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Diploma Thesis

Project Management in Virtual Teams

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Declaration

I declare that I have worked on my diploma thesis titled " Project management in virtual teams " by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on 18th March 2020 _____

Project Management in virtual teams

Summary

The aim of this diploma thesis is to verify how it goes project management in virtual teams. Additionally, the diploma thesis is aimed at identifying the negative or positive features of communication among virtual team members. In theoretical part of the diploma thesis the main characteristics and process of communication are examined as well as concept of virtual team, its characteristics, advantages and disadvantages, as well as barriers to communication in virtual teams and traditional organizations and solutions to improve communication suggested in literature. The practical part of the diploma thesis is focused on the own survey, evaluation of its results. A questionnaire and an interview were chosen as data collection techniques. Questionnaires were filled out by workers of large software companies (regular employees and members of virtual teams). Based on the survey results evaluation recommendations to improve communication in virtual teams were proposed.

Keywords: virtual team, communication, teamwork, research, questionnaire, features of communication, communication barriers, communication tools

Fungování projektového managementu ve virtuálních týmech

Souhrn

Cílem předkládané diplomové práce je ověření fungování projektového managementu v týmech, jejichž členové komunikují na dálku prostřednictvím moderních technologií a informačních sítí. Práce se také zaměřuje na identifikaci negativních a pozitivních prvků komunikace členů ve virtuálních týmech. Ve své teoretické části se práce zabývá základní charakteristikou a také podrobněji definuje procesy komunikace a pojem „virtuální týmy". Zahrnuje také výhody a nevýhody tohoto způsobu komunikace mezi jednotlivými členy týmů, zmiňuje komunikační bariéry ve virtuálních týmech a v klasických organizacích. Diplomová práce navrhuje na základě literatury metody zlepšování komunikace. Praktická část se zaměřuje především na průzkum a zhodnocení jeho výsledků. Dotazníky a rozhovory byly připraveny pomocí konkrétní metody shromážďování dat. Dotazníky byly vyplněny zaměstnanci větších softwarových společností – řádovými zaměstnanci a členy virtuálních týmů. Výsledky průzkumu přispěly ke stanovení doporučení zdokonalení komunikace.

Klíčová slova: virtuální tým, komunikace, týmová práce, výzkum, dotazník, vlastnosti komunikace, komunikační bariéry, komunikační nástroje

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1 Introduction

In the competitive market, virtual teams represent a growing response to the need for fasting the time to market, low-cost and rapid solutions to complex organizational problems. Virtual teams enable organizations to enhance the talents and expertise of employees and non-employees by eliminating time and space barriers. Nowadays companies are heavily investing in virtual teams to enhance their performance and competitiveness (Nader, Shamsuddin and Zahari, 2009). From the last century every aspect of life have been revolutionized by numerous Information.

Technology (IT) developments and by the expansion of the Internet. Physical boundaries for information availability, or for collaboration and communication no longer exist in the society of information. In relevance to new work forms, members of the same teams do not necessarily have to sit next to each other in order to contribute to the same project.

Virtual project management has become a widely spread form of cooperation. In parallel, a new IT technology, namely cloud computing has been developed, and it has been spreading with an amazing speed all around the world. As the nature of work in today's organizations becomes more complex, dynamic, and global, there has increasing emphasis on widespread, distributed, virtual teams as organizing units of work. Despite their growing prevalence, relatively little is known about this new form of work unit. (Bell, B. S., & Kozlowski, S. W. J. (2002).

Projects are an essential part of human history. Virtual teams cooperate by communication technologies across geographical, temporal, cultural and organizational boundaries to achieve common goal in their organizations outputs (Nader, Shamsuddin and Zahari, 2009). Nowadays achieving high business performance and effective organization management are difficult without the usage of modern information technologies such as Internet, email, audio/video conferencing and so on. These tools allow specialists, who live in different geographic locations to work effectively all together on one common project. The concept of virtual teams is becoming more and more popular in the last decade due to the rapid development of information technologies, increasing globalization and decentralization of working process. Virtual

teams cooperate by communication technologies across geographical, temporal, cultural and organizational boundaries to achieve common goal in their organizations outputs (Nader, Shamsuddin and Zahari, 2009). In conditions of fast development of electronic means of communication, interpersonal and managerial relationships are changing.

With the fast growth of electronic information and communication media in these latest years, distributing work load has become much easier, faster and more efficient. Many companies deal with a culturally diverse and geographically distant workforce and use advanced communication technologies for information exchange and decision-making. The creation of global virtual teams is one of the fastest growing trends in organizations in these days, and is determined by the need for harmonization between different parts of multinational companies and overcoming the cultural and geographical barriers, together with the advancement of technology. Virtual teams are important mechanisms for those organizations that are trying to overcome scare of resource across geographic boundaries as well as many other limits. Regardless of the newness of the concept of virtual team, some areas of it have not been yet fully examined. One of the unexamined areas is communication in virtual teams.

Communication in teamwork plays one of the main roles in effective management, efficient performance and in achieving the desired success in projects. Members of virtual teams do not have the usual daily face-to-face communication. Hence, they rely on different tools of communication support technologies such as email, telephone, videoconferencing and so on. In order to review the influence of virtual teams in project management the topic "Project management in virtual team" is selected to see the interactions, the obstacles and advantages of virtual teams in projects management.

2 Objectives and Methodology

2.1 Objectives

The aim of this diploma thesis is to analyze virtual team project management, see the implementation of project management in virtual teams, identify the means of communication among virtual team members, techniques used to do, and challenges arise by the virtual team for a given project management.

Additionally, the diploma thesis is aimed at identifying the impact of communication of virtual teams in project management. For the arising negative results, then the goal of this thesis is to refer to them and suggest recommendations to reduce their impact on the virtual team in project management. In order to reach the main aim it is necessary to achieve the following objectives:

- To define project management and virtual team
- To identify roles and responsibilities of the project manager
- To detect the characteristics of the virtual team
- To analyze virtual communication system and role of communication in virtual teams the results of the research
- To set solutions for improving communication barriers in virtual team project management
- To create a list of questionnaires and interviews
- To make conclusions

In order to achieve this aims three main research questions were formulated

1. How do characteristics of virtuality influence the relationship among the project managements in the surveyed workers?
2. What is the most challenging part of communication in the surveyed workers when it comes to managing global virtual teams compared to local teams?
3. In the surveyed workers how is the knowledge of IT important inorder to efficiently manage in the virtual team?
4. What are the positive and negative features of virtual team in project management?

2.2 Methodology

The thesis has two parts theoretical part and a practical part. The theoretical part is the description of the thesis in literature review section contains the main descriptions. And the practical part is done by distribution of questionnaires and interview questions for the selected study group. The first part of diploma thesis is based on relevant professional resources such as articles, books and other documents that were acquired from sources in libraries, different periodicals and web resources.

The practical part of diploma thesis is focused on the own research of project management in the virtual team. The research conducted for this thesis focused on NU Exchange/Agro Information Management, which is Ethiopia in four regions. This project have employees involving local and global virtual teams. Based on the scope of the project, the global virtual team is not that much considerate, so for this thesis much focused on local virtual teams. The practical research methods such as questionnaire for the members of these project teams and interview for virtual project managers were used to collect the data. Analysis of answers for open questions was used to evaluate project management in virtual teams and to propose recommendations for eliminating of negative issues. The questionnaire is composed of 17 open questions for regular employees and members of virtual teams. The number of respondents is 45. And three project managers were interviewed in person total of 10 questions

3 Literature Review

3.1 Definition of Project management

Project management defined as "the application of knowledge, skills, tools and techniques to project activities to meet project requirements". Project management is the practice of initiating, planning, executing, controlling, and closing the work of a team to achieve specific goals and meet specific success criteria at the specified time. A given project should answer the three basic questions what? when? And How much? The primary challenge of project management is to achieve all the project goals within the given constraints. Project management is based on the three main project goals:

- ➢ The scope of the project
- ➢ Time
- ➢ Budget

A project is a temporary endeavour designed to produce a unique product or service with a defined beginning and end, undertaken to meet unique goals and objectives, typically to bring about beneficial change or added value. It is time constrained. The nature of projects is temporary. The management of such distinct production approaches requires the development of distinct technical skills and management strategies.

These four aspects time, budget, scope, and quality make up the balance quadrant, which is pictured in Figure 1. The balance quadrant demonstrates the interrelationship between the four aspects and how a change to one aspect will unbalance the quadrant. For instance, an increase in the project's cost will have an impact on the time, the scope, and the quality of the project. So, there is high dependency between the four aspects. Any decision you make will have an impact on these four aspects and will it make the project more or less expensive, take longer or shorter time, be of lower or higher quality or affect its scope. Essentially, project management is a set of skills and tools that will help you get the project right in every way.

Figure 1 The balance quadrant

(source: The principles of project managment by Meri Williams)

The project life cycle is simple first you start the project called Initiating, then you go on to actually implementation of the project (through the Planning, Executing, and Controlling phases, which form a loop), and finally you finish, a strategy for the future in place and a check in your hand (closing).This process is illustrated in Figure 2.

Figure 2. The project life cycle You may previously have heard of the project triangle containing three of those four elements essentially, the balance quadrant is a real-world version of that concept.

Figure 2 The project life cycle
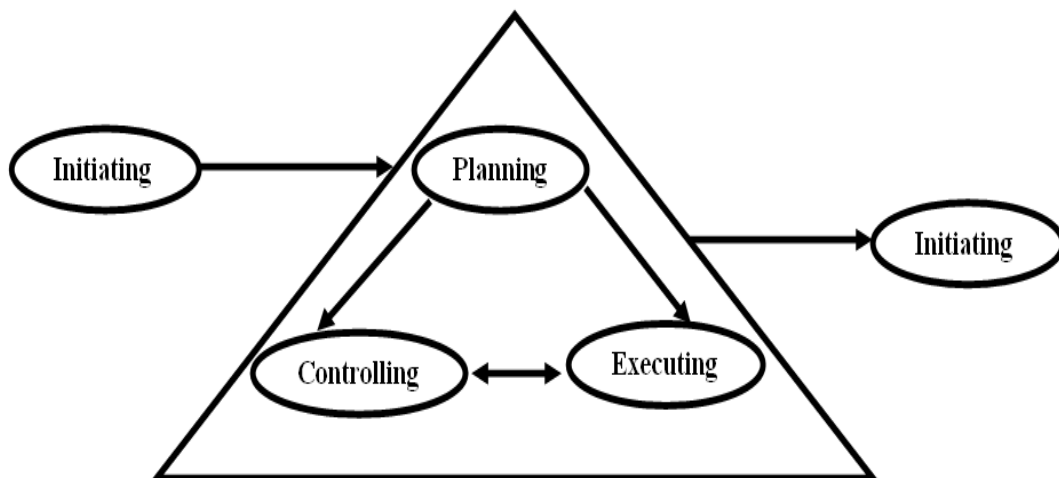
(Source: The principles of project managment by Meri Williams)

There are several approaches to organizing and completing project activities, including: phased, lean, iterative and incremental. There are also several extensions to project planning, for example based on outcomes product-based or activities process-based.

Phased approach

The phased approach breaks down and manages the work through a series of distinct steps to be completed and is often referred to as traditional or waterfall. Although it can vary, it typically consists of five process areas, four phases plus control: Typical development phases of an engineering project

1. Initiation
2. Planning and design
3. Construction
4. Monitoring and controlling
5. Completion or closing

Many industries use variations of these project stages and it is not uncommon for the stages to be renamed in order to better suit the organization. For example, when working on a brick-and-mortar design and construction, projects will typically progress through stages like pre- planning, conceptual design, schematic design, design development, construction drawings and construction administration.

It is good for small projects, steps are easy to follow, and preferred because when you move to the next phase you have a clear picture of the previous phase. Also, it has some shortages due to its usefulness for large projects and problem to manage when frequent requirements to change. While the phased approach works well for small, well defined projects, it often results in challenge or failure on larger projects, or those that are more complex or have more ambiguities, issues and risk.

Process-based management

Process-Based Management is a management approach that guides the actions and mindset of an organization. It has a wider scope than the management of individual processes. A process-based organization design manages and improves its processes to optimize the delivery of customer value. Process-Based organizations use PBM as a guiding philosophy to differentiate themselves from and outperform their competition.

Projects are an increasing feature of modern work. Once, workers performed the same set of tasks, day after day, focusing on getting more of the same done as quickly and efficiently as possible. It helps organizations to understand and meet customer expectations integrate diverse initiative an manage process related measurements.

One of the few constants is that the work you do today will be different from what you do tomorrow. For many, our jobs consist of an ongoing stream of new projects, new technologies, and new challenges every day. This is particularly true in our modern world, where technology is an intrinsic part of almost any business. These days, it's hard to imagine a company that could survive without telephones, email, computers, and handhelds. It's even harder to imagine technology staying the same for more than a few years.

We also face changing expectations among our clients and business partners. Nowadays there's much more of an expectation that you will deliver not just an isolated product, but a solution to a business problem. Delivering that full solution requires a broader skill set than was traditionally expected (Russel and John, 2012).

It can be easy to see project management as a function that's all overhead and no return. This is especially true when you first start to make use of the approaches and practices, we've discussed so far, they can feel a little alien. But you can rest assured that your project management work will become much easier with practice. In order to give a comprehensive analysis of virtual project management and how it differs from traditional project management, the basics of project management must be introduced.

A project is a temporary attempt with finite and limited resources, and with objectives defined in advance by the ones who are financing and are interested in it. Generally, the final aim of a project is to create a unique tangible or intangible product. In this sense, temporary refers to the duration of the project and implies a specific beginning and end date. A project is finished when its aims have been achieved, or when the project is ceased because the aimed targets cannot or will not be met, or when there is no longer need for the existence of the project.

Even if project management really was as boring and difficult as some people assume it to be, it would still be worth doing. The reason I believe this point to be fundamentally true is that without decent project management, the value of everything else you do can be negated. Failing to invest in project management on employing more team members to do the real work can seem like a good idea, but it leaves the project team open to a much greater risk of delivering late, overspending, or creating a product that's not up to scratch or in line with what the customer wants. Project management is an investment in getting it right a bit like making sure that the foundations and walls of a building are strong before you start the intricate carving on the front door. Setting up your project to succeed and adhering to the processes that will keep it on track, can determine whether all the real work pay-off in the end or not (Russel and John, 2012).

3.2 Roles and responsibility of project manager

A project manager is a professional in the field of project management. Project managers oversee the people in a project. People are the key to any successful project. Without the correct people in the right place and at the right time, a project cannot be successful. Project managers can have the responsibility of the planning, execution, controlling, and closing of any project typically relating to the construction industry, engineering, architecture, computing, and telecommunications. Many other fields of production engineering, design engineering, and heavy industrial have project managers.

A project manager needs to understand the order of execution of a project to schedule the project correctly as well as the time necessary to accomplish each individual task within

the project. A project manager is the person accountable for accomplishing the stated project objectives. Project Managers tend to have multiple years' experience in their field. A project manager is required to know the project in and out while supervising the workers along with the project. Typically, in most construction, engineering, architecture and industrial projects, a project manager has another manager working alongside of them who is typically responsible for the execution of the task daily. This position in some cases is known as a superintendent. A superintendent and project manager work hand in hand in completing daily project task. Key project management responsibilities include creating clear and attainable project objectives, building the project requirements, and managing the triple constraint for projects, which is cost, time and scope for the first three but about three additional ones in current project management. A typical project is composed of a team of workers who work under the project manager to complete the assignment. A project manager normally reports directly to someone of higher stature on the completion and success of the project.

A project manager is often a client representative and must determine and implement the exact needs of the client, based on knowledge of the firm they are representing. The ability to adapt to the various internal procedures of the contracting party, and to form close links with the nominated representatives, is essential in ensuring that the key issues of cost, time, quality and above all, client satisfaction, can be realized.

There is a tendency to confuse the project success with project management success. They are two different things. Project management success criteria is different from project success criteria. The project management is said to be successful if the given project is completed within the agreed upon time, met the agreed upon scope and within the agreed upon budget. Meanwhile, a project is said to be successful, when it succeeds in achieving the expected business case.

A project manager used different mechanisms in order to monitor the tasks in the project. One of these mechanisms is to use Work breakdown structure: The work breakdown structure (WBS) is a tree structure that shows a subdivision of the activities required to

achieve an objective – for example a program, project, and contract. The WBS may be hardware, product, service, or process oriented. A WBS can be developed by starting with the end objective and successively subdividing it into manageable components in terms of size, duration, and responsibility e.g. systems, subsystems, components, tasks, sub-tasks, and work packages, which include all steps necessary to achieve the objective. The work breakdown structure provides a common framework for the natural development of the overall planning and control of a contract and is the basis for dividing work into definable increments from which the statement of work can be developed and technical, schedule, cost, and labor hour reporting can be established. The work breakdown structure can be displayed in two forms, as a table with subdivision of tasks or as an organizational chart whose lowest nodes are referred to as "work packages."

It is an essential element in assessing the quality of a plan and an initial element used during the planning of the project. For example, a WBS is used when the project is scheduled, so that the use of work packages can be recorded and tracked.

In general, the project manager is responsible and accountable for the planning and performance of the project but has little authority outside of the project scope. Although each project member has its own responsibility in the project, the project manager is accountable for all project issues in one person (McGhee et al. 2007.). There are four main roles of project managers according to McGhee (2007).

- First, the project managers manage the resources and processes in order to deliver the final product. In addition, they manage the budget and keep the timeline.
- Secondly, project managers perform the traditional duties of functional or operational managers. Therefore, they negotiate, persuade, organize, delegate, facilitate, coordinate, and build the team.
- Thirdly, they create and maintain the communications plan.
- Fourthly, they need to understand the business purpose behind the project to be able to make the right decisions in order to execute the project.

In addition to the responsibilities and roles of project managers, they also must take care of project drivers. Project managers always must balance among the three driving areas which are time, cost and scope. One side of this triangle will become the primary project driver, and the other two drivers will be dependent or sacrificed. If there is a second project driver, then the management really depends on the balancing ability of the project manager.

As an indirect consequence of globalization and IT developments, traditional project management principles do not completely cover the current discipline of project management. Increased complexity in economics and society completed with the more and more complex technology have oriented the focus in the discipline of project management toward new notions. These notions are systematic, holistic views, complexity, problem solving, self-organisation, synergy, and network relationships. The business landscape has changed, it became more complex which cannot be handled by only traditional project management methods. Two main variances of this burning complexity are the continuously appearing new technological innovations and the new social relationships. It brings new ways and challenges to teamwork conceptualization and business conduction as well. Members of a team, location of the members, and the tasks they are required to fulfil have all gone through changes. Team members are not sitting in the same buildings anymore. They might even be in different countries. Also, international teams are often responsible for comprehensive, global operations where the related duties might differ from traditional tasks, and they are often more complex. In addition, participants in international teams often concern with more business fields at the same time. All these changes require new approaches from the project managers as well. Say that a "culture of trust" is the key for this new project management, and for project managers of this new era to succeed. In a trusting culture, new ideas, outsiders, and new ways of cooperation are welcome which are indispensable for handling the upcoming challenges. Project management software is software used to help plan, organize, and manage resource pools, develop resource estimates and implement plans.

Depending on the experience of the software, functionality may include estimation and planning, scheduling, cost control and budget management, resource allocation, collaboration software, communication, decision-making, workflow, risk, quality, documentation and administration systems. First, the introduced IT developments have

opened the possibility for the establishment of multinational companies. In parallel, the evolving capitalism with the increasing wages in the developed countries has created the need for international operation of a company. If an organization wanted to stay competitive, it had to outsource some fields of operation to a country with cheap labour. Or in another case, if for example a service providing company aimed to expand its market share, or wanted to break into other markets, it had to be present in other countries as well. Thus, whether due to outsourcing or business enlargement, project teams have become global. Consequently, project managers, as well as team members need to be more understanding of cultural differences. In addition, managers need to count with different availabilities because of different time zones or national holidays during the year. Furthermore, linguistic difficulties are there as well. Even if all the parties speak English, understanding each other can cause some delays in project operation. Geographically dispersed teams bring new challenges that require special project management.

Project management can apply to any project, but it is often tailored to accommodate the specific needs of different and highly specialized industries. For example, the construction industry, which focuses on the delivery of things like buildings, roads, and bridges, has developed its own specialized form of project management that it refers to as construction project management and in which project managers can become trained and certified. The information technology industry has also evolved to develop its own form of project management that is referred to as IT project management and which specializes in the delivery of technical assets and services that are required to pass through various lifecycle phases such as planning, design, development, testing, and deployment. Biotechnology project management focuses on the intricacies of biotechnology research and development. Localization project management includes many standard project management practices even though many consider this type of management to be a very different discipline. It focuses on three important goals: time, quality and budget. Successful projects are completed on schedule, within budget, and according to previously agreed quality standards.

For each type of project management, project managers develop and utilize repeatable templates that are specific to the industry they're dealing with. This allows project plans to become very thorough and highly repeatable, with the specific intent to increase quality, lower delivery costs, and lower time to deliver project results.

A 2017 study suggested that the success of any project depends on how well four key aspects are aligned with the contextual dynamics affecting the project; these are referred to as the four P's:

1) Plan: The planning and forecasting activities.
2) Process: The overall approach to all activities and project governance.
3) People: Including dynamics of how they collaborate and communicate.
4) Power: Lines of authority, decision-makers, policies for implementation and the like.

Planning the whole project in advance is not always as successful as getting feedback from time to time and adjusting the project plan according to the actual conditions. Time difference, however, complicates this method too because when a European team member wants to get feedback from a colleague in America, that is problematic since Americans are sleeping in that time. To add more, business in the era of information society must rely more intensively on vendors and suppliers. Real-time orders and the increasing number of requests for projects create so much demand, it is almost impossible to serve alone for one enterprise. It increases reliance on outsources and vendors, thus project managers need to face another new need, they need to bear the responsibility of partner relationship management, as well as coordinate the resources. Planners need a deep understanding off the nature of major projects and their physical and operational characteristics and their known impacts including ways of maximising benefits by implementing complementary measures.

In summary, new working culture and workplace have been born. People work in the same team with different nations across the world. Different cultures meet daily; they try solving problems, overcoming the upcoming challenges, and create something together in a common, foreign language. It is certainly not easy, but as ICT has made it possible, it can

also provide solutions and support in this new business environment. There is a digital revolution resulting in a business anywhere, anytime. Therefore, ICT development, or otherwise called the digital revolution has opened the gates for virtual collaboration. Neither geographic nor informational boundary are real anymore. With virtual collaboration, project teams can operate across the world smoothly, although not without any challenges. Team members can communicate and cooperate with the help of different online and traditional collaboration tools, while project managers need to coordinate them from distance virtually. All these result in a new form of project management, the project management of virtual teams.

Because projects are temporary, they have a defined beginning and end. Project managers must manage start-up activities and project closeout activities. The processes for developing teams, organizing work, and establishing priorities require a different set of knowledge and skills because members of the project management team recognize that it is temporary.

They seldom report directly to the project manager, and the effect of success or failure of the project might not affect their reputations or careers the same way that the success or failure of one of their other job responsibilities would (Nader and Zahari, 2009). Project management offices (PMOs) have emerged to facilitate development of organizational knowledge, skills, and tools to internally charter and manage projects within the organization. The PMO varies in structure and responsibility depending on the project management approach of the parent organization. On one end of the spectrum, the PMO has complete responsibility for projects within an organization from the criteria and selection of appropriate projects to accountability for project performance. In organizations that make a large investment in the PMO, a large number of new products or process improvement projects are submitted, and the project office develops a portfolio of projects to manage over a given period that maximizes the use of organizational resources and provides the greatest return to the organization. PMOs can provide various functions for an organization. Some possible functions include the following:

- Project Management: - Some organizations maintain the project manager within the PMO, assign project managers from other departments, procure contract project managers or practice a combination of all three.
- Centre of excellence: - The project office can maintain the organization's project management policies and procedures, maintain a historical database, maintain best practices, and provide training and specialized expertise when needed.
- Portfolio Management: - The project office supervises the project managers and monitors project performance. Portfolio management also includes prioritizing projects based on value to the organization and maintains an inventory of projects. Portfolio management balances the number and type of projects to create the greatest return from the entire portfolio of projects.
- Functional support: - The project office maintains project management expertise to support the project. Estimating, project scheduling, and project cost analysis are examples of functional support.

Often the difference between the project that succeeds and the project that fails is the leadership of the project manager. The leadership skills needed by the successful project manager include all the skills needed by operations managers of organizations. These skills include:

- ✓ Good communication skill
- ✓ Team building
- ✓ Planning
- ✓ Accomplish a given task quickly
- ✓ Motivating

The five characteristics of an effective project leader include the following:

- Credibility
- Creativity as a problem solver
- Tolerance for ambiguity
- Flexibility in management style
- Effectiveness in communicating

The training of project managers and, based on the finding, categorized project management into interpersonal, technical, and administrative skills:

- ❖ Interpersonal skills: - These skills include providing direction, communicating, assisting with the problem solving, and dealing effectively with people without having authority.
- ❖ Technical expertise: - Technical Knowledge gives the project manager the creditability to provide leadership on a technically based project, the ability to understand important aspects of the project and the ability to communicate in the language of the technicians.
- ❖ Administrative skills: - These skills include planning, organizing, and controlling the work (Russel and John, 2012).

By applying the discovery in measuring work complexity described in Requisite Organization and Stratified Systems Theory, Dr Elliott Jaques classifies projects and project work (stages, tasks) into basic 7 levels of project complexity based on such criteria as timespan of discretion and complexity of a project's output:

- Level 1 Project – improve the direct output of an activity (quantity, quality, time) within a business process with targeted completion time up to 3 months.
- Level 2 Project – develop and improve compliance to a business process with targeted completion time from 3 months to 1 year.
- Level 3 Project – develop, change and improve a business process with targeted completion time from 1 to 2 years.
- Level 4 Project – develop, change and improve a functional system with targeted completion time from 2 to 5 years.
- Level 5 Project – develop, change and improve a group of functional systems/business function with targeted completion time from 5 to 10 years.
- Level 6 Project – develop, change and improve a whole single value chain of a company with targeted completion time from 10 to 20 years.
- Level 7 Project – develop, change and improve multiple value chains of a company with target completion time from 20 to 50 years.

3.3 Conventional and non-conventional project management

1.Conventional project management

It is also called Traditional Project management is a common practice which incorporates an arrangement of created methods utilized for planning, assessing and controlling exercises. Surely, the point of those strategies is to achieve the desired outcome on time, within the planned budget, and as per details. Usually, this practice is helpful where the requirements and activities are stable and there is a sequence flow of completion. Additionally, the idea of conventional project management depends on expected experience and expected tools. Waterfall methodology is an example of conventional project management. Each project takes the same lifecycle, which incorporates five phases:

1. Initiating
2. Planning
3. Executing
4. Controlling
5. Closing

Conventional project management is an approach that will work for most areas and conditions. This approach utilizes a universal approach and procedures for managing and problem-solving. These tools and techniques have been establishing for a long period of time, hence the techniques and methods will precisely anticipate by these tools. With regards to exceptional situations and conditions, one should move far from conventional project management approach and should investigate present day techniques that have been particularly created for such situations and conditions, which is non-conventional or agile methodology. Conventional project management is suitable for projects with the low budget, contain 2-3 variables only, and with a medium time frame not more than 6 months from envisioning to deployment. Conventional project management is mainly used on projects where activities are completed in a sequence and there are rarely any changes. The concept of conventional project management is based on predictable experience and predictable tools.

2. Non-conventional project management

It is also called Agile/Lean management approach. Mostly, we use this approach in software development; IT related fields and business enterprises. The main benefit of Agile Project Management is its ability to respond to issues as they arise throughout the course of the project. Making a necessary change to a project at the right time can save resources and, ultimately, help deliver a successful project on time and within budget. Obviously, it stands out immensely from the conventional approach. In the non-conventional or agile/lean project management, the project will handle as small tasks. Priority is set for each activity and executed as the situation and importance suggest. On the other hands, it is totally against the conventional project management. Additionally. This approach stands out for two major approaches

- Eliminating waste
- Improving flow

They adopt practices such as continuous deployment (CD) and continuous integration (CI), using technology that automates steps to speed up the release and use of products. Additionally, Agile Project Management calls for teams to continuously evaluate time and cost as they move through their work. They use velocity, burn down and burn up charts to measure their work, instead of Gantt charts and project milestones to track progress.

Agile Project Management does not require the presence or participation of a project manager. Although a project manager is essential for success under the traditional project-delivery methodologies, such as the waterfall model (where the position manages the budget, personnel, project scope, quality, requirements and other key elements), the project manager's role under APM is distributed among team members. For instance, project goals are set by the product owner, while team members allocate scheduling, progress reporting and quality tasks. Certain Agile approaches add other layers of management; the Scrum approach, for example, calls for a scrum master who helps set priorities and shepherd the project through to completion.

A specific Agile Project Management framework that has evolved in more recent years is Scrum. Scrum is an agile process framework for managing complex knowledge work, with an initial emphasis on software development, although it has been used in other fields and is slowly starting to be explored for other complex work, research and advanced technologies. This methodology features a product owner who works with a development team to create a product backlog, a prioritized list of the features, functionalities and fixes required to deliver a successful software system. The team then delivers the pieces in rapid increments.

The benefits of utilization of Agile project management include the rapid deployment of solutions, more efficient use of resources, greater flexibility and adaptability to changing needs, more rapid detection of problems and thus quicker fixes and increased collaboration with users and, therefore, products that better meet user needs.

3.4 Virtual team and its characteristics

3.4.1 Definition of virtual team

The fast and unforeseen change of the business environment is symbolized by the waves. The team had to construct the raft which shows their creativity and ingenuity. Overall, the exercise pointed out the challenge and operation of virtual teams, whether they sank or swam together as a team (Kirkman etal. 2002). Virtual teams are working groups which have some core members who interact primary through electronic means and engaged in interdependent tasks.

Virtual teams as a group of people and sub-teams who interact through inter dependent tasks guided by common purpose and work across links strengthened by information, communication, and transport technologies. It is a working team which is in a given company or project, with a different geographical location. Another definition suggests that virtual teams, are distributed work teams whose members are geographically dispersed and coordinate their work predominantly with electronic information and communication technologies (e-mail, videoconference, telephone, etc.) Virtual teams are groups of individuals collaborating in the execution of a specific project while geographically and often temporally distributed, possibly anywhere within their parent organization.

Virtual teams' groups of people who work together although they are often dispersed across space, time, and /or organizational boundaries. Amongst the different definitions of the concept of a virtual team the this one is the most widely accepted: ''we define virtual teams as groups of geographically, organizationally and/or time dispersed workers brought together by information technologies to accomplish one or more organization tasks.'' A virtual team (also known as a geographically dispersed team, distributed team, or remote team) usually refers to a group of individuals who work together from different geographic locations and rely on communication technology such as email, FAX, and video or voice conferencing services in order to collaborate. Virtual teams can also be defined as "small temporary groups of geographically, organizationally and/or time dispersed knowledge workers who coordinate their work predominantly with electronic information and communication technologies in order to accomplish one or more organization tasks Nader and Zahari, 2009). "Nowadays working in different locations also includes working from home due to many reasons which we call it home office, for example, a given company, may have one specific office in one place and all the staff will be from one specific area, but in order to avoid missing of staffs from work place due to several reasons it may have a working from home opportunity. In this case there will be formation of the virtual team, having the same time zone with close geographic distribution only. The concept of a "team" is described as a small number of people with complementary skills who are equally committed to a common purpose, goals, and working approaches for which they hold themselves mutually accountable. It is worth mentioning that virtual teams are often formed to overcome geographical or temporal separations. Virtual teams work across boundaries of time and space by utilizing the modern computer driven technologies. The term "virtual team" is also used to cover a wide range of activities and forms of technology-supported working.

The term can also refer to groups or teams that work together asynchronously or across organizational levels. Virtual teams are "groups of geographically, organizationally and/or time dispersed workers brought together by information and telecommunication technologies to accomplish one or more organizational tasks. This team trait has fostered extensive use of a variety of forms of computer-mediated communication that enable geographically dispersed members to coordinate their individual efforts and inputs.

Design of a virtual team means simply that forming a VT should be planned. This means structuring the interactions; what kind of communication tools are used, how much face-to-face time will be possible, etc. Research has found that team building exercises, the establishment of shared norms and the establishment of a clear team structure helps the team to succeed. Kirkman et al. found empirically that having more face-to-face meetings improved the empowerment of virtual teams, which leads to better learning.

Numerous communication problems can be diverted by creating shared knowledge databases in order to allow all the team members to have the same information and to know that others have it, too. As a bonus, shared knowledge databases also share the same language and mental models, which are substitutes for all the important face-to-face time. Also, shared mental models can be focused through designing, requiring the teams to create goals and strategies. This has been shown clearly to improve the teams with cultural differences also coordination problems and obstacles to effective communication can be involved. These problems may be solved by actively understanding and accepting differences in cultures. A multi-country study, based on the GLOBE culture model, found that virtual communication environments were experienced differently by people from different cultures. The culture dimension individualism-collectivism was most strongly and very significantly related to how positively or negatively team members experienced videoconferences and telephone conferences, compared to face-to-face meetings. People from collectivistic societies showed a stronger preference for face-to-face meetings and evaluated virtual meetings more negatively compared to people from more individualistic societies.

The technical expertise of a team seems to have a positive effect on the team's performance and the satisfaction of belonging to the team. At the same time, high trust is found to develop. On the other hand, the relationship between technology and task performance is found to be more dependent on experience with technology and with group membership than the type of task on which the group was working.

Diverse technological skills can create conflict among the team. Therefore, teams should have consistent training to improve team performance. For an instance, mentoring is a good way to make personal ties to more experienced virtual team professionals. Consistent

training fosters cohesiveness, trust, teamwork, commitment to team goals, individual satisfaction and higher perceived decision quality. In their article, they taught a communication technique called the dialogue technique. It is created through three stages: small talk, sharing mental models and norm building.

3.4.2 Types of virtual team

Generally, we can differentiate various forms of "virtual" work depending on the number of persons involved and the degree of interaction between them. Tele work (telecommuting) which his done partially or completely outside of the main company workplace with the aid of information and telecommunication services. Virtual groups exist when several tele workers are combined and each member reports to the same manager. In contrast, a "virtual team" exists when the members of a virtual group interact with each other in order to accomplish common goals. Finally, "virtual communities" are larger entities of distributed work in which members participate via the internet, guided by common purposes, roles and norms (Nader and Zahari, 2009). Virtuousness has a different effect on teams depending on the length of team duration. For short-term teams, leaner media, misattributions, and subgroups all potentially contribute to less effective teams. In longer-term teams, members make fewer misattributions to a person as they interact with each other over a longer time frame and develop relationships. Also, over longer time spans teammates build a group identity that helps them to overcome differences. There aren't any negative effects on team performance or satisfaction, and team conflict decreased as the degree of virtuousness increased. Although there was a negative effect on communication frequency and knowledge sharing, the effect was much less in long-term teams compared to short-term teams.

Virtuousness also has varying influence on teams depending on how the virtuousness is measured as well as the length of time that a team is working together. The negative effects that effect short-term teams disappeared for longer term teams. Their results also showed that there are different effects on virtuousness depending on what type of analysis is used individual or group and the methods experiments or surveys of virtual work. In contrast to virtual teams, virtual communities are not implemented within an organizational structure but are usually initiated by some of their members. Examples of

virtual communities are Open Source software projects. Tele working is viewed as an alternative way to organize work that involves the complete or partial use of ICT to enable workers to get access to their labour activities from different and remote locations. Tele work provides cost savings to employees by eliminating time - consuming commutes to central offices and offers employees more flexibility to coordinate their work and family responsibilities. There are four categories of virtual teams:

1. Tele workers: A single manager of a team at one location. In this kind of virtual team employees do not travel to central workplace like office building or warehouse. They often use mobile telecommunication technology such as smart phones, laptops and wifi to work from elsewhere.

2. Remote team: this is a geographically dispersed team. This refers to a group of people working together to serve a common purpose, without being in the same location. A single manager of a team distributed across multiple location.

3. Matrixed tele workers: this refers to a team working in single geographic area but having cross functional matrixed teams. They have multiple manager of a team at one location.

4. Matrixed remote teams: this kind of team is both geographically and functionally diverse team. They have multiple managers across multiple locations.

   - Matrix team working can incorporate several dimensions, including Cross functional matrix teams – where team members come from different organizational functions and are led by a particular "activity leader" who they may not have a formal reporting line to. An example would be a cross functional problems solving team working on a business issue that impacts several functions. This simple form of matrix team may operate within a single location.

   - Functional matrix teams – where individuals from the same function need to cooperate across an internal matrix such as HR specialists, all of whom are within the HR function, but normally working in different business units, product groups or regions. They may come together to advance a functional activity or interest such as developing a common group wide policy.

   - Global matrix teams – where individuals from different functions, countries, time zones and cultures come together to solve a common problem. An

example might be a matrix team solving a problem for a global customer which requires input from different functions and regions. A global matrix team is one of the most complex teams to manage.

- Extended matrix teams – where individuals from different organizations need to come together to solve common problems. An example might be a supply chain team that incorporates suppliers, partners and customers. These matrix teams need to manage the additional dynamic of operating across traditional organizational boundaries and commercial considerations.

3.4.3 Construction of virtual team

Virtual teams offer the promise of flexibility, responsiveness, lower costs and improved resources utilization necessary to meet the ever-changing task requirements of companies operating in highly turbulent and dynamic global business environments. Many of the elements that constitute successful face to face teams are also necessary for successful virtual teams. The key factors of success include.

- High level of trust
- Clear communication
- Strong leadership
- Appropriate levels of technology

Nevertheless, virtual teams face certain obstacles, which can hinder high level performance such barriers to success include.

- Multiple time zones
- Language
- Different approach to conflict resolution
- Different work culture and ability to work independently

Members of virtual teams communicate electronically and may never meet face-to-face. Virtual teams are made possible by a rapid increase of fiber optic technology that has

significantly increased the scope of off-site communication. Virtual teams allow companies to procure the best talent without geographical restrictions. Virtual teams require new ways of working across boundaries through systems, processes, technology, and people, which requires effective leadership despite the widespread increase in virtual teamwork, there has been relatively little focus on the role of virtual team leaders.

There are some attributes can be asserted about virtual teams in general. First, team members often participate in virtual projects with a definable and limited membership. Even if change of responsibilities happens for a member that has little or no effect on the team. The next attribute is the interdependence of members who work for the same purpose, but mostly independently. In addition, the team takes a joint responsibility for the outcomes of the project. Furthermore, virtual members collectively manage their relationships across organizational departments. As it has been mentioned earlier, members of a virtual team might be working from great distances, but it is not always the case. At last, most of the virtual teams dominantly rely on ICTs rather than face-to-face communication in order to fulfil their tasks.

In addition, some company policies of special incentives might discourage team members to work in virtual teams. Also, members who work coastal receive daily allowances above their normal salary. In contrast, virtual team members receive only their usual salary. Despite that, they often make sacrifices to be able to collaborate with coastal team members. Overall, there are several difficulties emerging in virtual teams as well which are going to be discussed in detail in the next chapter. Overall, the reviewed literatures reflect that several advantages in the project management of virtual teams have already been revealed and documented. Nevertheless, as the above described collection indicates, advantages of virtual project management are not expounded or researched as exhaustively as the challenges of virtual project management reviewed below. Furthermore, comparing the extensity of the subject and the availability of studies focusing on the advantages of virtual project management as well, further study in the field is still considered relevant in the presumption of finding new, yet not exposed advantages in the project management of virtual teams.

3.4.4 Characteristics of virtual team

There are three main aspects to a virtual team - purpose, people and links. While purpose is an important aspect for all organizations, it's the most critical aspect for virtual teams; purpose is what holds a virtual team together. Virtual teams do not have hierarchy or any other common structures because they may not be from the same organization and purpose here brings and holds the team together. Purpose is generally translated into certain action steps for people to work on with a defined structure consisting of common goals, individual tasks and results. Several factors may affect the performance of members of a virtual team. For example, team members with a higher degree of focused attention and aggregate lower levels of temporal dissociation (or flow) may have higher performance. Further, members with higher degrees of attention focus may prefer asynchronous communication channels, while those with low levels of flow may prefer synchronous communication channels.

Design of a virtual team means simply that forming a virtual team should be planned. This means structuring the interactions; what kind of communication tools are used, how much face-to-face time will be possible, etc. Research has found that team building exercises, the establishment of shared norms and the establishment of a clear team structure helps the team to succeed. Numerous communication problems can be diverted by creating shared knowledge databases in order to allow all the team members to have the same information and to know that others have it, too. As a bonus, shared knowledge databases also share the same language and mental models, which are substitutes for all the important face-to-face time. Furthermore, shared mental models can be focused through designing, requiring the teams to create goals and strategies. This has been shown clearly to improve the teams. Virtual program management (VPM) is management of a project done by a virtual team, though it rarely may refer to a project implementing a virtual environment. It is noted that managing a virtual project is fundamentally different from managing traditional projects, combining concerns of telecommuting and global collaboration culture, time zones, language.

For companies, the use of virtual teams is assumed to enhance flexibility, capability, and responsiveness. Its reason partly lies in the co-actions and harmony among team members

who have different personalities, different professional background, and different knowledge. First, virtual teams cease time and space being obstacles, and they are usually cost efficiently. Furthermore, enterprises can achieve significant savings if they properly use the special allowances of specific countries. They can save the lost working hours and travelling costs of business trips too. Even if a company takes the costs of business trips or relocations, in case of a short deadline, it is not an option because of getting visas, arranging families and ongoing tasks take too long time. To add more, with virtual teams, specialists can be reached for tasks without relocating them. Finally, due to the constant usage of electronic tools, performance documentation is automatically done (Berry 2011). Approaching from team members' points of views, working in virtual teams evokes different feelings in different type of people. For some, working in the home office is the best option they can imagine.

3.5 Working in virtual team

Research on socio-emotional development in virtual teams has centred on relationship building, specifically team cohesion and trust. Relationship building deals with interactions that increase inclusiveness. Socio-emotional processes and outcomes of virtual team projects are closely related, as virtual teams need to meet the socio-emotional needs of virtual team members in order to be successful.

Communication is one of the most crucial things in virtual teams. Communication is vital to the success of the virtual team, and it is crucial that the team is a group of excellent communicators with the proper technology for the best levels of communication. It starts by selecting excellent communicators for the team members and the right technology for them to use. Virtual communication technologies cause many difficulties in effective team communication, such as time delays, common reference frames, differences of interpretation, and assurance of participation for remote team members. Some empirically found challenges in successful communication in virtual teams are failure to communicate due to wrong or lacking contextual information, unevenly distributed information, interpretation of the meaning of silence and technical problems.

The basic principle for making virtual team includes the following points: -

1. Get the team together physically. Face-to-face communication is still better than virtual when it comes to building relationships and fostering trust, an essential foundation for effective teamwork. If you can get the team together, use the time to help team members get to know each other better, personally and professionally, as well to create a shared vision and a set of guiding principles for how the team will work.

2. Clarify tasks and processes virtual teams' coordination is inherently more of a challenge because people are not co-located. So, it's important to focus more attention on the details of task design and the processes that will be used to complete them. Simplify the work to the greatest extent possible, ideally so tasks are assigned to sub-groups of two or three team members.

3. Commit to a communication charter. Communication on virtual teams is often less frequent, and always is less rich than face-to-face interaction, which provides more contextual cues and information about emotional states — such as engagement or lack thereof. The only way to avoid the pitfalls is to be extremely clear and disciplined about how the team will communicate. Create a charter that establishes norms of behaviour when participating in virtual meetings, such as limiting background noise and side conversations, talking clearly and at a reasonable pace, listening attentively and not dominating the conversation, and so on. The charter also should include guidelines on which communication modes to use in which circumstances, for example when to reply via email versus picking up the phone versus taking the time to create and share a document.

4. Support the best communication technologies. Developments in collaborative technologies — ranging from shared workspaces to multi-point video conferencing — unquestionably are making virtual teaming easier.

5. Build a team with rhythm. When some or all the members of a team are working separately, it's all-too easy to get disconnected from the normal rhythms of work life. One antidote is to be disciplined in creating and enforcing rhythms in virtual teamwork. This includes, having regular meetings, ideally same day and time each week, sharing meeting agenda in advance, having clear agreements on communication protocols, and starting and finishing on time.

6. Agree on a shared language. Virtual teams often also are cross-cultural teams, and this magnifies the communication challenges — especially when members think they are speaking the same language. When the domain of teamwork is technical, then the languages of science and engineering often provide a solid foundation for effective communication.

7. Create a "virtual water cooler." Water cooler is a metaphor for informal interactions that shares information to strength social bonds. Enterprise collaboration platforms increasingly are combining shared workspaces with social networking features that can help team members to feel more connected.

8. Clarify and track commitments. When teams work remotely, however, it's more difficult to do this, because there is no easy way to observe engagement and productivity. One useful tool is having a "deliverables dashboard" that is visible to all team members on whatever collaborative hub they are using.

9. Foster shared leadership. Find ways to involve others in leading the team. These include assigning responsibility for special projects, such as identifying and sharing best practices; or getting members to coach others in their areas of expertise; or assigning them as mentors to help on-board new team members; or asking them to run a virtual team-building exercise. By sharing leadership, you will not only increase engagement, but will also take some of the burden off your shoulders.

10. Don't forget the 1:1s. Leaders' one-to-one performance management and coaching interactions with their team members are a fundamental part of making any teamwork. Make these interactions a regular part of the virtual team rhythm, using them not only to check status and provide feedback, but to keep members connected to the vision and to highlight their part of "the story" of what you are doing together.

3.5.1 Technological and communication tools

If all the parties to the communication are taking part in the exchange at the same time, the communication is synchronous. A telephone conference call is an example of synchronous communication. When the participants are not interacting at the same time, the

communication is not synchronous or asynchronous. The following are examples of synchronous communications:

- Live meeting. Gathering of team members at the same location.
- Audio conference. A telephone call between two individuals and a conference call where several people participate.
- Computer-assisted conference. Audio conference with a connection between computers that can display a document or spreadsheet that can be edited by both parties.
- Video conference. Like an audio conference but with live images of the participants.
- Some laptop computers have built-in cameras to facilitate video conferencing.
- IM (instant messaging). Exchange of text or voice messages using pop-up windows on the participants' computer screens.
- Texting. Exchange of text messages that are 160 characters or fewer between mobile phones, pagers, or personal digital assistants (PDAs)—devices that hold a calendar,
  a contact list, a task list, and other support programs.

The worldwide communication network makes it possible to assemble project teams from anywhere in the world. Most people work during daylight hours, which can make synchronous meetings difficult if the participants are in different time zones, where they start, end, and take meal breaks at different times. Getting a team together at the same time can be a challenge—especially if they are spread out across time zones. Many types of communication do not require that the parties are present at the same time. This type of communication is not synchronous; it is asynchronous. There are several choices of asynchronous communications.

The following are examples of asynchronous communications:

- Mail and package delivery. Transfer of objects and contracts that need signatures.
- Fax. Document transmitted over telephone.
- Electronic mail (e-mail). Text messages with attachments can be distributed and managed by computer programs.
- Web log (blog). An online journal may be used to record events, thoughts, and lessons learned.
- Really Simple Syndication (RSS). News feeds that push relevant content to a reader to keep the manager informed of new events that could affect the project. In order to decide if a new technology should be included in a communications plan, seek answers to the following questions:
  - ✓ Does the new communication technology provide a competitive advantage for the project by reducing cost, saving time, or preventing mistakes?
  - ✓ Does the project team have the expertise to learn the new technology quickly?
  - ✓ Does the company offer support such as help desk and equipment service for new communication technology?
  - ✓ What is the cost of training and implementation in terms of time as well as money?

3.5.2 Virtual communication system and communication in virtual teams

Communication in virtual teams is an issue that receives considerable attention. It is a process of developing the relationship. Keeping the synergy and creativity flowing, without frequent face to face interaction, is the greatest challenge to a virtual team. Communication is the vehicle for creating the energy, keeping the team together, and moving forward. Several studies have shown that the total amount of information exchange in virtual groups is less than that in face-to-face.

Figure 3 The communication system of the virtual team
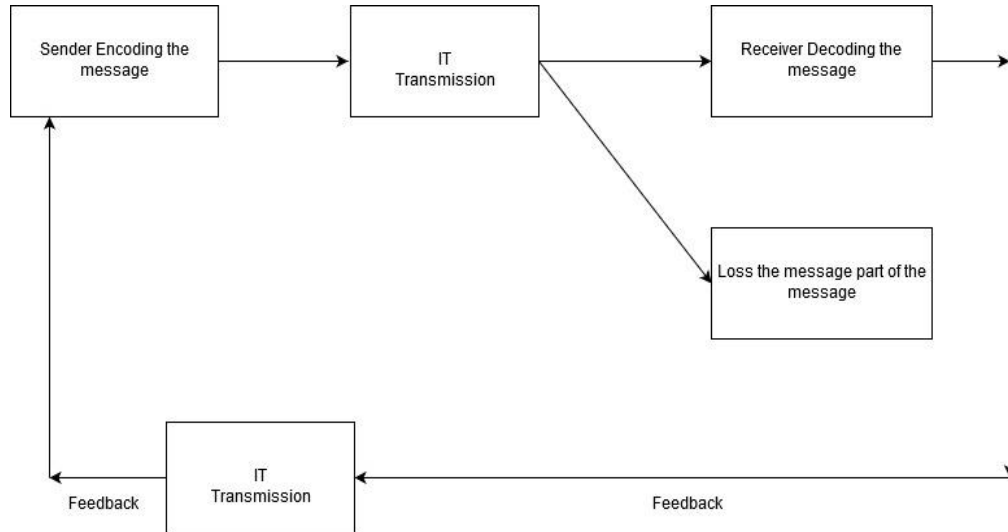
(Source: The communication process in virtual teams by Adriana Burlea-Schiopoiu)

We have characterized the communication within virtual teams like interactive, complex and limiting process. Communication interaction is due to the facilities given by information technology. Sending the message by means of Internet technology makes the relation between the sender and receiver to be established in a very short time even if the messages are not directly sent to the receiver (Adriana Burlea- Schiopoiu, 2007).

Due to the use of information technology, coding and decoding the messages are made automatically without important modifications of the message. But there is the disadvantage given by the possibility that in the IT field, the message to be totally or partially lost. This will lead to delays in the communication process and to a certain mood of uncertainty between the members of the virtual team. Delays in receiving the message lead to the appearance of some time to think about supplying with the answer, which diminishes the spontaneity and the creativity of the receiver. The consequences of losing totally or partially the message are all the more serious as the communication is realized between more senders because, at one time, it will be difficult to identify the 'missing link' among the series of messages between the members of the team, and thus, the team will not to be able to realize, in time, its objective.

Another disadvantage of the interactive communication is that the employee feels isolated in front of the computer and has no longer the protection of the other members of the team.

The feeling of isolation correlated with the lack of overview of the objectives of the team lead to disappointment and the appearance of relation conflicts within the team. The conflict of relations is based on disagreement created between two or more members of the virtual team.

The source of the conflict of relations is the misunderstandings that occur at one time in the process of communication and in the way of thinking of the team members. Cultural diversity within virtual teams can lead to an inexact understanding of the message, especially if we take into consideration the lack of body language that, in some cases, has the role to emphasize or to complete certain essences of the message.

3.5.3   Challenges of virtual team and virtual team management

When virtual teams' cross boundaries, leaders are faced with several new challenges. One very salient challenge for leaders is determining how best to manage the performance of team members who span different functional areas, organizations, and cultures. Leaders need to assess how individual and team self-regulation methods translate across different boundaries. It will be difficult for leaders to adopt a universal strategy. Instead, they may need to tailor their actions to coincide with a team member's orientation. Differences in power distance, uncertainty avoidance, and other values across cultures require leaders to determine the most appropriate behaviors for a situation. Leaders who attempt to relate to the worldview of the different members of their virtual team will be better able to individualize their performance management actions.

Team developmental functions are also more challenging as virtual teams are distributed across different organizations, cultures and functions. It is more difficult for leaders to create a well-orchestrated team when individuals do not share similar values or possess a common set of work procedures. To overcome these problems and to facilitate coherence among team members,leaders need to implement a leadership structure that builds a unique culture. At the core of this leadership structure is a network of working relationships based on strong bonds of mutual respect, trust, and obligation between individuals at all levels. The goal is to empower all employees and link them together so that they are insiders in the team. This structure ensures that individuals will put the team's interest above self-

interest and should help to facilitate cohesion among individuals drawn from across multiple boundaries. Virtual team leaders also need to engage in functions such as boundary spanning and buffering.

The leader spans boundaries to link the dispersed team members to needed information and resources and buffers the team from shocks and disturbances that can disrupt its work. These functions along with the creation of a third culture allow a virtual team leader to enact a boundary around an entity that has no tangible boundaries.

When virtual teams are distributed across time, it is also more difficult for leaders to perform team development functions. However, tasks that allow team members to operate across time usually involve fewer intensive forms of collaboration and interdependence. In these situations, leader developmental functions may not be as critical. On the other hand, leader developmental functions become extremely critical as coherence and collaboration become necessary for team success. In these instances, virtual teams need a real-time focus that enables leaders to effectively perform critical developmental functions. Leaders need to determine how to develop team coherence through communication technologies. They need to evaluate the degree to which coherence is required for team success and choose communication media based on these requirements. For example, when it is important for team members to have opportunities to bond, it is necessary for leaders to choose real-time communication media which maintain information richness. When coherence is extremely critical to team success, leaders may need to bring team members together for face-to-face meetings at designated project milestones.

3.5.4 Solutions for improving communication barriers in virtual team project management

Any manager knows of the challenges they face in making a team of individuals located together productively. The challenge is compounded when the team is distributed globally. Managing a team that has an offshore component has aspects that include managing people, cultural diversity, geographic diversity, and communication. The key points of these four aspects are as follows:

1. People management refers to the fact that coordination challenges and miscommunication is bound to happen when the team is geographically distributed.

2. Cultural diversity will be a challenge given the various backgrounds, languages, and beliefs of the employee base that can create "culture shock" for some team members.

3. Geographic diversity refers to the "out of sight, out of mind" mentality a workforce that is not continually plugged in from a communication perspective can have given they are not physically together, along with the time differences in different regions across the world that must be dealt with.

4. Communication refers to what modes of communication will work best depending on not only the cultural and geographic diversity, but also the type of work the firm is engaged in and what communication modes work best for that business and its workforce.

4 Research analysis

4.1 Analysis of interview questions

As I mentioned earlier the secondary source of this thesis is interviews and questionnaires. I have done interview with three managers from the NU Exchange/ Agro information management, these are executive project manager, marketing team leader and team leader of the virtual team. I coded the respondents of the interview as follows:- Executive project manager – R1, Marketing team leader – R2, Team leader in virtual team – R3. Here I presented their answers for the ten interview questions.

1) **How long have you been working as a project manager?**

   R1 "I was working as project manager for four years and previously I was working as assistant project coordinator for three years". R2 "I was working from junior marketing officer up to marketing manager in my previous office for about six years. From my six years work experience three of them i worked in projects including NU Exchange/ Agro information management." R3 "I was working in different projects starting from project team member up to assistant project manager in different small size and also big projects."

2) **How many years have you worked in project management at NU Exchange/ Agro information management?**
   R1 "in NU Exchange/Agro information management I am here from the beginning, so it's been three years including the designing and planning." R2 "it's been year and half since I started working for this project. " R3 "it's been two years since I started working for this project."

3) **What was the nature of the project (duration, purpose, scope, size, geographical spread, etc) Please describe the key people involved in terms of their roles and responsibilities? Please describe your role in the virtual project team.**

This project NU Exchange was formed to create digital marketplace for agricultural products, information and services. The team is developing a three-tier platform which

includes a data system, a virtual marketplace for Agro- products (offer -bid matching) and give up-to-date expert advisory system for farmers. NU Exchange targets a small and commercial farmer, traders, processors, exporters, and any other key players in the chain.

The project is designed for 10 years, since in the country there is only one trading market which is ECX for agricultural products we designed this project with a time range 10 years. The scope of the project with increase efficiency, Agro- productivity, food security, export performance, Agro – industrial processing while also creating jobs. For the first three years our plan is in four selected regions with different products. Harar with coffee (Eastern Ethiopia), oil seed farms in Amhara region (Northern part of Ethiopia), another coffee product from Sidama or Yirgachefe area (Southern part of Ethiopia), and finally cotton production in Humera region (Northern -East part of Ethiopia). Since our project is working between the merchants and farmers our team have different professionals. These includes project managers, project coordinators, supervisors, agricultural experts, marketing and sales specialists, and technical assistance team. Based on our project structure the main office is at the capital Addis Ababa and we have four branch offices have the same team structures including project managers, project coordinators supervisors, agricultural experts, marketing specialists and technical experts. In the beginning we didn't include agricultural experts since our aim is to structure a smooth trading opportunity for farmers, but when we go detail to increase supply and productivity, the follow up of these experts become the basic focus.

The current situations in in the country affects our achievements different project offices. Due to unsettled political situations there was a lot of internet disconnections and in the three project sites our offices were also closed for some time and our colleagues were unable to move and work with the farmers also. This was a big trouble as a starter project. The head office which is in Addis Ababa mainly concentrates in evaluating the projects and creating chains and sales. In this office the project managers can create sales strategies with different time intervals. R2 "I am working in the main office project team and my role is leading the marketing project. In my team there are two project managers three supervisors, marketing managers, sales manager, communication coordinator, IT and technical teams." "In my opinion virtual team project management have character of useful tool when we consider working of different geographical locations teams of the same

project. In our case as I described earlier the nature of the project is national and a bit of international when we come up to sales step. So, in this case we try to build the team as if there are no geographical boundaries. One of the goals for successful project is doing in timely manner. In order to do that we designed our plan and make a daily and weekly meeting on skype or mail. So, the success of our project in virtual team is to address wide area markets within specific time. Based on this angel I can say is good and attainable. And the challenge is when we come to communication, due to lack of technological and infrastructure facilities we are facing some troubles in making constant meetings via skype.

4) **Have you been involved in any kind of courses or trainings related to communication? For example: managing virtual teams, intercultural communication, managing global teams etc?**

R1 "through my project experiences I can say I have gained enough practical knowledge and when I get opportunities, I used to get trainings and took part in different seminars related communication, management and leadership. It helps me so much even to understand my team progress and goals without making face to face meetings and other obvious means of communication." R2 "before I came to this project, I got the opportunity to take training regarding intellectual communication, which was useful for a better understanding of the team." R3 "it's obvious, the main input for a team leader is special trainings which helps him/her for creating a better team spirit."

5) **What is the most challenging part of communication when it comes to managing global virtual teams compared to "local" teams?**

These communication challenges were lack of face-to-face communication, communication technology, and language competence related challenge "And I as a project manager I am responsible for sending message in a way that the receiver understands it correctly. So, I need to understand what the difference is and overcome that." Lack of face to face communication was mentioned as a communication challenge by all project managers. This factor was described by respondents as one of the biggest communication challenges. Although the option of video conference was a helpful method, the quality of the picture and Internet connection is often experienced as poor which decreases its usefulness as communication aid. You are lacking one or two dimensions in the interaction

when they are remote. On video conference you can see something, but it still takes away the immediate feedback and response.

All respondents thought that meeting face-to-face is a vital factor for building relationships between the team members and that it contributes to more efficient communication. You must build a strong relationship with the people you're communicating with for the communication to be wide enough to carry the signals not just explicit things. Project managers try to arrange as many face-to-face meetings as possible and they have seen evident progress in communication and work efficiency after the meetings. The important aspect is also that these meetings would include informal communication. The personal information that is learned during the face-to-face meetings is later used as energy in virtual   communication.
Trust is connected to the willingness to work with certain team. Trust building in virtual teams takes longer time than in collocated teams. Respondents have mentioned that face-to-face presence allows not only to build better trust, but as well to get important background information related to the project, that makes working processes more clearly understandable One project manager mentioned that the fact that he is not meeting his team members often and therefore does not know them personally and professionally, creates a feeling of uncertainty which leads to lack of trust and tensions. Another project manager mentioned that trust is essential for efficient communication and that he consciously builds trust with the teams.

Project managers say that videoconferencing has showed good results in helping solving problems and has provided opportunities for seeing each other's body language. Videoconferencing was considered especially useful in situations when meeting face-to-face during the project is impossible. Poor Internet connection causes low picture and audio quality which as a result, decreases video conference usefulness as a communication aid. However, some respondents admitted that video conferencing probably should be used more often than it is used now. Project managers also mentioned that they prefer audio conferencing to video conferencing because of its better quality. Poor sound quality during audio conferences was also mentioned and perceived as challenging. E-mail is also seen as

a challenging medium for communication, they are often written inefficiently and unclearly which could cause misinterpretation of information. In this case, communication via e-mails helps to overcome other challenging factors - lack of language competence and possible misunderstandings. Language competence is the linguistic knowledge owned by native speakers. It is the level of the language that is studied. In our case the work language which is English is the second and, in some cases, the third language for some of the team members, and its application and level of understanding show us wide gap, which is also visible in the project work.

6) Do you think that your relationships have been affected by coordination problems due to virtuality?

This question depicts interesting patterns displayed by different respondents. Problematic, advantageous, coordination, formal barriers are some of the key words mostly used by the respondents. It shows a spectrum of behaviours ranging from pure negative to positive range. Distance has been viewed as challenging if not problematic towards relationship development among team members. There are mixed responses from different members of the team. Some consider it to be a hindrance towards task clarity and communication while others consider it to be a productivity enhancer. Physical distance has been attributed to influence relationships as well. Most of the respondents think it to be taxing due to lessened phenomena of social interactions and see it as a hindrance towards speedy relationship development. However, topic of flexibility emerges in every response although in different ways. The ability to decide own working hours, being able to detach oneself from the group at times and reduced travelling is some of the explanations towards flexibility provided by the virtual environment.

Especially in geographically distribute team all members must create a suitable means of communication with all members of the project in either way verbal or non-verbal means of communication. R3 "When we evaluate the progress of the project based on time, in case of best communicative situations, projects will run a bit faster than the expected due date and vice versa.

7) Is there a dependency between communication in a team and its performances?

Of course, communication affects the outcomes of the project successful virtual team project management is obtained within effective communication in any kind of project management specially in virtual project management.

8) Do you think that a better IT understanding is necessary in order to work effectively in a virtual team? Do you regard this for example at the selection of project members?

Technology can really help with communication. Team members can talk to one another with virtual messaging services, as well as they will be able to organize their work in a more central way. Having a central hub for messages and notes means that everyone can keep track of what is happening within the company. Tasks can be shared with the whole team, allowing individual members to put their views and recommendations, as well as keeping them informed of what the rest of the team are up to. They can share data in order to help the company work more efficiently overall. They can also check in with one another to make sure that everything is going as it should be. Project managers will also be able to track the progress of the work easily. In order to handle updated technological tools a better understanding of IT is the key factor for it.

9) Did you know that many virtual team participants consider telephone and email not enough tools for proper collaboration in virtual teams? What do you think of this? How do you contact your colleagues or monitor processes? I asked this because research studies showed that most virtual members believe that audio video tools are highly useful for virtual cooperation, but still only few use them. Have you experienced similar things? Do you use it?

The interviewed managers mentioned the following collaboration tools used by them for managing a virtual team. Email, share point, MS Project, and MS Excel can work on desktop, or on cloud base as well, nevertheless, due to the research purpose, here they regarded as cloud computing tools. The description here is started with Share point and

Cisco Jabber, used to be called WebEx. All the other tools of the list that come after these can be included as functions of these. SharePoint and Cisco Jabber are online project management software with several functions helping project managers and virtual team members. Project planning, resource sharing, access right management, shared calendars, deadline and deliverable management, and many other functions are included. SharePoint and some other online project management tools, for example Project Place, mentioned by R2, are even more complex which is not always suitable, Lync system is a cloud based in-house communication tool. Lync as a regular telephone anymore. You see the status of the person, if he is at a meeting, if he is available, if he is away from his computer. So, you have more information than with telephone. When to call someone, you can set your status that I'm now busy, don't call me. It's interesting, it's a new way. Having now Lync, the chat is also far more used by me. When I have just a quick question, is it blue or is it the red what I should select? Then it is a very quick question sent to the person. While in old methods we would send a lengthier email, more time spent. 3 times or 5 times that I spend with email for a very quick question, more formal." Conference calls are online audio calls used by all virtual managers, however, here they are meant as separate software, not included in SharePoint, Cisco Jabber, or in Lync. Separately, only R2 uses them.

Instant messenger is an in-house chat, here it is meant as separate software, not included in SharePoint, Cisco Jabber, or in Lync. Although the chat function was mentioned by 2 managers, in this separate form, only R 1 uses it. File management in the cloud is a collaboration tool used by all the interviewed project managers. The reader can think of Google Docs, or Drop box which are the most popular similar software for a not business users. This tool allows to keep files available via the Internet from anywhere, also several people with the right authority access can edit them, so information is easy to access, edit, download, and share. Email and telephone as collaboration tools are left to the end of this description, because they are the most frequently used, most well-known tools, however, recently they have started to fulfil different roles in virtual collaboration then they used to.

10) If there is something, what would you improve regarding the available cloud computing tools at your company?

Finally, managers talked about their preferences and overall satisfaction regarding virtual project management and the available collaboration tools. As some possible further opportunity for develop virtual cooperation within a team, though not requirements, were mentioned. R 1 talked about a smart board: The desired tool would be a smart board where you have the chance to write on it and it's all digital, you have the chance to send out the information to other members, collaborators. You can have better drafts, better drawings; the quality of your presentation could be increased a lot by this tool. R 2 mentioned some other small rooms for improvement: I could accept a bit more developed SharePoint.

4.2 Analysis of questionnaires

Questionnaire Answers total is 45. The written for of the questionnaire is distributed for 45 volunteers who are currently working in this project. The selected volunteers are currently working in the four sites of the project as well as in the main project office (Addis Ababa). I have categorized the answers in two main categories. These are:

- Virtual team
- Regular employees

The first group which is the virtual team are only workers who are working remotely and because of their job situation their communication is not with the one who are working in the same office with them. I identified this group as a perfect symbol of virtual team for this thesis.

The second group is the regular employees; these group is regular workers for this projects with a longer contract in the project. They work in a regular manner they are working in the same geographic area of the project.

Age distribution

As we can see in the figure 6 below most of the respondents which is 60% are in the 26 – 35 age range. And 24% of the total population is in the age range 36 – 45 which is the second highest number from the total population, the 9% that is the age range 18- 25 is in the third position and people who aged above are the fourth , they are 7% of the total population.

Figure 4 Age distribuion of the respondents
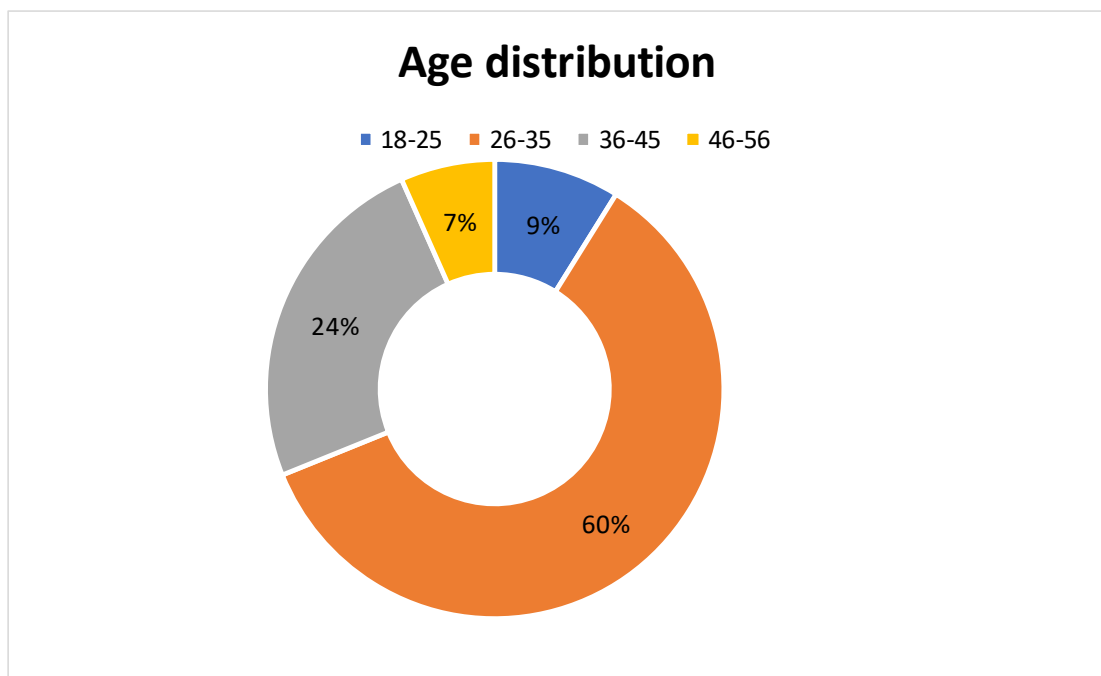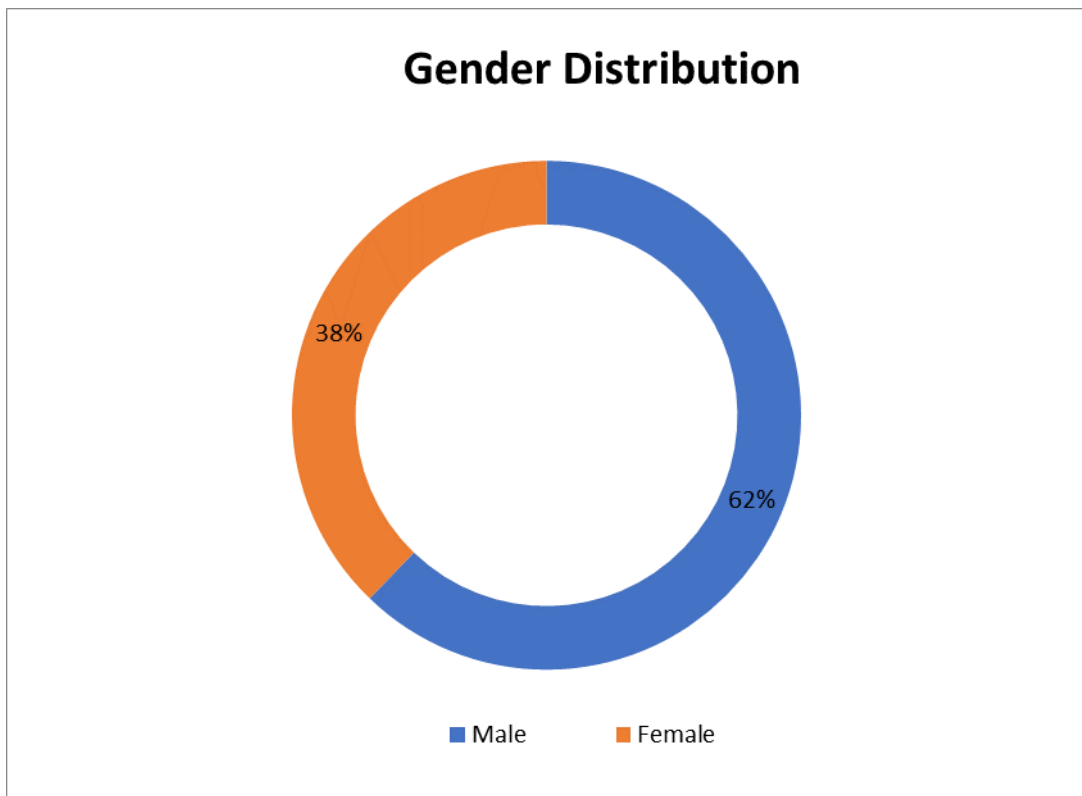

Age distribution

(Source: own elaboration 2020)

Gender distribution

As we see in the figure 7 from the total respondents the number of male respondents which is 62% is higher than the female respondents which is 38%. I can also observe this gender difference in the total participants of the project.

Figure 5 Gender distribuion of the respondents

As we see in figure 8 majority of the respondents are working in this project from 1- 3 years which is 49% of the total population, the second higher number of respondents which is 33% have 6 months – 1 year experience in this project and the rest 18% of the total population have a work experience of below 6 months. The reason that we can't find anyone who worked above 3 years in this project is that, the project is in its initial stage and it's just in the third year.

Figure 6 Length of time in the project of the respondents

WORKING IN THE PROJECT

■ less than 6 months   ■ 6months-1 year   ■ 1-3 years   ■

0%

18%

49%

33%
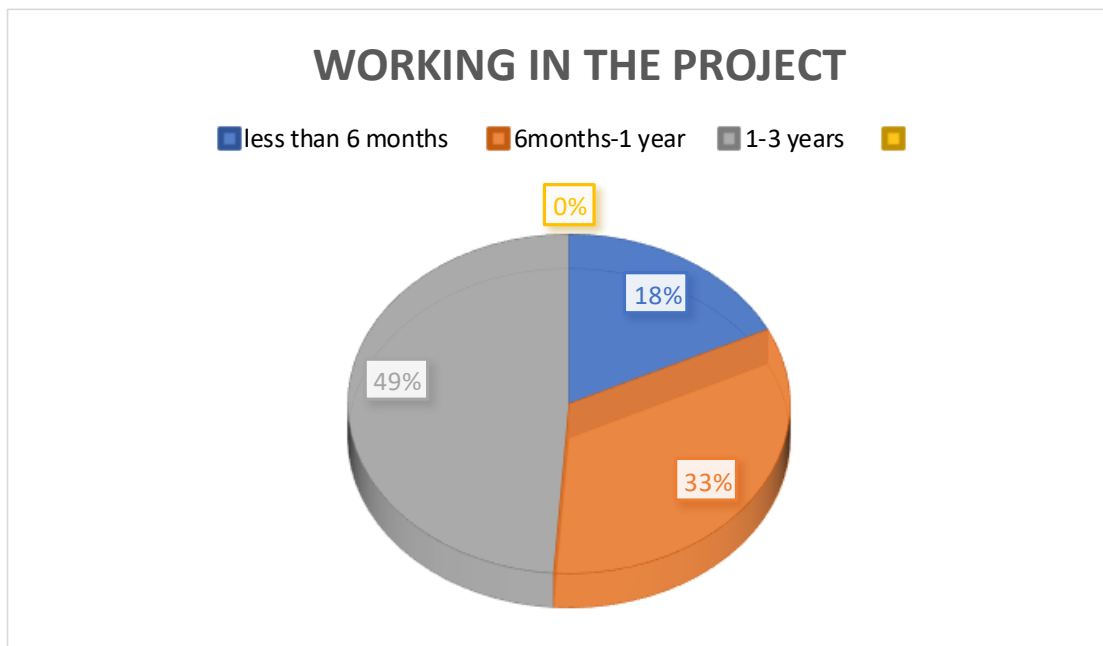
(Source: own elaboration 2020)

From the investigation of the employment status of the respondents, the first group which is 27% of the total population are the virtual team, they are constantly working in the a virtual team, the second and more populated group includes 73% of the total population and they are regular employees.

*Figure 7 Employment status in the project of the respondents*
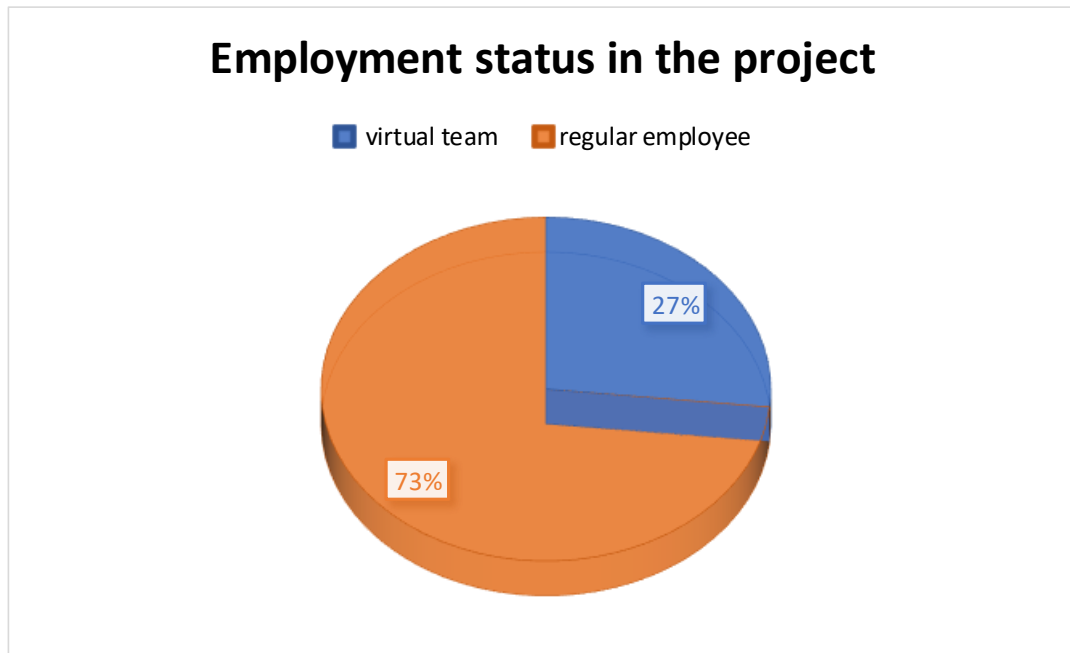
(Source: own elaboration 2020)

Majority of the respondents are in non-supervisory level in the project which is 60% of the total population. The second majority of the population that is 29% are in supervisory level in different teams and the rest 11% is in managerial level in the project.

Figure 8 Level in the project of the respondents

Level in the project

60% — Non-supervisory level
29% — Supervisory level
11% — Manageerial level
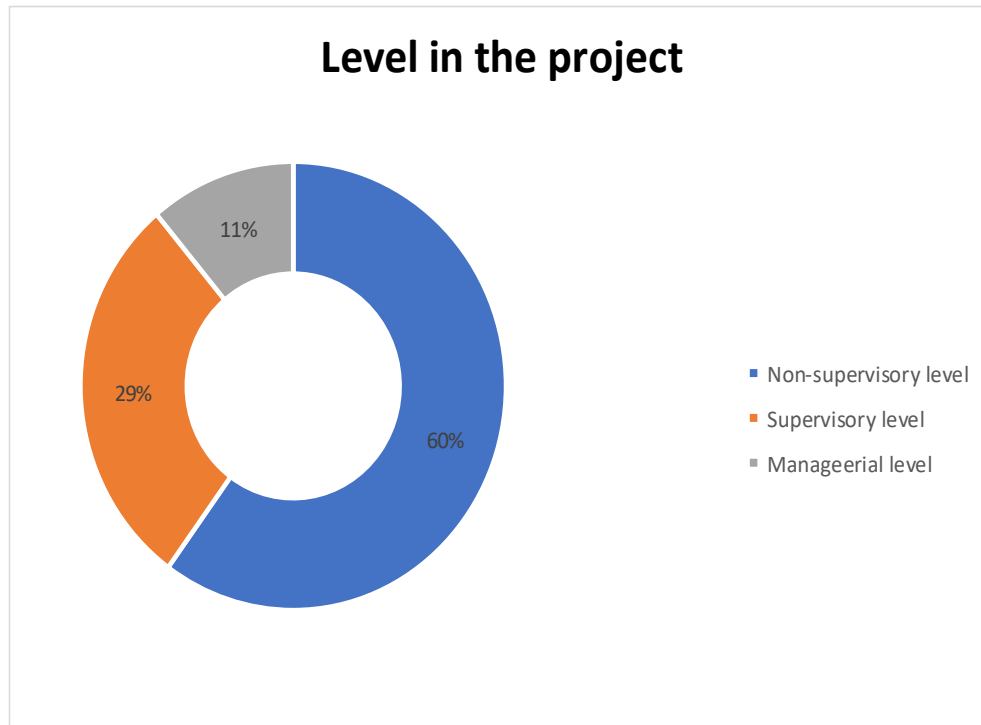
(Source: own elaboration 2020)

From the figure 9 respondents' opinion in communicating without fear with their colleagues. In the both groups (i.e. virtual team and regular employees) higher number respondents communicate without fear. For virtual team 8 out of 12 respondents said they communicate with their colleagues without fear and the rest 4 out 12 have some problems, and also regular employees 27 out of 33 respondents communicate without feat and the rest 6 respondents have some problem as well.

Figure 9 Respondents opinion in communicating without fear

Respondents opinion in communicating without fear

■ Yes ■ No

VIRTUAL TEAM: Yes 8, No 4

REGUALR EMPLOYEE: Yes 27, No 6
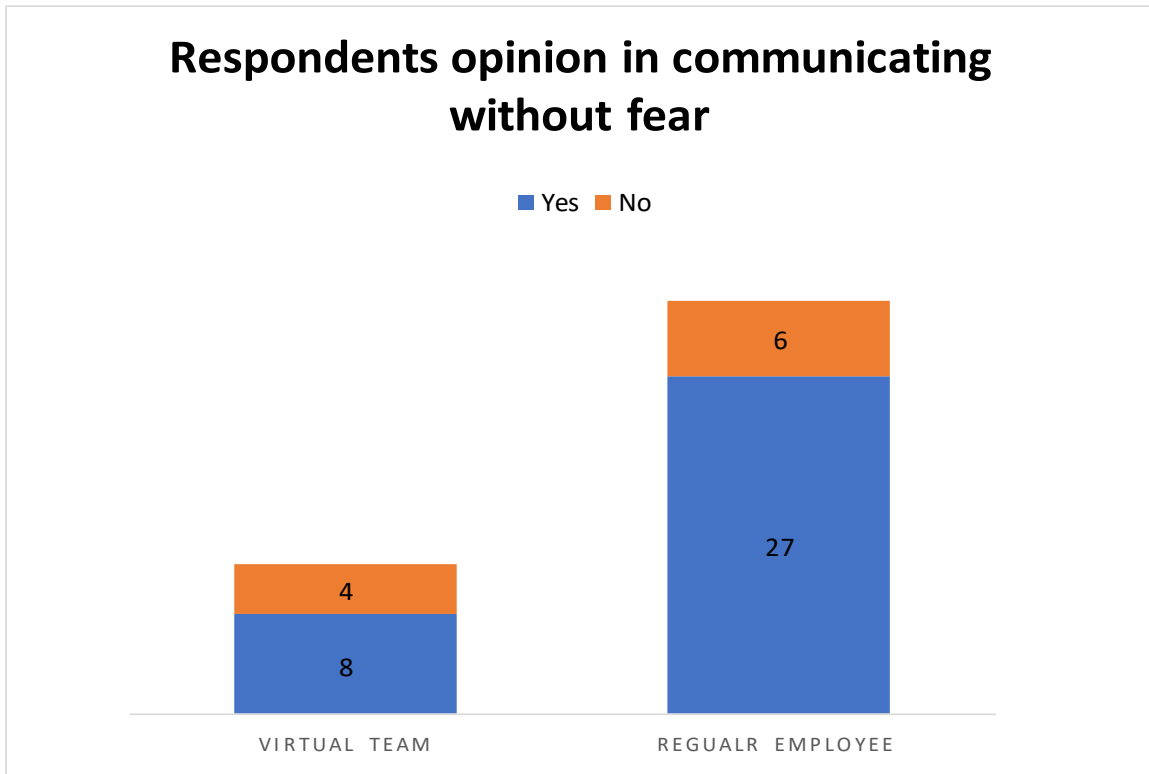
(Source: own elaboration 2020)

How important is communication for you in the project that you are working on? How would you rate it out of 10 (1- is the lowest level and 10- highest grade)? Regarding the importance of communication the result is shown in the figure below. For both groups they have higher communication experience. For member of virtual team 9 out of 12 respondents have higher communication experience, 2 out of 12 respondents have medium communication experience and 1 out of 12 has very low communication experience whereas for regular employees 22 out of 33 respondents have higher experience, 9 out of 33 respondents have medium experience and 2 out of 33 respondents have very low communication experience.

Figure 10 Rate of communication in the project

Rate of communication in the project

■ virtual team   ■ Regular employees

	0 -- 3	4 -- 6	7 -- 10
virtual team	5	2	3
Regular employees	2	9	22
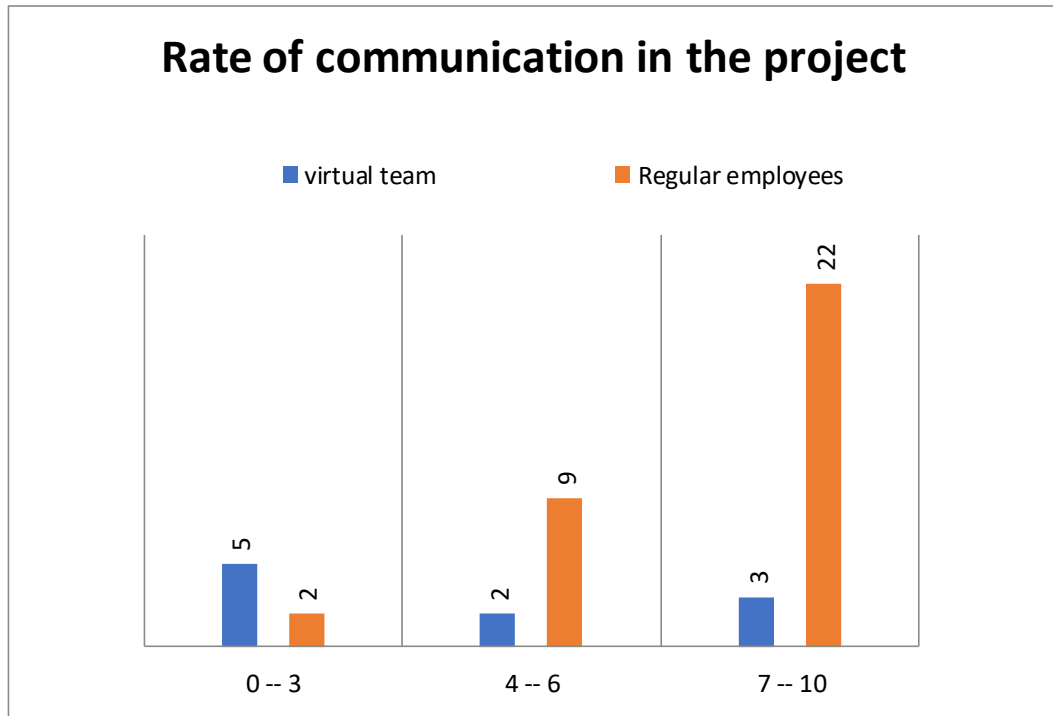
(Source: own elaboration 2020)

Are you satisfied with your communication with your colleagues? Regarding the satisfaction with the communication they have with their colleagues, the virtual team 7 out 12 respondents are not satisfied and 5 out of 12 respondents are satisfied, whereas for regular employees 23 out of 33 respondents are satisfied and 10 out of 33 respondents are not.

Figure 11 Respondents opinion about satisfaction in communicating with thier colleagues
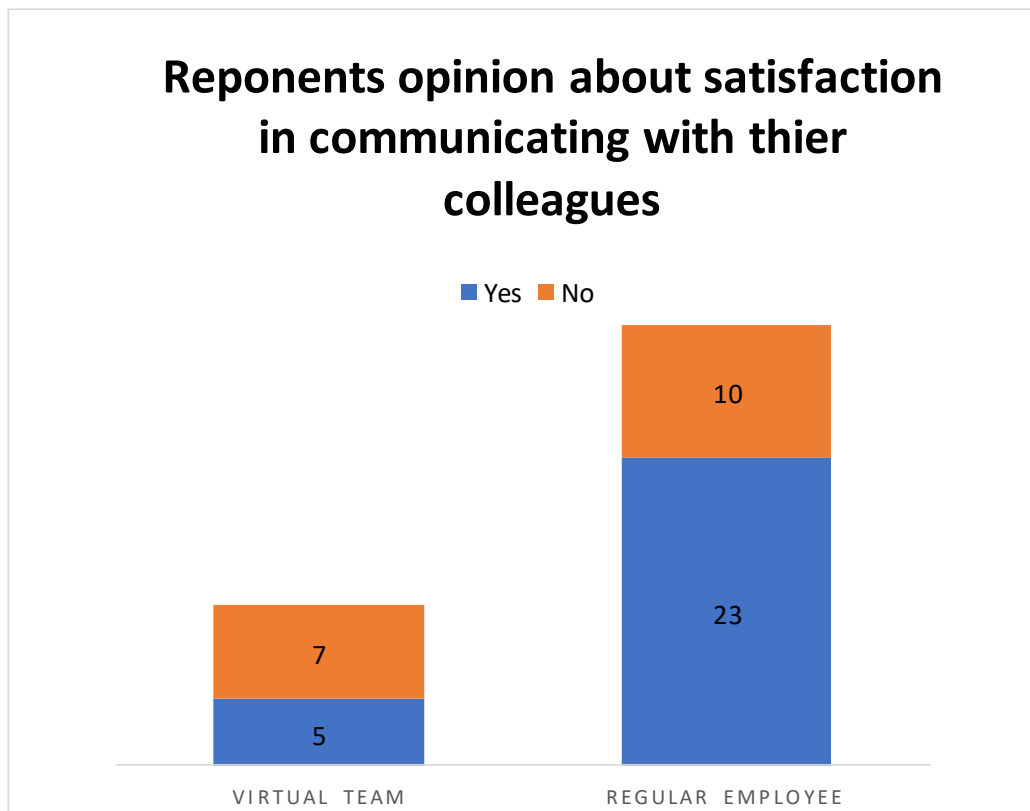
Reponents opinion about satisfaction in communicating with thier colleagues

■ Yes ■ No

(Source: own elaboration 2020)

In your opinion which type of communication is the most important and influential to project process?

Respondents opinion regarding the influential communication means from the listed communication means that is verbal, non-verbal and electronic is analysed in the figure below. In both categories of respondent's verbal communication means is the most influential means of communication. For virtual teams 8 of the 12 respondents prefer again verbal communication means and from the rest 4 respondents each of the two prefer electronic and non-verbal communication means. For the second category regular 26 of the 33 respondents prefer verbal communication means and 4 out of 33 prefer electronic and 3 out of 33 prefer non-verbal communication means.

Figure 12 Influential communication means

INFLUENTIAL COMMUNICATION MEANS

■ Electronic   ■ Verbal   ■ Non-verbal

VIRTUAL TEAM: Electronic 2, Verbal 8, Non-verbal 2

REGULAR EMPLOYEE: Electronic 4, Verbal 26, Non-verbal 3
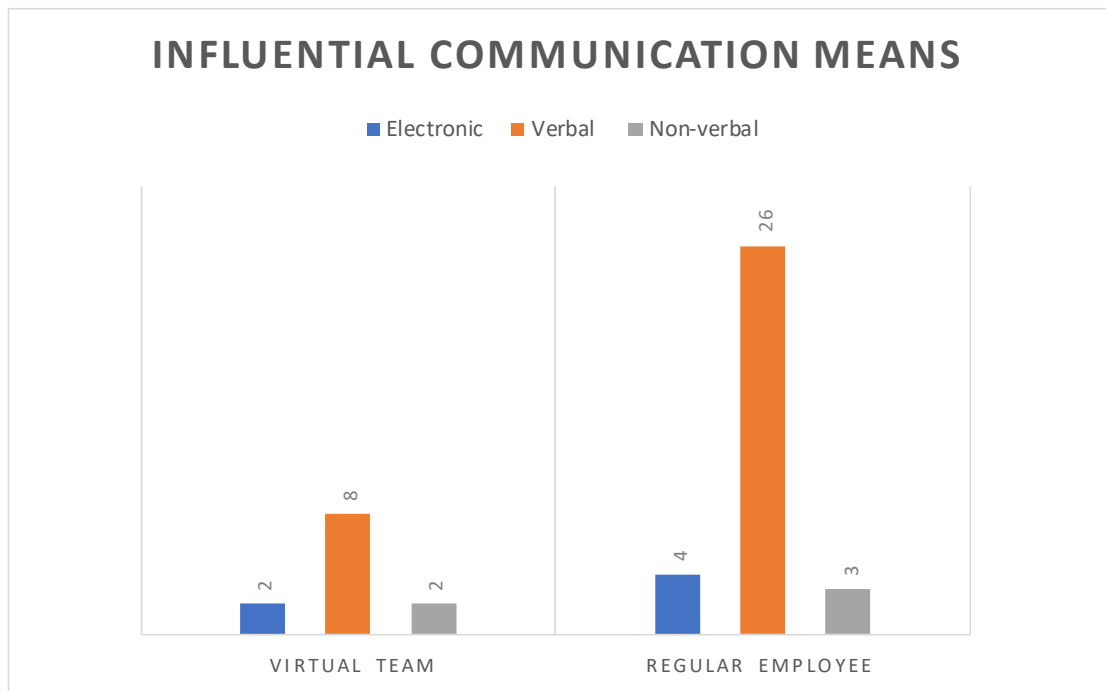
(Source: own elaboration 2020)

Out of the communications that you make each day how many of them are with virtual colleagues?

The response for these questions quite different in the two groups. For virtual teams they make most of the communication between themselves, 10 out of 12 respondents said that 70 % of the communication is between them and one respondent said 30% - 70% and the rest one respondent said between 10% - 30% is between them. For the second category which is regular employees 24 out of 33 respondents said that 70%of the total communication is with virtual teams, 6 out of 33 respondents rate between 30% - 70%, 2 out of 33 respondents rate between 10% - 30% and the rest 1 respondent rate less than 10% of communication is with virtual team.

Figure 13 Measurement of communication with virtual team

COMMUNICATION WITH VIRTUAL TEAMS

■ Less than 10%   ■ Between 10%-30%   ■ Between 30%-70%   ■ More than 70%
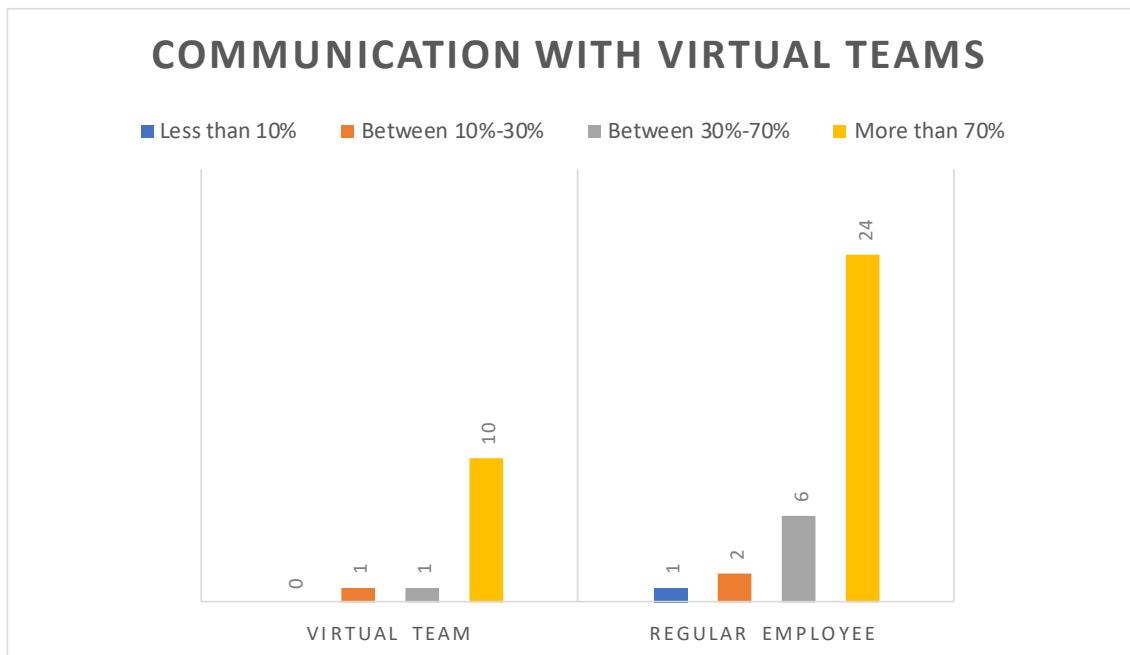
(Source: own elaboration 2020)

Do you consider yourself a team player?

Regarding the basic point for project management especially in the case of virtual team is being a team player. From the figure 17 below we see most of the respondents as a team player, for virtual team 10 out of 12 respondents consider themselves as a team player, and the other 2 are not. And for regular employee group 28 out of 33 consider themselves as team player and the rest 5 out of 33 are not.

Figure 14 Respondents opinion about team player

RESPONSE ABOUT TEAM PLAYER

■ Yes ■ No

	VIRTUAL TEAM	REGULAR EMPLOYEE
No	2	5
Yes	10	28
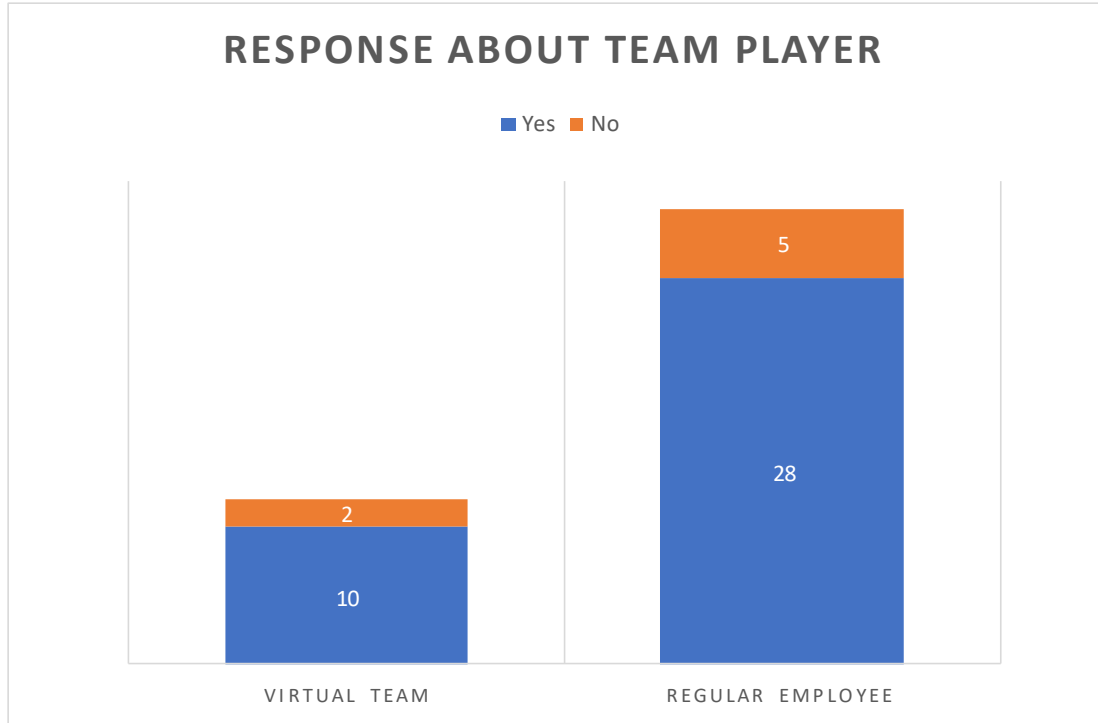
(Source: own elaboration 2020)

In your opinion who is responsible for project failure?

When the communication barrier is narrow everyone will be responsible for the success and failure of project. Based on the respondents response about the responsibility of project failure, in virtual team 10 out of 12 respondents said the whole team is responsible for project failure, and from the rest 2 respondents 1 said the team leader and the other one said the person who did not do his/her job properly. For the regular employee group 24 out of 33 respondents said the whole team is responsible, 5 out of 33 respondents said the team leader is responsible for project failure and the rest 4 out of 33 said the person who did not his/her job properly.

Figure 15 Respondents opinion about responsible person for project failure

RESPONSIBLE FOR PROJECT FAILURE

■ The team leader   ■ The whole team   ■ The person who did not do his/her job properly

VIRTUAL TEAM: 1, 10, 1
REGULAR EMPLOYEE: 5, 24, 4

(Source: own elaboration 2020)

Do you get all the important information that you need for your job in time?

Most of the respondents in both study groups get important information. When we see the virtual team 5 out of 12 respondents get important information very often, 3 out of 12 they get often, 2 out of 12 get sometimes and the rest two respondents their response is hardly ever and never respectively. For the regular employee group 24 out of 33 get important information very often, 5 out of 33 get often, 2 out of 33 sometimes and the rest two respondents respond hardly ever and never respectively.

Figure 16 Frequency of getting important information

GETTING IMPORTANT INFORMATION

■ Very often   ■ Often   ■ Sometimes   ■ Hardly ever   ■ Never

VIRTUAL TEAM: 5, 3, 2, 1, 1
REGULAR EMPLOYEE: 24, 5, 2, 1, 1
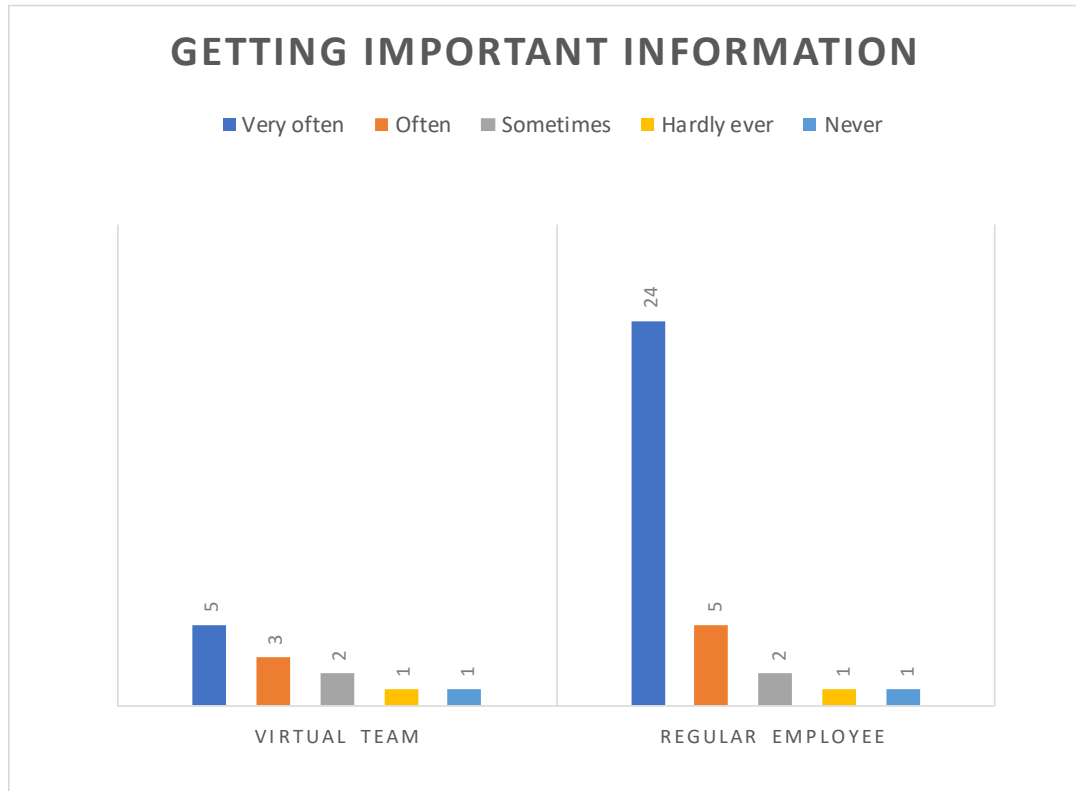
(Source: own elaboration 2020)

How often the following communication tools are used? (1-very often, 2-often, 3-sometimes, 4-hardly ever, 5-never)?

Regarding the virtual team obviously they are using nonverbal communication methods very often. When we see the results most of the respondents use telephone, email and voice and video conferences highly and other methods like MMS, telegram, and face to face meetings rarely. So, when i rate the tools voice and video conference is the first choice, then email, and telephone is in the third place from the first top tools.

Figure 17 Virtual team communication tools
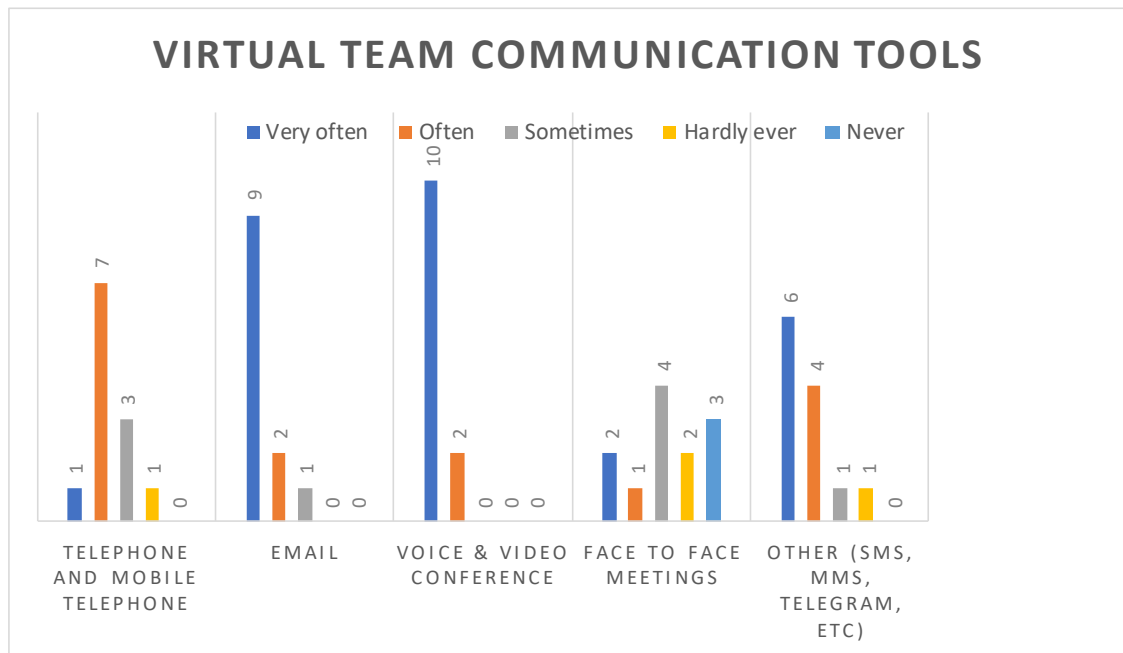
 (Source: own elaboration 2020)

For the regular employees group they are using nonverbal communication methods very often. When we see the results most of the respondents use telephone, email and voice and video conferences highly and other methods like MMS, telegram, and face to face meetings rarely. So when i rate the tools voice and video conference is the first choice, then email, and telephone is in the third place from the first top tools.
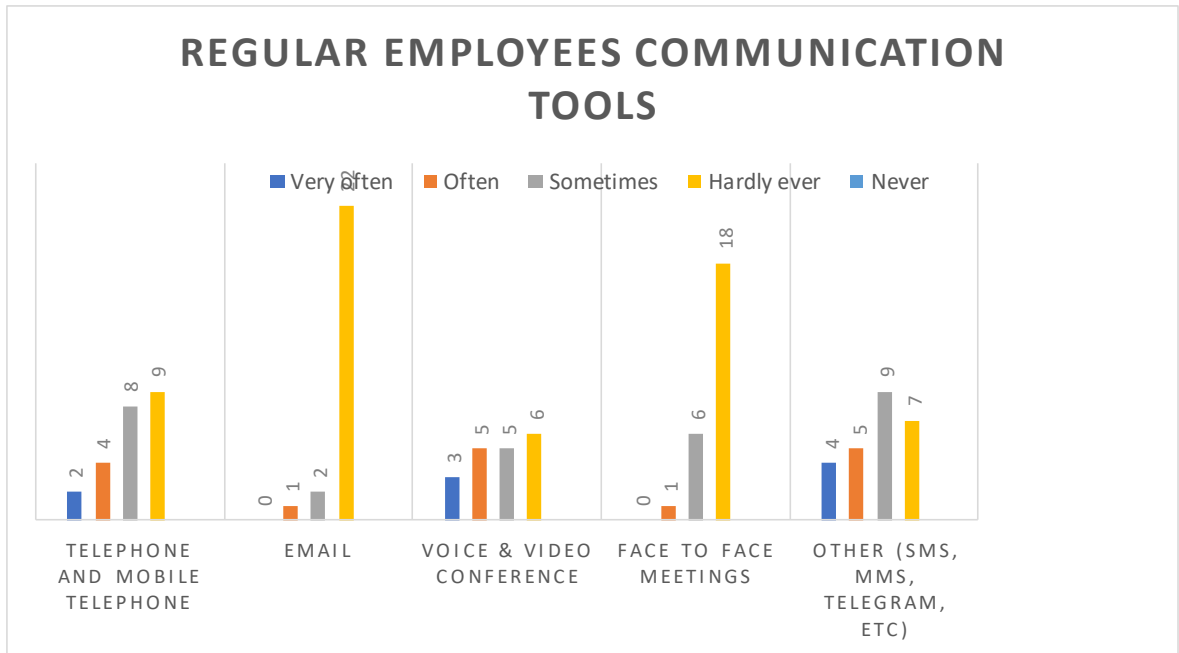
Figure 18 Regular employees communication tools

REGULAR EMPLOYEES COMMUNICATION TOOLS

■ Very often ■ Often ■ Sometimes ■ Hardly ever ■ Never

(Source: own elaboration 2020)

According to your opinions what influences on communication in virtual team? In both teams most of the respondents said language skill influences highly the communication in virtual team. For the first group virtual team 5 out of 12 respondents said language skill influences the communication, 4 out of 12 respondents said work experience, 2 out of 12 said personality and 1 out of 12 said age influences the communication in virtual team. For the second group the response shows that 15 out of 33 respondents said language skill influences communication in virtual team, 10 out of 33 said work experience, 4 out of 33 said personality and 4 out of 33 said age influences communication in virtual team.

Figure 19 Influences of communication in virtual team

WHAT INFLUENCES COMMUNICATION IN VIRTUAL TEAM

■ Age ■ Work expierence ■ Personality ■ Language skills

VIRTUAL TEAM: Age 1, Work expierence 4, Personality 2, Language skills 5

REGULAR EMPLOYEE: Age 4, Work expierence 10, Personality 4, Language skills 15
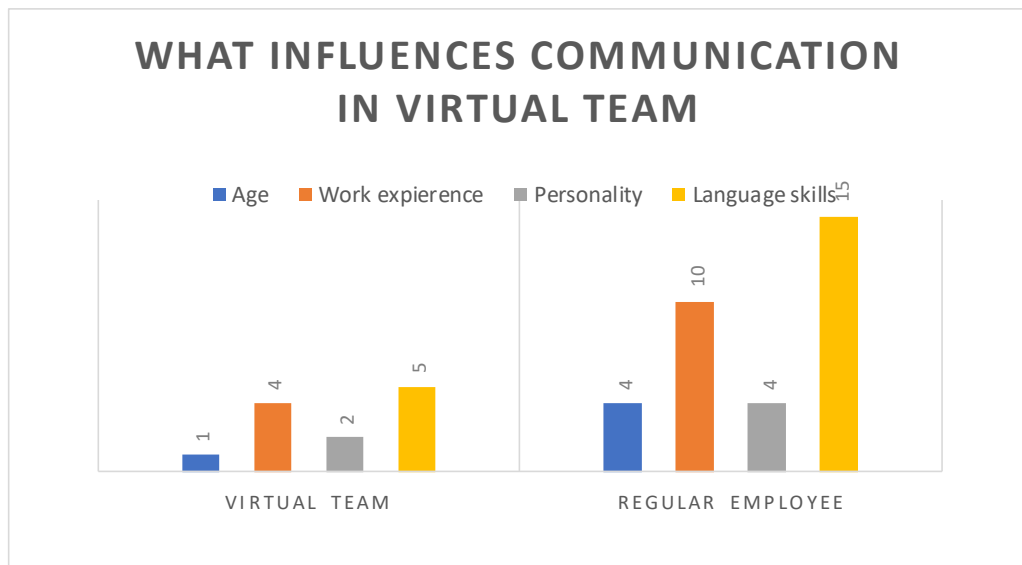
(Source: own elaboration 2020)

What problem in team communication do you come across with?

Respondents of virtual team listed problems in communication in their team. According to their response's information overload is the first, language usage, level of trust, level of cohesion, stereotypes and complication in solving problem will continue consequently in descending order. For the case of regular employees' stereotypes is in the first list, information overload, language usage, complication in solving conflicts, level of trust and level of cohesion will continue in descending order as well.

Figure 20 Communication problem

COMMUNICATION PROBLEM

■ Level of trust   ■ Level of cohesion
■ Complication in solving conflics   ■ Stereotypes
■ Information overload   ■ Language usage

VIRTUAL TEAM   REGUALR EMPLOYEES
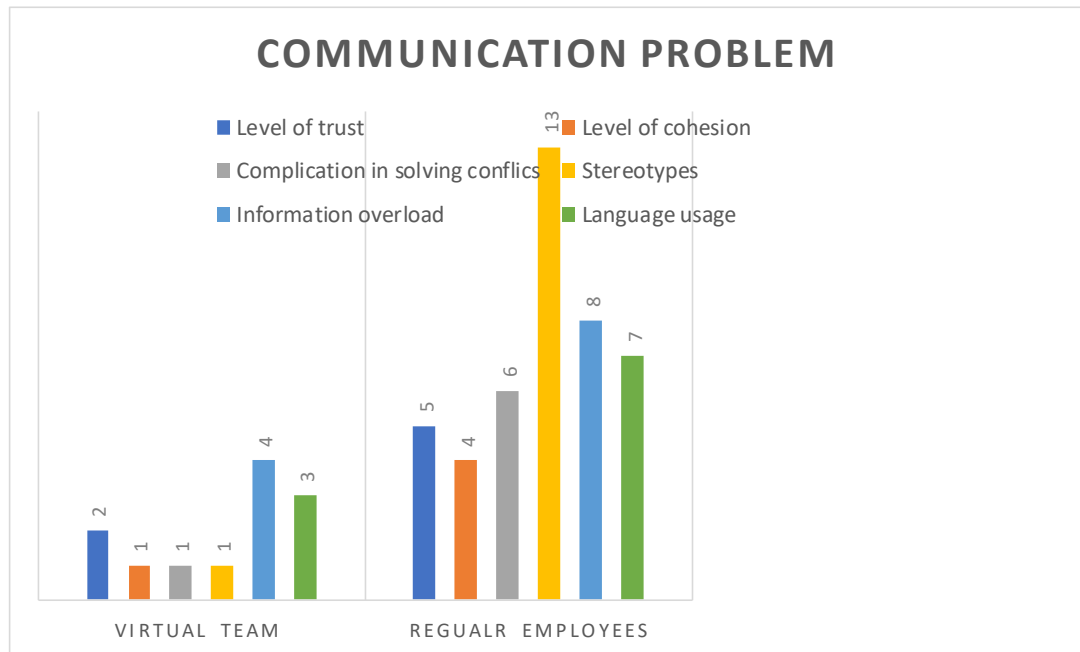
(Source: own elaboration 2020)

What can improve communication in a team?

Respondents suggest some solutions for the problems mentioned above in this survey. For both virtual teams and regular employees they have relatively similar suggestions for the recommendations. It is listed in descending order as follows.

- Agreement to use common language
- Providing personal data
- Regular meetings
- Setting rules

Figure 21 Respondents recommndations to improve communication
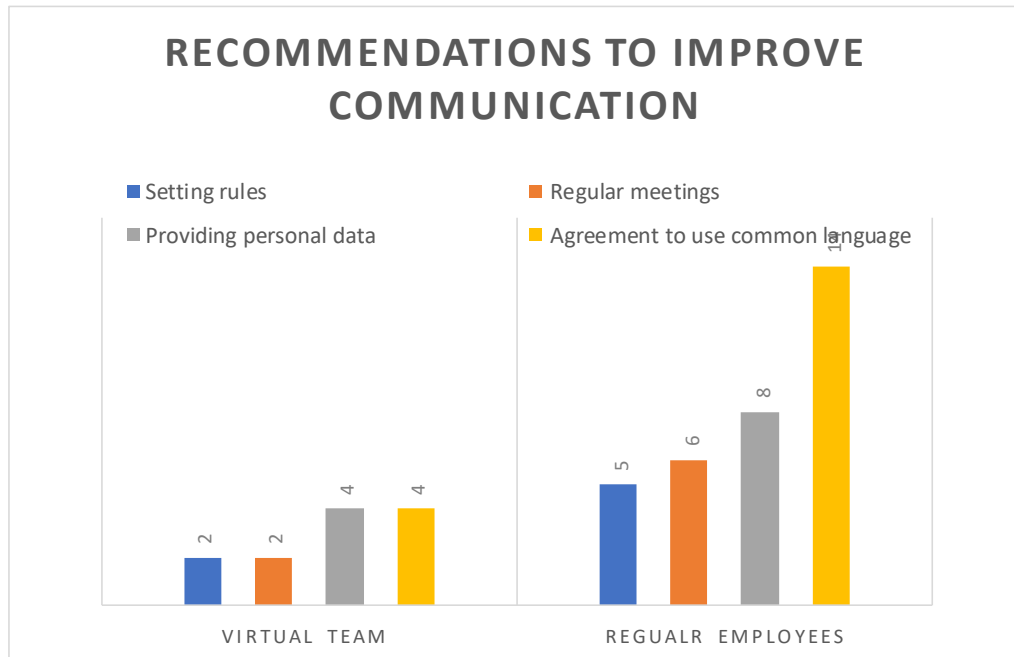
(Source: own elaboration 2020)

5 Evaluation of Results and Recommendation

5.1 Results and Discussion

1. How do characteristics of virtuality influence the relationship among the project managements in the surveyed workers?

Two categories identified in this question are related to temporal distance, physical distance, positives and negatives related to the factors of virtuality and distance. This question depicts interesting patterns displayed by different respondents. Problematic, advantageous, coordination, formal barriers are some of the key words mostly used by the respondents. However, topic of flexibility emerges in every response although in different ways. The ability to decide own working hours, being able to detach oneself from the group at times and reduced travelling is some of the explanations towards flexibility provided by the virtual environment.

Distance has been viewed as challenging if not problematic towards relationship development among team members. There are mixed responses from different members of the team. Some consider it to be a hindrance towards task clarity and communication while others consider it to be a productivity enhancer. Physical distance has been attributed to influence relationships as well. Most of the respondents think it to be taxing due to lessened phenomena of social interactions and see it as a hindrance towards speedy relationship development. Especially in geographically distribute team all members have to create a suitable means of communication with all members of the project in either way verbal or non-verbal means of communication. R3 "When we evaluate the progress of the project based on time, in case of best communicative situations, projects will run a bit faster than the expected due date and vice versa."

2. What is the most challenging part of communication in the surveyed workers when it comes to managing global virtual teams compared to local teams?

- Lack of face to face -to-face communication
- Communication technology
- Language competence related challenges

These communication challenges were lack of face-to-face communication, communication technology, and language competence related challenges. R1 "And I as a project manager I am responsible for sending message in a way that the receiver understands it correctly. So, I need to understand what the difference is and overcome that." Lack of face to face communication was mentioned as a communication challenge by all project managers. This factor was described by respondents as one of the biggest communication challenges.

Although the option of video conference was a helpful method, the quality of the picture and Internet connection is often experienced as poor which decreases its usefulness as communication aid. You are lacking one or two dimensions in the interaction when they are remote. On video conference you can see something, but it still takes away the immediate feedback and response.

All respondents thought that meeting face-to-face is a vital factor for building relationships between the team members and that it contributes to more efficient communication. You must build a strong relationship with the people you're communicating with for the communication to be wide enough to carry the signals not just explicit things.

Project managers try to arrange as many face-to-face meetings as possible and they have seen evident progress in communication and work efficiency after the meetings. The important aspect is also that these meetings would include informal communication. The personal information that is learned during the face-to-face meetings is later used as energy in virtual communication.

Trust is connected to the willingness to work with certain team. Trust building in virtual teams takes longer time than in collocated teams. Respondents have mentioned that face-to-face presence allows not only to build better trust, but as well to get important background information related to the project, that makes working processes more clearly understandable

One project manager mentioned that the fact that he is not meeting his team members often and therefore does not know them personally and professionally, creates a feeling of uncertainty which leads to lack of trust and tensions. Another project manager mentioned that trust is essential for efficient communication and that he consciously builds trust with the teams. Project managers say that video conferencing has showed good results in helping solving problems and has provided opportunities for seeing each other's body language.

Videoconferencing was considered especially useful in situations when meeting face-to-face during the project is impossible. Poor Internet connection causes low picture and audio quality which as a result, decreases video conference usefulness as a communication aid. However, some respondents admitted that video conferencing probably should be used more often than it is used now. Project managers also mentioned that they prefer audio conferencing to video conferencing because of its better quality. Poor sound quality during audio conferences was also mentioned and perceived as challenging. E-mail is also seen as a challenging medium for communication, they are often written inefficiently and unclearly which could cause misinterpretation of information. In this case, communication via e-mails helps to overcome other challenging factors - lack of language competence and possible misunderstandings. Language competence is the linguistic knowledge owned by native speakers. It is the level of the language that is studied. In our case the work language which is English is the second and, in some cases, the third language for some of the team members, and its application and level of understanding show us wide gap, which is also visible in the project work.

1. In the surveyed workers how is the knowledge of IT important in order to efficiently manage in the virtual team?

Technology can really help with communication. Team members can talk to one another with virtual messaging services, as well as they will be able to organize their work in a more central way. Having a central hub for messages and notes means that everyone can keep track of what is happening within the company. Tasks can be shared with the whole team, allowing individual members to put their views and recommendations, as well as keeping them informed of what the rest of the team are up to. They can share data in order to help the company work more efficiently overall. They can also check in with one another to make sure that everything is going as it should be. Having the right technology in place enables efficient communication and collaboration between team members. Project managers will also be able to track the progress of the work easily. In order to handle updated technological tools a better understanding of IT is the key factor for it.

2. What are the positive and negative features of virtual team in project management? Perhaps one of the key advantages of the virtual team is the ability to hire best people for the job. Unrestricted geographical location enables a virtual team to hire most skilled and experienced people from different parts of the world. Pool of talented people can be put together to increase efficiency and productivity of the business. Knowing the fact that virtual members do not need to travel reduces travelling costs and also reduces costs of renting office space because virtual members may or may not need to be physically in office.

Some of the positive features includes

- ➢ decreased travel costs by
- ➢ more productive and spent less time off sick
- ➢ time saving and increased productivity
- ➢ extended market opportunity: - ability to establish a presence with customers worldwide, especially for small businesses to complete on a global scale without limiting customer base.

- ➤ Gaining higher IT knowledge
- ➤ unlimited access of talent: - skilled people from different parts of the world can be put together in one team that gives great advantage to a company.
- ➤ Due to flexible working hours, it increases job satisfaction.
- ➤ The ability for an organization to bring people together from remote geography and quickly form a cohesive team that is capable of quickly solving complex problems and making effective decisions is an enormous competitive advantage.
- ➤ Diverse intelligence in virtual teams allows better performance. Also, some form of electronic media facilitates equality and effort made by each member.
- ➤ Increased global knowledge and getting to know different cultures.

The negative features include: -

- ❖ Lack of face to face -to-face communication: - lack of verbal communication which facilitates better understanding.
- ❖ Communication technology: - in making video calls sometimes interaction of network and lack of connectivity, regarding email misunderstanding of the concept etc.
- ❖ Language competence related challenges: - due to different level of understanding the language and the work language is the second or in some cases the third language for the project team so the level of understanding is also different.

Lack of advanced IT knowledge – since we are correlating project management and virtual team which both needs the application of modern technological tools, the knowledge of IT is very important. From the above analysis most of the members of the team lacks advanced IT knowledge.

5.2 Recommendation

The reviewed works were studying the positive and the negative features of project management in virtual team, although, the positive ones less intensive than the negatives. The outcome of literature review and the case study findings tell some of the measures needed for the project management in virtual team to be effective. The following recommendation should be implemented to improve project management in virtual teams.

- ✓ Lack of face-to-face communication: - In a virtual environment in order to solve the problem of lack of face-to-face communication the best way is to build trust. Trust is based more on ability and delivery of the task at hand than on interpersonal relationships. Members of virtual teams need to be sure that all others will fulfil their obligations with competence and integrity and behave in a consistent, predictable manner with a concern for the well-being of others. The level of member performance over time builds or denies trust in greater degrees than it does in conventional environments. To build trust in virtual teams, it is essential to ask effective questions; generate clear and concise objectives, including a project implementation plan; build tell-and-ask patterns; enable the free flow of data and information for constant, consistent, concerned, and concrete discussion, including the development of communication and meetings protocols; diagnose problems early and act on them; grow the virtual team's own culture and identity, including the promotion of virtual socializing skills; and make, share, and celebrate good news. Having a well-rounded set of soft skills is especially important for teams unable to communicate face-to-face. The inability to pick up on social cues, expressions or gestures while communicating online can really hinder conversation. Good soft skills help team members to empathize with one another and gain better understanding of each other's perspectives and preferred styles of communication. Team members should also feel comfortable giving and receiving feedback with one another, which can sometimes become a bit more challenging when not communicating face-to-face or with someone who might have a different native tongue.

- ✓ Communication technology: -Information Management Systems New management, measurement, and control systems must be designed. The workload tracking and management systems that are required in a virtual, matrices world differ from those used in conventional organizations. Details of work assignments must be made available more widely so that data and information gathered in one place for one purpose can be used in another for other purposes as well as up and down the management chain for planning and decision-making. Workload tracking and management systems must evolve to span all the work performed both in and out of a department. Electronic Communication and Collaboration Technologies For

virtual teams to work effectively, members from all geographic and functional areas need access to a standard set of electronic communication and collaboration technologies.

- ✓ Language competence: - As globalization increasingly requires people to work across borders, innovation relies more on cross-boundary collaboration and cooperation, therefore instilling a need for organizations to break down silos and improve communication. Since working globally and with foreign people are turned out to be advantages for most virtual members, people with good knowledge of the common language used in the given team and colleagues with more extrovert, more open-minded personalities would be better choices when constructing a virtual team.

- ✓ Lack of advanced IT knowledge: - Also, as results indicated, IT knowledge levels do matter, so it is suggested to put employees with at least basic IT knowledge, or with high willingness to learn about the usage of virtual collaboration tools in order to maximize efficiency of the virtual team. Furthermore, virtual project form was identified with faster information flow which might be exponentially beneficial for businesses in rapidly changing industries, such as IT, telecommunications, or fashion for instance. To sum up, the reviewed theoretical framework and the results gained by this research study can give new insights for virtual project managers or companies using virtual teams. Learning and Development Modern organizations must commit to, and make resources available for, training and other ongoing learning development activities focused on working in a virtual environment. They must also educate all employees, not just virtual employees, in virtual team culture. SharePoint and Cisco Jabber are online project management software with several functions helping project managers and virtual team members. Project planning, resource sharing, access right man agreement, shared calendars, deadline and deliverable management, and many other functions are included. Other recommended technological tools include Lync system, MS Project, data warehouse and Instant message. Lync system which is a cloud based in-house communication tool which is particularly useful for organizations that have multiple offices in different locations. File management in the cloud is a collaboration tool which is highly recommended tool that allows to keep files

available via the Internet from anywhere, also several people with the right authority access can edit them, so information is easy to access, edit, download, and share. Email and telephone as collaboration tools are left to the end of this description, because they are the most frequently used, most well-known tools, however, recently they have started to fulfil different roles in virtual collaboration then they used to.MS Project is project planning, resource sharing, and project management software that are widely used by project managers in general.

6 Conclusion

Technological innovations have been happening at a speed never seen before. As a result, a new economy of the information society has been born which is full of new business forms and new technologies. One of the newly created working forms is virtual project management.

Having virtual teams in place it gives the organizations a great advantage to compete and react quickly to the customer demands but putting bunch of people together does not guarantee satisfying results. Concerning project management, it has a different view in virtual teams. In this diploma thesis the main concern is to visualize project managements in virtual team.

In theoretical part the thesis illustrates project managements (conventional and non-conventional project managements), constructions and characteristics of virtual teams, technological and communications tools in virtual teams, the role and challenges of communication in virtual teams and solutions for improving communication barriers. In practical part of the diploma thesis is focused on the own survey. Obtained from results of survey data let to answer on four main research questions, which were formulated to meet the main aim of the diploma thesis.

Project management communication includes the process required to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. It provides the critical links among people, ideas, and information that are necessary for success. So when coming up to virtual team project management communication is the key role for the success and failure of the project. Everyone involved in the project must be prepared to send and receive interactions and must understand how the relations in which they are involved as individuals affect the project as a whole.

Planning the means of communication, information distribution, performance reporting and administrative closure are the vital steps to be stressed in the topic of virtual team project management.

- Planning the means of communication - determining the information and communications needs of the stakeholders', who needs what information, when they will need it, and how it will be given to them.
- Information distribution- making needed information available to project stakeholders in a timely manner.
- Performance reporting- collecting and disseminating performance information. This includes status reporting, progress measurement, and forecasting.\
- Administrative closure- generating, gathering, and disseminating information to formalize a phase or project completion.

These processes interact with each other and with the processes in the other areas as well. Each process may involve effort from one or more individuals or groups of individuals, based on the needs of the project. Each process generally occurs at least once in every project phase. Project resources should be expended only on communicating information that contributes to success or where a lack of communication can lead to failure. Information typically required to determine project communications requirements includes:

- Project organization and stakeholder responsibility relationships
- Disciplines, departments and specialities involved in the project
- Logistics of how many individuals will be involved with the project and at which locations.
- Internal and External communication needs

Communication requirements are the sum of the information requirements of the project stakeholders. Requirements are defined by combining the type and format of information required with an analysis of the value that information. Communication technology factors that may affect the project include:

- The immediacy of the need for information
- The availability of technology
- The expected project staffing
- The length of the project

From the analysis of the data and some other observations for achieving great success in virtual team project management, emphasis should be given for the utilization of modern IT and project management techniques besides solving the communication obstacles.

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8 Appendix

Supplements 1

Dear Sir/Madam, I am a student of Czech University of Life Sciences Faculty of Economics and Management department of System Engineering and Informatics, I am currently writing my diploma thesis on the topic Project management in Virtual Teams. I would like to ask you to fill out this questionnaire, which will help to obtain the data for my research. The questionnaire is anonymous and is used only for purposes of my diploma thesis. Thank you very much for your time and kind help. The information that you have provided will only be used for academic purposes.

Mark the circle that suits your opinion.

1. What is your age?

   a) 18 – 25   b) 26 – 35   c) 36 - 45

   d) 46 – 56   e) 56 +

2. What is your gender?

   a) Male   b) Female

3. How long have you been working in this project?

   a) Less than six months   b) 6 months - 1 year

   c) 1 - 3 years   d) 3 – 6 years

   e) More than 6 years

4. What is your employment status, are you working now as

   a) Part-time worker in a given project

   b) Member of virtual team

   c) Regular employee and member of virtual team

   d) Regular employee

5. What is your level in the project?

   a) Non supervisory level

   b) Supervisory level

   c) Managerial level

6. Can you communicate without any fear with your colleagues to expresses your opinion and suggestions?

   a) Yes   b) No

7. How important is communication for you in the projects that you are working on? How would you rate it out of 10 (1- is the lowest and 10- highest grade?

   a) 0 – 3   b) 4- 6   c) 7- 10

8. Are you satisfied with communication with your colleagues?

   a) Yes   b) No

9. In your opinion which type of communication is the most important and influential to a project success?

        Electronic

        Verbal (face-to-face)

        Non-verbal

10. Out of the communications that you make each day how many of them are with virtual colleagues?

   a) Less than 10%

   b) Between 10% - 30%

   c) Between 30% - 70%

   d) More than 70%

11. Do you consider yourself a team player?

   a) Yes   b) No

12. In your opinion who is responsible for project failure?

   a) The team leader

   b) The whole team   c) The person, who did not his / her job properly

13. Do you get all the important information that you need for your job in time?

Very often   Often   Sometimes   Hardly Ever   Never

14. How often the following communication tools are used? (1 - Very often, 2 - often, 3 sometimes, 4 - hardly ever, 5 - never)

   - Telephone and mobile phone ____

   - Email ____

   - Video conference _____

   - Voice-conferences _____

   - Face-to-face meetings _____

   - Others (SMS, MMS , whatsup, Telegram, etc) _____

15. According to your opinion what influence on communication in virtual team. (You can tick more than one circle)

   - Age

   - Work experience

   - Personality

   - Language skills

   - Other, please specify _____

16. What problem in team communication do you come across with? (You can tick more than one circle)

   - Low level of trust

   - Low level of cohesion

   - Complication in solving conflicts

   - Stereotypes

   - Information overload

   - Complicated language using by colleagues

   - Other: _____

17. What can improve communication in a team?

- Setting of special rules regulating communication

- Regular personal meetings personal 3 day's meetings at the start of new project

- Providing some personal data and social information about team members to get to know each other better

- Agreement to use common language without specialized terms if it's not necessary or to make sure that all team members know its meaning

- Other please specify _____

Supplement 2

Interview questions for project managers

1. How long have you been working as a project manager?
2. How many years have you worked in project management at NU Exchange/ Agro information management?
3. Please describe the successful/challenging virtual project and team. What was the nature of the project (duration, purpose, scope, size, geographical spread, etc) Please describe the key people involved in terms of their roles and responsibilities? Please describe your role in the virtual project team.
4. Have you been involved in any kind of courses or trainings related to communication? For example: managing virtual teams, intercultural communication, managing global teams etc?
5. What is the most challenging part of communication when it comes to managing global virtual teams compared to "local" teams?
6. Do you think that your relationships have been affected by coordination problems due to virtuality?
7. Is there a dependency between communication in a team and its performances?
8. In my thesis I'm trying to explore the correlation between IT competence, computer knowledge, usage of cloud collaboration tools and virtual project management. Do you think that a better IT understanding is necessary in order to work effectively in a virtual team? Do you regard this for example at the selection of project members?
9. Did you know that many virtual team participants consider telephone and email not sufficient tools for proper collaboration in virtual teams? What do you think of this? How do you contact your colleagues or monitor processes? I asked this because research studies showed that most virtual members believe that audio video tools are highly useful for virtual cooperation, but still only few use them. Have you experienced similar things? Do you use it?
10. If there is something, what would you improve regarding the available cloud computing tools at your company?