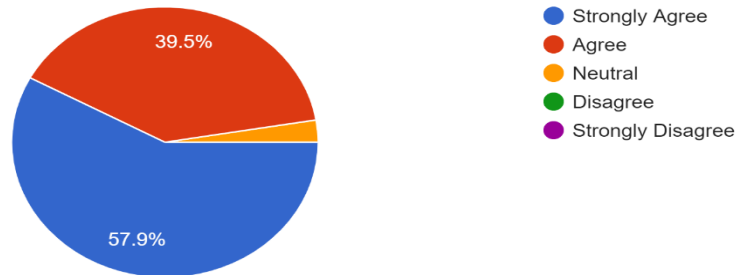
members face-to-face and must instead rely on text messages or phone conversations to get their message through. Working digitally is a challenging endeavour. Technology can fail, reaction times may be slower if operate across time zones, and a lack of face-to-face interaction can make it much more difficult to understand the full meaning of a message have received. Due to the risk of losing the human side of the workplace, virtual teams require leaders who are skilled at making relationships and developing good rapport with both team members and clients. In reality, managing a virtual team brings unique challenges since can't see what individuals are doing or monitor their performance in the same manner. It can only manage, analyse, and reward based on outcomes and results. Most of the time, if lead a virtual team, it will be an international team with individuals from various cultures and time zones. 26.3 percent of people say they agree with the above argument, while 10.5 percent are neutral.

Question 6:

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	22	57.9	57.9	57.9
Agree	15	39.5	39.5	39.5
Neutral	1	2.6	2.6	2.6
Disagree	0	0	0	0
Strongly Disagree	0	0	0	0
Total	38	100	100	100

According to your experience, does computer literacy of the employees influence the work efficiency in virtual team?

38 responses



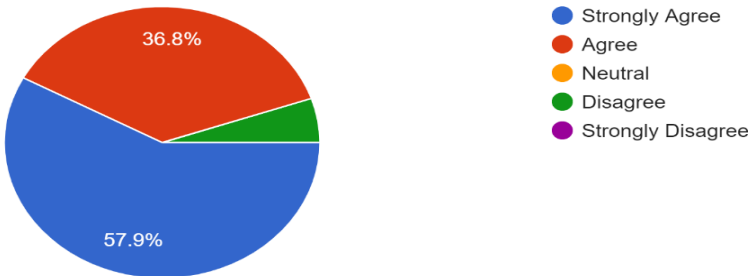
As shown in the graph, 57.9% strongly agree that the computer literacy of the employees influences their work efficiency in virtual teams. It is probable that the employment of information and communication technology in project teams will be problematic in terms of effective communication cohesion, connection development, dispute resolution, information coordination, and team identity, with a detrimental influence on total team performance. Concerns have been expressed about the use of technology in virtual teams, including inadequate task-technology, a synchronicity of communication, and a loss in communication depth, among other things. It implies that team members will be happier and perform better if they employ a variety of technologies to do the duties allocated to them. Information and communication technologies encompass both synchronous and asynchronous communication systems. When it comes to the consequences of various types of information and communication technology, there is a lack of consistency. While some authors argue that asynchronous communication reduces the frequency of messages and increases uncertainty, others argue that communicating using both synchronous and asynchronous technologies is effective in reducing coordination issues when team members' working hours overlap and that asynchronous communication allows teams to "exchange information more efficiently due to fewer interruptions." According to the authors, computer-mediated communication techniques with a low degree of information richness hamper a team's ability to organise their work, communicate ideas, and reach consensus on issues. 39.5 percent agree, while 2.6% are undecided.

Question 7:

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	22	57.9	57.9	57.9
Agree	13	36.8	36.8	36.8
Neutral	3	5.3	5.3	5.3
Disagree	0	0	0	0
Strongly Disagree	0	0	0	0
Total	38	100	100	100

Do you think dealing with the employee’s motivation help to better organization performance in the virtual team project?

38 responses



As shown in the above graph, 57.9% strongly agree that employees' motivation helps to better organizational performance in virtual team projects. To keep employees interested and connected, create a virtual workspace for them. The organization should invest in technology solutions such as Virtual Conferencing Software and Collaboration Tools to improve professional and personal conversations among employees. Because remote teams do not meet in person, it is common for things to be lost in translation. If the overall internal communication strategy does not focus on preserving clarity, communication gaps between workers and low engagement among remote employees may arise. Employees that are shut out of the office are frequently dissatisfied. As a manager or team leader, may motivate remote employees to pursue personal and professional

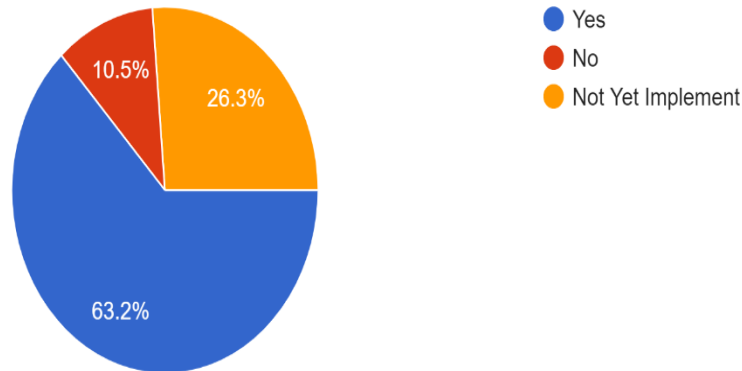
development. Create a visual scoreboard that records individual and team achievements and motivates employees to achieve their goals. Providing flexibility and focusing on success can aid in the management of remote people. Outline the bigger group and individual performance tasks. Provide workers with a defined goal and a time window for achieving it. Employees will be more motivated to achieve their objectives. Recognizing employees' efforts and successes is crucial to the overall success of a firm. Any company that wants to survive and thrive needs constant input. Employees, too, require frequent feedback in order to progress. Technology is crucial in today's remote working environment for keeping the team connected. It's never been easier to form online organizations and have virtual meetings. Once they have set their roles and responsibilities, they must trust them to perform their tasks. It's hard to find out what a remote worker is working on during the day. 36.8% agree with this, and 5.3% remain neutral.

Question 8

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	24	63.2	63.2	63.2
No	4	10.5	10.5	10.5
Not Yet Implement	10	26.3	26.3	26.3
Total	38	100	100	100

Do you implement any leadership approach suitable for managing cultural diversity in virtual team?

38 responses



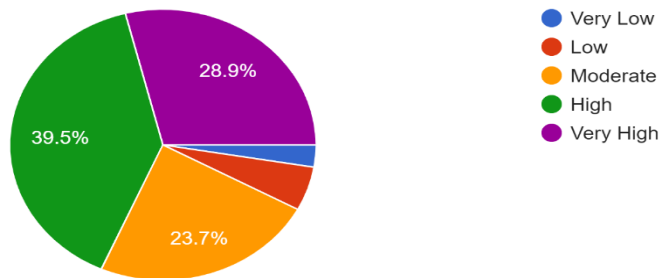
In the above graph, 63.2% said yes, they can implement any leadership approach suitable for managing cultural diversity in a virtual team. The most common types of diversity are those based on race, ethnicity, and gender. Diversity, on the other hand, goes beyond gender and race. According to the government's Office of Personnel Management, greater diversity is thought to contribute to better innovation, which in turn leads to higher income. Moreover, as per the Office of Human Resources, variety may lead to a higher return on recruitment and retention efforts since companies that embrace diversity are better positioned to attract and retain top people for longer periods of time. Diversity, on the other hand, is a sensitive issue that demands careful thought and application. Diversity and inclusion consultants have the resources, skills, and sensitivity to manage the debates and changes that precede the implementation of a diversity and inclusion programme. These specialists also have regulatory knowledge, which they may use to help companies comply with applicable regulations. Once 've decided to diversify, should communicate on a regular basis in terms of diversity, cooperation, and inclusion. The fact that they're acknowledging where they've come from and stating their future aspirations contributes to a shift in the organization's culture. When 've got a varied team, r dedication to leadership diversity doesn't stop there. In order to keep the company diverse and keep new employees, might want to set up employee resource groups. 10.5% said no to this and 26.3% said that it is yet to be implemented.

Question 9

	Frequency	Percent	Valid Percent	Cumulative Percent
Very Low	1	2.6	2.6	2.6
Low	3	5.3	5.3	5.3
Moderate	9	23.7	23.7	23.7
High	15	39.5	39.5	39.5
Very High	10	28.9	28.9	28.9
Total	38	100	100	100

What is your opinion on the significance of software and tools that are used to communicate within the team?

38 responses



As shown in the above graph, software and tools that help people work together are very important to 28.9% of the people who took the survey. Organizations may use communication technology to monitor sentiment, wellness, and engagement qualities all within the confines of purpose-built software, allowing them to make educated decisions. Communication systems usually offer data collection tools that allow staff to view statistics, trends, and other information in real time. Communication tools are critical in the workplace for keeping employees motivated and informed.

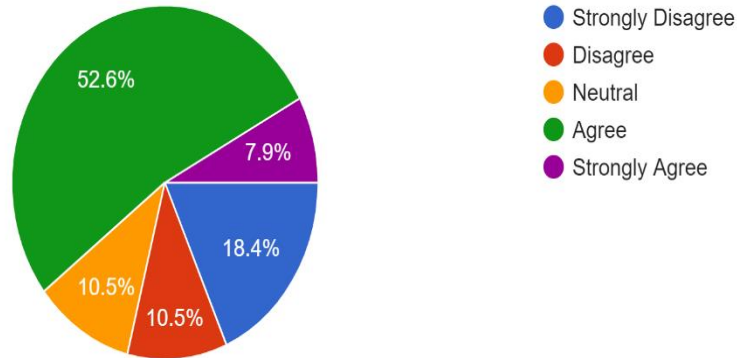
They seek to increase communication between management and employees, as well as among co-workers. Texting and calling apps Messaging services are increasingly supplanting email as the primary form of communication for most people. File-sharing programmes are often referred to as file-sharing services. There are video conferencing tools accessible. There is document editing software accessible. There are project management platforms accessible. They are a modern hybrid that blends the traditional functionality of intranets and extranets with new high-tech staff solutions to form a unified whole. Communication technologies, which are utilised by organization s, businesses, and corporate bodies all over the world to help with a variety of tasks, have profoundly changed the way individuals accomplish their work for the better. 39.5 percent of people who took the poll said that software and tools that help people work together are very important. Respondents believe that the relevance of software and tools used to engage within a team is still moderate. 7.9% said "low" as shown in the graph.

Question 10

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	3	7.9	7.9	7.9
Agree	20	52.6	52.6	52.6
Neutral	4	10.5	10.5	10.5
Disagree	4	10.5	10.5	10.5
Strongly Disagree	7	18.4	18.4	18.4
Total	38	100	100	100

Do you agree technological perspective for virtual collaboration impacts team's performance?

38 responses



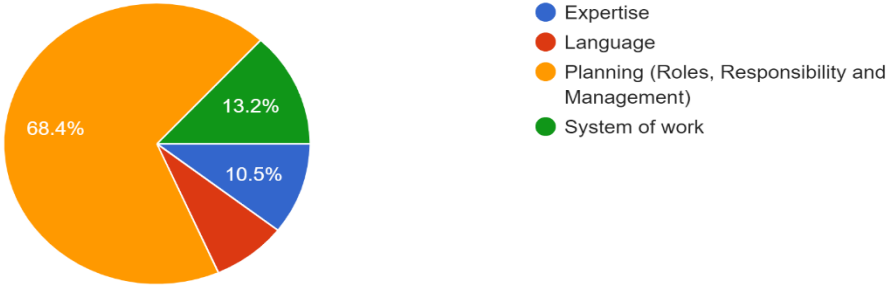
As shown in the above graph, when asked if the technology used for virtual collaboration has an impact on team performance, 18.4 percent strongly disagree, whereas 10.5 percent strongly disagree. In the current situation, 10.5 percent of the total is neutral. 52.6 percent of those questioned strongly disagree with the notion that the technological perspective on virtual collaboration affects team effectiveness. As a result of the widespread use of information technology and the increasing geographic dispersion of operations conducted by various organizations, virtual teams have evolved as an alternate organizational structure. Virtual teams have the power to drastically alter the workplace atmosphere. This article provides a review of previously published work on virtual team collaboration. The review is organized around two research perspectives, namely, technological and managerial methods, which are described further below. This study focuses on two significant factors that contribute to the efficiency of virtual team collaboration: the environment in which the collaboration takes place and the collaboration style adopted. In contrast to the former, which is distinguished by knowledge and teamwork, the latter is distinguished by technical media and leadership characteristics. We offer a model based on this categorization and explore potential future study topics, with a particular focus on the implications of this classification for organizational collaboration. According to the graph, 7.9 percent of people strongly agree with the statement.

Question 11:

	Frequency	Percent	Valid Percent	Cumulative Percent
Expertise	4	10.5	10.5	10.5
Language	3	7.9	7.9	7.9
Planning	25	68.4	68.4	68.4
System Of Work	6	13.2	13.2	13.2
Total	38	100	100	100

What are the obstacles that a virtual team must overcome in order to complete an effective virtual project?

38 responses



As shown in the above graph, 68.4% said that planning, like roles, responsibilities, and management, are the obstacles that a virtual team must overcome in order to complete an effective virtual project. Some companies are concerned that their employees' morale would deteriorate if they were not working. This isn't always the case; in fact, many people are driven to work remotely. According to 13.2 percent of respondents, a virtual team's method of work is the obstacle that a virtual team must overcome to effectively complete a virtual project. Remote meetings may look strange at first, but they are easy to set up. First, be sure remote meeting technology is adequate for the job. We propose using an interactive whiteboard that is linked to people's phones. 10.5 percent of those polled declared themselves to be experts. Working with a remote team necessitates planning. Each task must be planned, assigned, and commented on. It is best to use a tool like

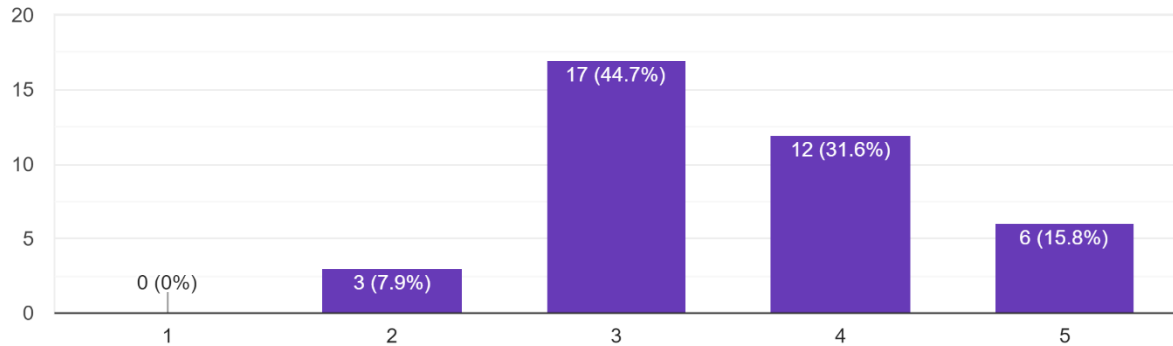
Trello. Trello is a project management application that uses boards to track the work of teams. 7.9 percent of respondents cited language as a hindrance to completing a successful virtual assignment. It may be difficult at first, especially if are used to having employees in the office. Meetings are an excellent way to do this, as is having customised contracts for employees to sign outlining communication objectives. If make them aware of the value of virtual team collaboration and check in on a regular basis, can easily create an open workplace where employees can express themselves. Assure staff that care about them and are available to talk about any concerns they may have.

Question 12:

	Frequency	Percent	Valid Percent	Cumulative Percent
1	0	0	0	0
2	3	7.9	7.9	7.9
3	17	44.7	44.7	44.7
4	12	31.6	31.6	31.6
5	6	15.8	15.8	15.8
Total	38	100	100	100

Many virtual team members are not satisfied with virtual collaboration tool. What is your opinion about the situation? You can rank from 1 to 5 impact scale.

38 responses

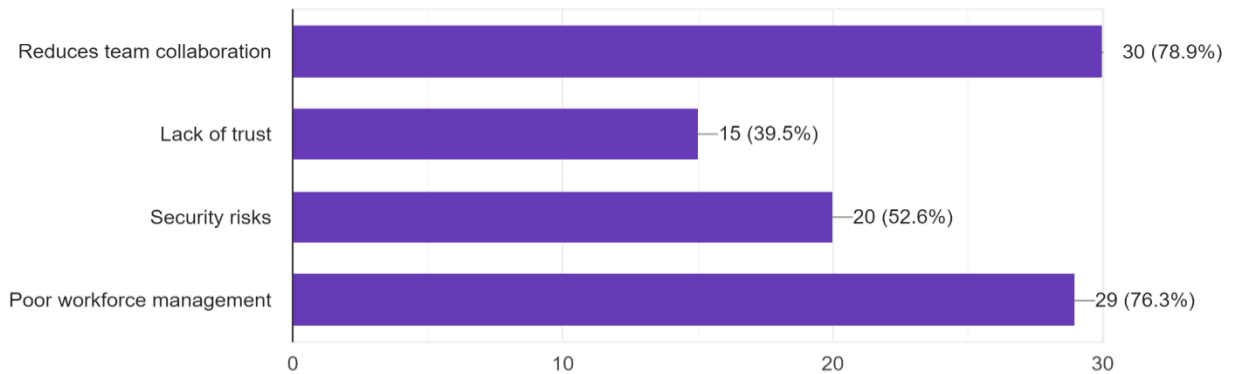


As shown in the above bar graph, 7.9% said that there is low impact on virtual team members who are not satisfied with the virtual collaboration tool. 44.7% have a neutral response. Many virtual team members are dissatisfied with virtual collaboration tools, with 31.6% having a significant impact. Many digital solutions assist faraway teams in staying connected, yet many are impersonal. Nominations As a result of Divergent's poor performance, staff duties are also unclear. Workplace Ethic Personality Deficiency It is vital to cultivate a culture of open communication at work. When team members are unable to freely express themselves, or when there is no shared platform for all team members to express themselves, collaboration suffers. A hazy goal is difficult to attain. Team members may labour inefficiently if there is no clear picture of the final objective, lowering productivity, motivation, and efficiency. Nobody works in the same manner. Some people prefer to work alone, while others thrive in groups. Furthermore, teams usually contain people from a variety of backgrounds and situations. Collaboration necessitates trust, which is difficult to establish among team members who do not communicate. One of the most significant barriers to workplace productivity is a lack of feedback. Poor thinking spreads quickly, and one person's negative view may have an influence on the entire organization. Organizations have long struggled with silos, and those with widely dispersed teams have an extra challenge. Adhesion snare as previously said, some employees prefer to work alone. This, however, may result in team isolation and a lack of communication.

Question 13:

Which of the following three are most detrimental qualities of virtual projects?

38 responses



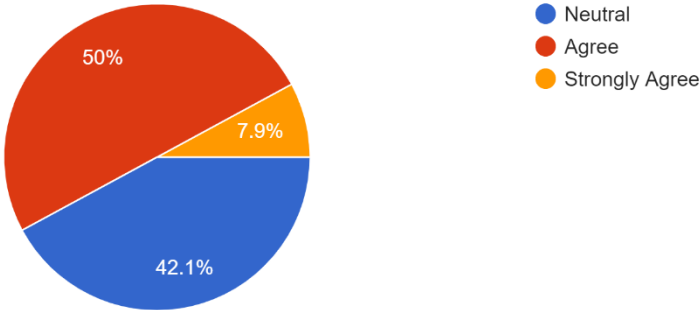
As shown in the above bar chart, 78.9% said that reducing team collaboration is the main quality of virtual projects. Anyone may use a virtual whiteboard to draw, write, or design online. Many solutions now offer flawless video conferencing with up to 50 users at once, enabling online remote collaborative meetings. For remote teams, casual communication is essential. Simply share boards with colleagues, either external or internal. may pick different access levels depending on who share the board with. Keep track of time with our new timer. Everyone's movements can be easily seen during a meeting or when working on a project together. 39.5% said that reducing team collaboration is the main quality of virtual projects. In order for virtual teams to achieve peak performance, trust and effective communication among team members must be developed. One critical component of developing robust communication across virtual teams is ensuring team members have a high level of team trust. 52.6% are talking about security risks. Attacks by viruses, malware, and ransomware on virtual machines These attacks might be carried out by malicious VM images or by inexperienced people. If infected VMs are not isolated and guarded appropriately, they might spread malware throughout the whole virtual infrastructure. 76.3% have poor workforce management. So, as a result, reducing team collaboration, poor workforce management, and security risks are the most detrimental qualities.

Question 14

	Frequency	Percent	Valid Percent	Cumulative Percent
Agree	19	50	50	50
Neutral	16	42.1	42.1	42.1
Strongly Agree	3	7.9	7.9	7.9
Total	38	100	100	100

Do you agree utilizing virtual team management technique help to better performance of the employees?

38 responses



According to the graph above, half of those polled believe that using virtual team management techniques can help employees perform better. Online employees require high-quality and dependable equipment since it is the only way to ensure smooth and uninterrupted work. The first point is more technical, while the second is more basic in terms of performance. Specifically, they must carefully consider company objectives and define the appropriate targets and deliverables for each member of the virtual team. Micromanagement does not function in an online setting. Therefore, employees must learn to appropriately delegate jobs. Every member of the digital workforce should be aware of tasks and should concentrate on a single project at any given time. Although it may appear paradoxical, our experience has shown us that having several communication channels may help virtual teams work more efficiently. The fact that cannot meet with colleagues in person does not exclude from organising online meetings. Because this is the

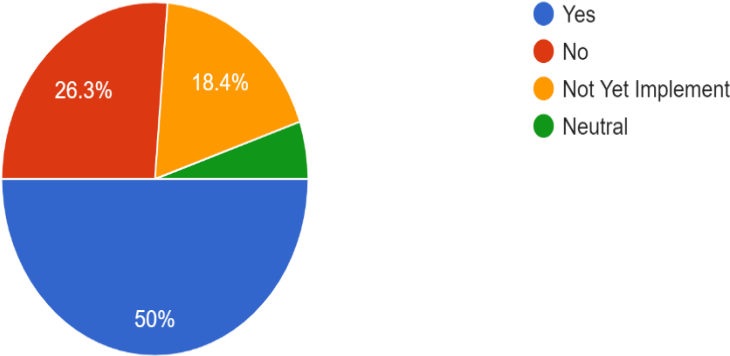
foundation of virtual work, we urge to plan meetings on a regular basis and address the most critical issues with r co-workers. Traditional internet communication methods are always important, but project management technologies may increase staff efficiency. If want the most talented members of r team to stay for a long time, must acknowledge their accomplishments and reward top performers. 7.9% strongly agree on utilising virtual team management. 42.1% remain neutral on this.

Question 15

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	19	50	50	50
No	10	26.3	26.3	26.3
Not Yet Implement	7	18.4	18.4	18.4
Neutral	2	5.3	5.3	5.3
Total	38	100	100	100

Have you proposed any future strategy for managing the project in virtual team?

38 responses



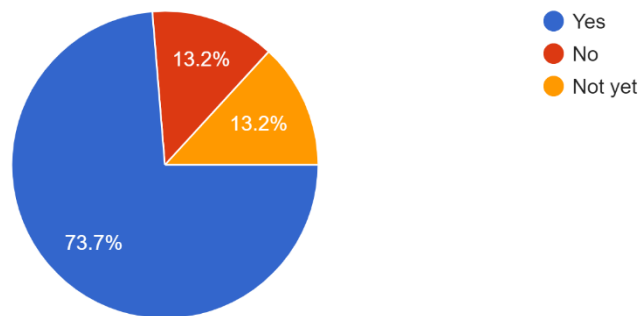
As shown in the graph, 50% of respondents agreed that any future plan for project management in a virtual team should be provided. A collaborative leadership approach is appropriate for a remote team because the project manager cannot be physically present in each location to meet with each stakeholder. When the circumstances call for it, each team member assumes leadership, ensuring that he or she communicates effectively with the project manager and the other members of the team as needed. Project management via virtual teams is a method of managing any project remotely by utilising virtual teams. This involves staying on top of the work as well as other tasks, no matter where they are or what time zone, they are in. This is because labour is scattered across many time zones rather than being concentrated in a single place. Meetings that are held at a distance Remote meeting may look odd at first, but they are actually quite straightforward to plan and execute. Time Zones are defined as follows: Workplace ethics Keeping track of who is where Communication Dissimilarities in culture Employees' hardware and software needs Keeping everything in order When asked whether they would recommend any future solution for project management in a virtual team, 26.3 percent said no. 18.4 percent of respondents stated that they had not yet adopted.

Question 16

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	28	73.7	73.7	73.7
No	5	13.2	13.2	13.2
Not Yet	5	13.2	13.2	13.2
Total	38	100	100	100

Have you implemented communication platform for virtual team management?

38 responses



As shown in the graph, 73.7% said yes that they implemented a communication platform for virtual team management. To be efficient when working online, people must be able to trust one another. Trust does not appear in a magical way. It begins to take shape when bring a team together for training or team-building events, and it continues to grow when leaders consistently set clear expectations and the team as a whole meets them. In a physical office setting, "busy work" is sometimes misconstrued as genuine work. Controlling results is critical while working in a virtual setting because can't see what other people are doing. Set realistic goals and concentrate on outcomes rather than day-to-day activity. It is vital that the team set aside time on a regular basis to communicate both successes and potential concerns to the rest of the organization. Therefore, people stay on track, and the discipline of a team check-in helps everyone. E-mail and instant messaging are important tools in modern workplaces, but they must be accompanied by a new culture of effectiveness. Superior performance and a shared feeling of pride in the company's principles are essential for creating a sense of togetherness among personnel. People want to feel like they belong, and a strong corporate culture gives them both the sense of belonging and the confidence that they understand the rules of the road, both for themselves and for the organization. When employees work from home, it is important to set up a set of responsiveness standards that fit the company's culture. 13.2% said no to this. 13.2% said that they had not implemented yet.

5 Result and discussion

5.1 Result

Attributes	Frequency	Percentage	Cumulative percentage
Employee behaviour and communication	27	71.1	71.1
Virtual project management	9	26.3	26.3
Function of virtual project manager	9	23.7	23.7
Implementing different project management method	27	71.1	23.7
Necessary of the basic IT understanding	24	63.2	63.2
Significance of computer literacy among employee	22	57.9	57.9
Importance of employee motivation in management	22	57.9	57.9
Leadership approach	24	63.2	63.2
Significance of software in tool for communication	15	39.5	39.5
Technology perspective	20	52.6	52.6

Obstacles for overcoming managing virtual team Planning	25	68.4	68.4
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5.2 Discussion

According to the study's objectives, the following segment of the findings concentrates on the extraction of analysis results through closed ended questionnaires and literature studies and their presentation in accordance with those objectives (Burrell, 2020). As mentioned in the research aims, this section highlights the recognizing the driver for the managing virtual team in MNC's in the IT filed. There are majorly three research questions for this study, and the conclusions of this discussion will be the same as the responses to those questions.

5.2.1 Managing distributed projects issues

Research objectives 1: Virtual enterprises are composed of many different, dynamic and temporary distributed business processes in different, widely dispersed areas or countries. Communication is often seen as the most important factor contributing to the success of individuals, project teams, and organizational growth (Burrell, 2020). Effective communication is vital for virtual teams that cannot meet in face-to-face settings (Baker 2002). One challenge for managing communication among distributed processes is that advanced technology is needed to offer an environment that provides reliable and timely task-related information sharing and a support for rapid decision-making. Baker's (2002) study found that for virtual teams, the addition of video to audio-based communication can result in improved decision making when compared to other collaborative technologies. Another challenge is coordination. As the business processes are performed by various enterprises, the management of the value-chain is a complex task, especially when some degrees of coordination are envisaged for support.

5.2.2 Outsourcing challenges

Research objectives 2: Research shows that firms prefer to outsource facing competition with scale economies (i.e., the cost per unit of demand is decreasing in demand) even if the companies they outsource to do not have better technology than the firms' technology (Burrell, 2020).

Because scale economies make price competition brutal, firms can benefit from outsourcing to mitigate price competition (Burrell, 2020). Most companies choose outsourcing because it can reduce cost and improve performance, but there could be hidden cost that managers couldn't pinpoint or aren't aware of. These hidden costs could lead to deemed failure. As outsourcing increases, the need for understanding better relationships between parties, management of distributed vendors and identifying hidden cost become more critical. For distributed project management due to outsourcing, it is important to define the relationship among the participants. Kern (2002) uses interaction approach to study the relationship in information technology outsourcing and found that both formal and informal information exchange pervade all interactions (Burrell, 2020). Information exchanges in fact define a key operational effectiveness measure in outsourcing relationship. To ensure good communication is not an easy process, it often requires thorough planning of an appropriate communication structure.

The critical factors affecting virtual team's development include the team characteristics (e.g., size, geographic dispersion and members shared work experience) and task characteristics (e.g., complexity, uncertainty, ambiguity and difficulty), information and communication technology choice, project management strategies, communication patterns and information sharing and processing. These factors interplay with each other, and their inter-relationship are potentially relevant to the functioning and effectiveness of virtual teams (Burrell, 2020). Studies using collaborative technologies have studied variables such as problem solutions generated, number of options and ideas generated, and satisfaction with the outcome were used in experimental. These studies measure the effect of process support factors such as anonymity, group memory, parallel communication and certain media effects in computer support for structuring face-to-face group processes.

The main purpose and goal of this research is to explore the challenges of software project management in a virtual or remote working environment, to focus on how the highlighted challenges regarding to a virtual context affect relationships and performance of virtual team, how to build mutual trust within members of virtual teams and how higher leadership influence a virtual setting (Burrell, 2020). Initially through theoretical framework we have concluded some issues regarding virtual teams that helped us in making questionnaire. We distributed our questionnaire

to different People who worked remotely for some organizations (Burrell, 2020). Next, the studied each questionnaire to conclude the success factors for managing virtual teams.

The implementation of a virtual teaming strategy enables organizations to work across geographical and time boundaries, improve responsiveness, and be more adaptive to their projects and clients (Burrell, 2020). A virtual teaming strategy increases the diversity of the teams, which can bring innovation and a range of talent to a project that improves the effective nature of virtual teams to significantly boost productivity. However, the impact of this strategy on how teams effectively work together is not necessarily acknowledged in the operational culture of the organization involved or addressed through the leadership of project managers.

Advantages for implementing a virtual team include:

- The ability to maintain project productivity 24/7 across global time zones
- Access to a greater resource pool of experts to deliver projects
- Lower costs resulting from outsourcing and shared knowledge across an organization.

Challenges and difficulties (which differ to those faced when working within a co-located team) include:

- Developing trust in the team due to the lack of face-to-face interaction
- Monitoring and managing team activities
- Problems collaborating across geographic distances and without personal interaction
- Communication difficulties and cultural differences

Virtual teams are becoming more widely adopted as a strategy to deliver infrastructure design projects globally (Burrell, 2020). The implementation of virtual teams enables organizations to work across geographical and time boundaries and to also improve responsiveness to their projects and clients. Advances in communication and information technology create new opportunities for organizations to build and manage virtual teams. Such teams are composed of employees from different genders, experiences, back grounds and geographic locations. Virtual teams have become a norm for organizations whose members work across disparate geographical locations, relying primarily or exclusively, on the usage of Information and Communication Technology (ICT) for the completion of common goals.

5.2.3 Information sharing in virtual teams

Research objective 3: Virtual teams give individuals a chance to plug and play, cooperate and strive, share knowledge, information and work. The degree of interaction and interdependence between the team members is the first dimension on which definitions of virtual teams may differ (Chan et al., 2018). As information sharing is a vital part of a team's success, organizations often exchange persons within virtual teams to minimize the effects of loss of technical or nontechnical information. It is vital for organizations to encourage individuals within the organization to share information with other members. Information sharing happens once individuals who share a mutual purpose and experience, come together to exchange ideas (Chan et al., 2018). The process of information sharing among individuals involve the conversion of the knowledge held by an individual into a form that can be understood, absorbed, and used by other individuals. An interruption or breakdown happens when an individual of the team withholds the information from another. Sharing information becomes a tough job when teams are spread out in distant geographical locations. Hence, it becomes essential to develop mechanisms in virtual environments, through which knowledge and information can be transferred from one individual to another. In fact, sharing information amongst team members has been shown to enhance the performance of the teams. However, effective knowledge sharing between members is more difficult in virtual teams than in traditional forms of teams.

6 Conclusion

The purpose of this thesis was to understand the virtual team management in IT sector as well as which strategy used for managing team. The study's goal was separated into many research questions, on which the whole investigation was built. The analysis phase was responsible for responding to the following study questions to meet the research's goal.

A virtual team is a collection of persons who work together to achieve a common goal for a joint enterprise. As a result of this progression, global project management emerged. Virtual teams may collaborate across time and geographical barriers by employing contemporary computer-driven technology. In the Methodology part, academic publications and research papers using the selection process described in the Methodology section. Virtual team management is a collection of tasks that includes the steps of gathering, constructing, coordinating, managing, and overseeing the virtual cooperation that takes place online. When working on a project with a team, teamwork is critical.

However, in remote teams, these challenges need extra attention and remain a concern. A company's personnel must be in constant contact. Most companies find it challenging to stay in touch with group members and others in current environment. There is different type of perspectives like technological, in which different tools are used for managing virtual team like remote control and accessibility, web conferencing, messaging, services, E-mail. Human perspective and Operational perspective are there as well. A company-wide policy including top management and workers should be adopted to formalise the use of virtual teams.

IT projects are notorious for being late, overbudget, and underperforming. These solutions include the development of complicated process improvement approaches and the use of codified project management procedures to track costs, schedules, and results. Co-workers may be located almost anywhere in the world. In other words, “monitoring the team's progress” allows them to address their problems and improve the project's results via appropriate feedback. Projects are not continually monitored and controlled while working remotely. Because of this, initiatives may swiftly go off course. That's because team mobility creates ambiguity, and communication routes aren't always optimal. Traditional Project Management can't swiftly resolve ambiguities or respond to changes in the environment. To address geographical and temporal dispersion, virtual

teams use ICT such as email, online meetings, and telephone. Virtual teams' communication varies from traditional team cooperation due to the lack of in-person interaction. Assists in understanding the study results by providing a conceptual framework for understanding the research findings. It contains two parts: As stated earlier, the analytical technique begins with a summary. So that constructing an explicit model is easier, the information has been divided into many groups. And results are shown above in graphical format.

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Appendix

Closed ended questionnaires

- 1) Do you agree behaviour and communication are essential for the virtual team management?
 - A. Strongly Disagree
 - B. Strongly agree
 - C. Neutral
 - D. Agree
 - E. Disagree

- 2) Do you agree virtual project management is different conventional project management?
 - A. Strongly Disagree
 - B. Strongly agree
 - C. Neutral
 - D. Agree
 - E. Disagree

- 3) Do you think the function of a virtual project manager differs from that of a normal project manager?
 - A. Strongly Disagree
 - B. Strongly agree
 - C. Neutral
 - D. Agree
 - E. Disagree

- 4) Do you implement different project management methods for managing virtual team in IT project?
 - A. Yes
 - B. No
 - C. Not yet implement
 - D. Neutral

- 5) Do you agree that a better IT understanding is necessary for managing virtual team?
- A. Strongly Disagree
 - B. Strongly agree
 - C. Neutral
 - D. Agree
 - E. Disagree
- 6) According to your experience, does a computer skill of the employees influence the work efficiency in virtual team?
- A. Strongly Disagree
 - B. Strongly agree
 - C. Neutral
 - D. Agree
 - E. Disagree
- 7) Do you think a dealing with the employee's motivation help to better organization performance in the virtual team project?
- A. Strongly Disagree
 - B. Strongly agree
 - C. Neutral
 - D. Agree
 - E. Disagree
- 8) Do you implement any leadership approach suitable for managing cultural diversity in virtual team?
- A. Yes
 - B. No
 - C. Not yet implement
 - D. Neutral

- 9) What is your opinion on the significance of software and tools that use to communicate with the team?
- A. Very high
 - B. High
 - C. Moderate
 - D. Low
 - E. Very low
- 10) Do you agree technological perspective for virtual collaboration impacting team's performance?
- A. Strongly Disagree
 - B. Strongly agree
 - C. Neutral
 - D. Agree
 - E. Disagree
- 11) What are the obstacles that a virtual team must overcome in order to complete an effective virtual project?
- A. Expertise
 - B. Language
 - C. Planning (Roles responsibility and management)
 - D. System of work
- 12) Many virtual team members are not satisfied with virtual collaboration tool. What is your opinion about the situation? You can rank from 1 to 5 impact scale.
- A. 1: High impact
 - B. 2: Moderate impact
 - C. 3: Neutral
 - D. 4: low impacted
- 13) Which of the following three most detrimental qualities of virtual projects?

- A. Reduce team collaboration
- B. Lack of trust
- C. Security risks
- D. Poor workforce management

14) Do you agree utilizing virtual team management technique help to better performance of employee?

- A. Strongly Disagree
- B. Strongly agree
- C. Neutral
- D. Agree
- E. Disagree

15) Do you proposed future strategy for managing the project in virtual team?

- A. Yes
- B. No
- C. Not yet implement
- D. Neutral

16) Have you implement communicating platform for virtual team management?

- A. Yes
- B. No
- C. Not yet implement
- D. Neutral

Responses

Timestamp	Username	Do you agree behavior of employee and communication with manager impact virtual team management?
2022/03/19 10:12:44 AM GMT+2	meetparikh.ind@gmail.com	Strongly Agree
2022/03/19 10:13:37 AM GMT+2	vyas.het19@gmail.com	Strongly Agree
2022/03/19 10:17:31 AM GMT+2	jigneshkdhanani@gmail.com	Agree
2022/03/19 10:18:52 AM GMT+2	chiragchalke09@gmail.com	Strongly Agree
2022/03/19 10:19:38 AM GMT+2	prashasti.bhargav@gmail.com	Strongly Agree
2022/03/19 10:29:17 AM GMT+2	hardikahir5201@gmail.com	Strongly Agree
2022/03/19 12:01:24 PM GMT+2	nirumaru85@gmail.com	Strongly Agree
2022/03/19 2:19:44 PM GMT+2	anubraham@gmail.com	Agree
2022/03/20 1:38:24 PM GMT+2	tanviraval98.tr@gmail.com	Strongly Agree
2022/03/20 1:44:38 PM GMT+2	dhruvalpatel556@gmail.com	Neutral
2022/03/20 1:46:27 PM GMT+2	hitmorad94@gmail.com	Strongly Agree
2022/03/20 2:04:16 PM GMT+2	hardikpatel16628@gmail.com	Strongly Agree
2022/03/20 2:13:28 PM GMT+2	Anamrizvi1902@gmail.com	Strongly Agree
2022/03/20 2:13:46 PM GMT+2	ujjwalarora1991@gmail.com	Agree
2022/03/20 2:16:42 PM GMT+2	snaman007@gmail.com	Strongly Agree
2022/03/20 2:20:01 PM GMT+2	abhijitnawale.an@gmail.com	Strongly Agree
2022/03/20 2:21:24 PM GMT+2	jigarthakkar9315@gmail.com	Agree
2022/03/20 2:23:54 PM GMT+2	nihit.rai01@gmail.com	Agree
2022/03/20 2:25:06 PM GMT+2	ruddra.thakr@gmail.com	Strongly Agree
2022/03/20 2:30:33 PM GMT+2	yashmodi007@gmail.com	Strongly Agree
2022/03/20 2:30:37 PM GMT+2	prashantgupta.981@gmail.com	Agree
2022/03/20 2:37:02 PM GMT+2	pm15shashankp@iimidr.ac.in	Agree
2022/03/20 2:38:18 PM GMT+2	kartiksoni681@gmail.com	Strongly Agree
2022/03/20 2:40:26 PM GMT+2	pyash1807@gmail.com	Strongly Agree
2022/03/20 2:42:40 PM GMT+2	anisha2593@gmail.com	Strongly Agree
2022/03/20 2:46:13 PM GMT+2	tkar2k@gmail.com	Strongly Agree
2022/03/20 3:09:21 PM GMT+2	aishwarya9110@gmail.com	Strongly Agree
2022/03/20 3:10:22 PM GMT+2	itsme.arnabm@gmail.com	Strongly Agree
2022/03/20 3:17:02 PM GMT+2	axaydarji94@gmail.com	Strongly Agree
2022/03/20 3:23:21 PM GMT+2	vaibhav.mahagaonkar@gmail.com	Agree
2022/03/20 3:31:11 PM GMT+2	kaushal6998@gmail.com	Strongly Agree
2022/03/20 3:40:48 PM GMT+2	6ydude.aditya@gmail.com	Agree
2022/03/20 4:42:44 PM GMT+2	itishreeshah@gmail.com	Agree
2022/03/20 7:26:59 PM GMT+2	harshnakumari1695@gmail.com	Strongly Agree
2022/03/20 7:45:58 PM GMT+2	nikisharma295@gmail.com	Strongly Agree
2022/03/20 8:00:50 PM GMT+2	urvishkavde665@gmail.com	Strongly Agree
2022/03/20 9:31:10 PM GMT+2	radhiksoni21@gmail.com	Strongly Agree
2022/03/21 12:42:51 AM GMT+2	baranwal.sahaj14@gmail.com	Strongly Agree
2022/03/22 9:48:04 PM GMT+2	muskaanbaksh12@gmail.com	Strongly Agree

Do you agree virtual project management is different from conventional project management?	Do you think the function of a virtual project manager differs from that of a normal project manager?
Agree	Agree
Neutral	Disagree
Neutral	Agree
Neutral	Strongly Agree
Agree	Agree
Agree	Strongly Agree
Agree	Agree
Agree	Neutral
Agree	Agree
Agree	Agree
Agree	Agree
Neutral	Strongly Agree
Agree	Agree
Neutral	Agree
Strongly Agree	Neutral
Strongly Agree	Strongly Agree
Agree	Disagree
Disagree	Disagree
Agree	Neutral
Strongly Agree	Strongly Agree
Agree	Agree
Agree	Agree
Strongly Agree	Neutral
Strongly Agree	Strongly Agree
Agree	Agree
Strongly Agree	Agree
Neutral	Disagree
Strongly Agree	Agree
Strongly Agree	Strongly Agree
Agree	Agree
Strongly Agree	Strongly Agree
Strongly Agree	Agree
Agree	Strongly Agree
Agree	Disagree
Agree	Agree
Agree	Neutral
Agree	Disagree
Agree	Agree
Agree	Neutral

Do you implement different project management methods for managing virtual team in IT project?	Do you agree that basic IT understanding is necessary for managing virtual team?
Yes	Strongly Agree
Yes	Agree
Yes	Strongly Agree
No	Neutral
Yes	Agree
Yes	Agree
Yes	Agree
Yes	Strongly Agree
Yes	Agree
Yes	Strongly Agree
Yes	Strongly Agree
Yes	Agree
Yes	Neutral
Yes	Agree
Yes	Neutral
Not Yet	Strongly Agree
Yes	Strongly Agree
No	Agree
Yes	Agree
Not Yet	Agree
Not Yet	Neutral
Yes	Strongly Agree
Yes	Strongly Agree
Yes	Strongly Agree
Yes	Strongly Agree
Yes	Strongly Agree
Not Yet	Strongly Agree
Yes	Strongly Agree
Not Yet	Strongly Agree
Not Yet	Strongly Agree
Yes	Strongly Agree
Yes	Strongly Agree
Yes	Strongly Agree
Yes	Strongly Agree
Not Yet	Strongly Agree
Not Yet	Strongly Agree
Not Yet	Strongly Agree
Yes	Strongly Agree
Not Yet	Strongly Agree

According to your experience, does computer literacy of the employees influence the work efficiency in virtual team?	Do you think dealing with the employees motivation help to better organization performance in the virtual team project?
Neutral	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Agree
Strongly Agree	Disagree
Strongly Agree	Agree
Agree	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Disagree
Strongly Agree	Strongly Agree
Agree	Strongly Agree
Agree	Agree
Agree	Agree
Agree	Strongly Agree
Strongly Agree	Strongly Agree
Agree	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree
Agree	Agree
Agree	Agree
Agree	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Strongly Agree
Agree	Agree
Strongly Agree	Strongly Agree
Strongly Agree	Agree
Agree	Agree
Agree	Agree
Agree	Agree
Strongly Agree	Agree
Agree	Strongly Agree
Strongly Agree	Strongly Agree
Strongly Agree	Agree
Strongly Agree	Strongly Agree
Agree	Strongly Agree

Do you implement any leadership approach suitable for managing cultural diversity in virtual team?	What is your opinion on the significance of software and tools that are used to communicate within the team?
Yes	High
Not Yet Implement	High
Not Yet Implement	Very High
No	Low
Yes	Very High
No	Moderate
Yes	High
Yes	High
Yes	Very High
Yes	Moderate
Yes	High
Yes	High
Yes	High
No	High
Yes	Very High
Yes	Very High
Not Yet Implement	Moderate
Not Yet Implement	Very High
Yes	Moderate
Not Yet Implement	High
Yes	High
Yes	Very High
Yes	Very Low
Yes	Very High
Yes	Very High
Yes	Moderate
Not Yet Implement	High
Yes	High
Not Yet Implement	High
Not Yet Implement	High
Yes	High
Yes	Low
Yes	Very High
Yes	Moderate
Not Yet Implement	Moderate
Yes	Very High
Not Yet Implement	Moderate
No	Moderate
Yes	Moderate

Do you agree technological perspective for virtual collaboration impacts team's performance?	What are the obstacles that a virtual team must overcome in order to complete an effective virtual project?
Strongly Disagree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Strongly Disagree	Expertise
Agree	Planning (Roles, Responsibility and Management)
Disagree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Agree	Expertise
Neutral	Expertise
Strongly Disagree	Language
Neutral	Planning (Roles, Responsibility and Management)
Disagree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Agree	Language
Strongly Agree	Language
Strongly Disagree	Planning (Roles, Responsibility and Management)
Disagree	System of work
Agree	Planning (Roles, Responsibility and Management)
Strongly Agree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Strongly Disagree	Expertise
Agree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Strongly Disagree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Agree	Planning (Roles, Responsibility and Management)
Strongly Disagree	Planning (Roles, Responsibility and Management)
Neutral	System of work
Agree	Planning (Roles, Responsibility and Management)
Disagree	Planning (Roles, Responsibility and Management)
Agree	System of work
Neutral	Planning (Roles, Responsibility and Management)
Strongly Agree	Planning (Roles, Responsibility and Management)
Agree	System of work
Agree	System of work
Agree	Planning (Roles, Responsibility and Management)
Neutral	Planning (Roles, Responsibility and Management)

<p>Many virtual team members are not satisfied with virtual collaboration tool. What is your opinion about the situation? You can rank from 1 to 5 impact scale.</p>	<p>Which of the following three are most detrimental qualities of virtual projects?</p>
2	Lack of trust;Security risks;Poor workfo
3	Reduces team collaboration;Security risk
4	Reduces team collaboration;Security risk
5	Lack of trust
4	Reduces team collaboration;Security risk
2	Lack of trust;Security risks
3	Reduces team collaboration;Poor workfo
3	Reduces team collaboration;Lack of trust
5	Reduces team collaboration
5	Reduces team collaboration
4	Reduces team collaboration;Security risk
4	Reduces team collaboration
5	Reduces team collaboration;Lack of trust
5	Reduces team collaboration;Lack of trust
2	Reduces team collaboration;Lack of trust
3	Reduces team collaboration;Security risk
4	Reduces team collaboration;Lack of trust
4	Security risks;Poor workforce managem
3	Poor workforce management
3	Reduces team collaboration;Lack of trust
3	Reduces team collaboration;Poor workfo
4	Security risks;Poor workforce managem
3	Reduces team collaboration
5	Reduces team collaboration;Security risk
4	Reduces team collaboration;Lack of trust
3	Reduces team collaboration;Lack of trust
3	Reduces team collaboration;Security risk
4	Reduces team collaboration;Poor workfo
4	Reduces team collaboration;Poor workfo
3	Reduces team collaboration;Lack of trust
3	Poor workforce management
3	Security risks;Poor workforce managem
3	Reduces team collaboration;Lack of trust
4	Reduces team collaboration;Poor workfo
3	Reduces team collaboration;Lack of trust
3	Reduces team collaboration;Lack of trust
4	Reduces team collaboration;Security risk
3	Reduces team collaboration;Security risk
2	Lack of trust;Security risks;Poor workfo

Do you agree utilizing virtual team management technique help to better performance of the employees?	Have you proposed any future strategy for managing the project in virtual team?
Neutral	Yes
Neutral	Not Yet Implement
Neutral	Not Yet Implement
Agree	No
Agree	Not Yet Implement
Agree	Yes
Agree	Yes
Agree	Yes
Neutral	Yes
Neutral	Yes
Agree	Not Yet Implement
Agree	No
Agree	Yes
Agree	Yes
Strongly Agree	No
Neutral	Yes
Agree	Yes
Strongly Agree	No
Neutral	Yes
Agree	Not Yet Implement
Agree	Yes
Neutral	No
Neutral	Yes
Strongly Agree	Yes
Agree	Yes
Neutral	No
Agree	No
Agree	Yes
Neutral	Neutral
Agree	Yes
Agree	No
Neutral	Not Yet Implement
Agree	Yes
Neutral	Yes
Agree	No
Neutral	No
Neutral	Not Yet Implement
Neutral	Neutral
Strongly Agree	Neutral

Have you implemented communication platform for virtual team management?
Yes
Yes
Not yet
No
Yes
Yes
Yes
Yes
Yes
Yes
Yes
Yes
Yes
Yes
No
No
Yes
Yes
Yes
Yes
Not yet
Yes
Yes
Yes
Yes
Yes
Yes
Yes
No
Yes
Not yet
Yes
Yes
Yes
Yes
Yes
Yes
Not yet
Not yet
No
Not yet