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Team Management and Collaborative Distance Working: Open-Source vs Vendor-Provided Tools

Dorkofiki Eleni

SID:3305200013

SCHOOL OF SCIENCE & TECHNOLOGY

A thesis submitted for the degree of
*Master of Science (MSc) in e-Business
and Digital Marketing*

January 2022

THESSALONIKI – GREECE



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Dorkofiki Eleni

SID:3305200013

Supervisor:

Dr. Ioannis Magnisalis

Supervising Committee Members:

Assoc. Prof. Apostolos Papadopoulos

Assist. Prof. Maria Drakaki

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Abstract

This dissertation was written as a part of the MSc in E-business and Digital Marketing at the International Hellenic University. The unfolding of Covid-19 pandemic has demonstrated that remote work is a one-way street. The extended distance working model of unprepared companies brought to the surface many challenges. In this research we examine two main pillars, team management and collaborative distance working. We conducted a literature review to determine what the main components of team management and collaborative distance working are. Additionally, after we defined the concepts of vendor-provided and open-source tools, we concluded to the decision-making attributes for software tool selection. Subsequently, we composed a series of questions and distributed the questionnaire online to participants who have remote work experience. Analysis of the above gave us valuable insights, showing that variables of communication, trust and productivity are highly interconnected and software tools are extension of their interaction.

Eleni Dorkofiki

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Introduction

It was the beginning of 2020 when the first COVID-19 case was reported in Wuhan, China. Back then, no one would have expected such a tragedy; humanity has been facing an invisible enemy called SARS-CoV-2, which is responsible for the COVID-19 disease. More than five million¹ people have been killed so far despite the imposed social distancing measures and the vaccinations developments, while the whole phenomenon is still undergrowth in some countries which seem incapable of facing this unprecedented challenge impacting severely not only domestic healthcare systems but also the global economy and other domains.

The way of working should be numbered among these domains since the so-called “remote working” was one of the numerous social distancing measures to limit the spread of COVID-19. Other common definitions for these measures except for “remote working” are: “distance working”, “work from anywhere (WFA)”, “teleworking”, “telecommuting”, or “working from home”. At this point, it is important to clarify that the term “working from home” corresponds specifically to the house of the employee while the terms “remote work”, “distance working”, “teleworking”, and “telecommuting” is used broadly meaning working out of company’s offices, Beno (2018).

Additionally, many organizations endorse this new working model on a normal basis. Virtual teams, which are today a common and very well-known term by all industries on a global level, have been used more often than ever. Nevertheless, according to Ernst & Young’s report,² remote working is here to stay, while results from the Brooking community, Guyot & Sawhill (2020), have shown that half of the American employees are working remotely due to Covid-19, even though a recent paper, Dingel & Neiman, (2020), estimates that only a third of jobs can be done entirely from home. Also, according to the European Commission, almost 40% of all EU employees are working remotely on a full-time basis due to the COVID-19 outbreak. (Milasi et al. 2020).

We may be very recently familiar with these terms because of the current pandemic situation but truth is that remote working was frequent even before the pandemic; not at

¹ www.worldometers.info/, Accessed on 15/11/2021, <https://www.worldometers.info/coronavirus/>

² EY.com, “Why remote working is the way forward”, Accessed on 15/11/2021, https://www.ey.com/en_gl/alliances/why-remote-working-is-the-way-forward

the current magnitude of course. According to the same Ernst & Young report, “5.2% of US employees worked from home full time, while up to 43% did so at least some of the time”. Moreover, insightful research has been investigating the benefits and drawbacks of remote working even at the beginning or before the 21st century, Mersham (1996), Baruch (2002), Sullivan (2012).

The necessity to understand more thoroughly the work dynamics of remote working has increased the amount of research material the last two years approximately. However, there is a big debate on whether remote working is more efficient than office working. Some studies are promoting that remote working employees have increased working hours, by about 30%, while productivity declined by about 20%–Gibbs, Mengel, Siemroth (2020). On the contrary, other studies argue that remote work for a specific period may seem successful, if and only if companies consider that the correct implementation requires a structured approach on the aspects of trust, communication, and productivity. Moreover, other studies argue that remote working contributes significantly towards the improvement of work-life balance, performance, and motivation or increases the trustfulness between employers and employees–Lupu (2017), Fehr and Gächter (2000), Dahlstrom (2013), Kazekami (2020). However, extracting insights from both perspectives is crucial to structure a thorough and well-rounded approach to this research.

In any case, remote working is a new reality and either managers or employees have been facing many challenges especially in terms of supervision, distractions at home, social isolation, and lack of access to information–Larson, Vroman, and Makarius (2020). Also, because of the increasing demand for remote working, the companies must nurture traits that used to be taken for granted in the office, including processes, routines and culture. For managers to do that, they must develop the most important qualities to lead a remote workforce: trust, respect, communication, shared values, and culture which will lead to increased productivity, Phillips (2020). All these qualities, among many others such as common goals and defined team responsibilities, comprise the basic elements of team management. In this particular study, the biggest emphasis is given explicitly to trust and communication as well as productivity.

As exactly happens in natural office environments where managers have to secure these qualities by using certain tools and practices, the same applies in digital environments.

The necessity may be even higher since there is no direct contact between professionals. However, technology has reached a very high level of expertise by giving the managers the appropriate tools to excel in managing efficiently their employees. Some of these tools are introduced under the concept of Computer-Supported Cooperative Work (CSCW). As Wilson (1991) describes “*CSCW is a generic term, which combines the understanding of the way people work in groups with the enabling technologies of computer networking, and associated hardware, software, services, and techniques.*”

There are many ways to categorize the prementioned tools: text-based collaborative tools, audio-video collaboration tools, task management tools, open-source software systems, vendor or proprietary software systems, audio/visual modules, etc. The open-source and proprietary software systems will be analyzed further and be compared in terms of functionality, cost-efficiency, reliability, and other important attributes.

CSCW applications are quite difficult to be measured and their evaluation is considered a difficult endeavor in the research community. For CSCW specialists, developing frameworks and procedures for organizing this form of evaluation has become a top priority. It has to be noted that because of data intricacy, the results might be very subjective. More in-depth analysis of these frameworks and methodologies will be conducted in the next chapter of this dissertation.

1.1 Problem Statement

There is an ongoing debate in the scientific community on whether remote working is efficient and several studies argue differently as is discussed in the literature review chapter. Some of these studies are supporting that remote work is in favor of employees’ flexibility, autonomy, job satisfaction, and work-life balance. But others state that it runs the danger of exacerbating inequalities and causing additional psychological and emotional pressures, including isolation. Therefore, one of the goals of this dissertation is to contribute to that discussion and provide insights into whether remote working and more specifically collaborative distance working can improve three team-management important factors: trust, productivity, and communication.

On the other hand, the quantitative criteria used to evaluate customer-supported cooperative work tools, whether open-source or vendor-provided, have proved

ambiguous in many circumstances. In reality, having limited quantitative data that does not account for the important elements that determine whether a CSCW is successful or not can be deceiving. Therefore, the second goal is to shed light on the difficult part of evaluating CSCW software tools, and some critical attributes such as cost, scalability, reliability, and others are going to be used as metrics. Further details are being explained at the end of the second chapter.

1.2 Purpose of Study

The main purpose of this dissertation is to gain a broader understanding of how remote working impacts three major components of successful team management: communication, trust, and productivity. The second goal is to analyze and comment on the effectiveness of the CSCW applications, especially the open-source and proprietary software systems.

The discoveries of this paper will provide institutions and companies with additional insights on team management, collaborative remote working, and the CSCW tools; especially in the case, they are thinking of taking on remote work as another business strategy. It will also give further information to those looking for better collaboration tools to manage their groups of people more efficiently.

Additionally, this study might be useful for academic individuals, either students or academic staff, who are interested in the impact of remote working on team management as well as the open-source and vendor CSCW tools and their effectiveness. They could potentially exploit the findings of this study to strengthen their structure and improve the way of working across their academic projects.

1.3 Research Questions

The main research question that this study aims to answer is the following: How does remote working affect virtual teams' communication, trust, and productivity? The goal is to address the appropriate questions to as many employees and managers as feasible across various industries and various positions to extract a better understanding of the situation.

Thereafter, it is essential to look into what aspects of remote work are the most prevalent in influencing communication, trust, and productivity. For example, how autonomy or flexibility can increase the prementioned variables?

Then, the next question that needs to be answered is what the best collaborative tools are to preserve virtual teams' communication, trust, and productivity while adopting remote work. This dissertation focuses specifically on the open-source and vendor software tools and examines the factors that make each one of them appealing for use.

Last but not least, there is a question that is more of a comparison of whether open-source or vendor software tools are better and in which aspects.

1.4 Structural Outline

This dissertation is divided into six chapters. The 1st chapter which is the introduction presents the overall literature on which the study was based, describes the problem that is under review and the purpose of conducting this research, summarizes the research questions, and picture the main limitation of this study.

The 2nd chapter is the literature review. This chapter captures the literature that is used to dive deeper into the various topics: remote working, team management, and Computer-Supported Cooperative Work. It also provides the reader with the empirical background to comprehend the general context of the study as well as to understand the analysis of the questionnaire results.

In chapter 3, research methods, the methodology on which the dissertation is based is presented. More specifically, it is described the data collection methods, the variables under consideration, and the tools that were used to run the statistical analysis.

Coming to the 4th chapter, the reader can observe the outcomes based on the data used and their interpretation. Graphs and charts are utilized to illustrate better the results and help the reader have a more holistic view.

The 5th chapter, which is the conclusions chapter, contains the main findings of the project. There is also an additional discussion on limitations, conclusions and recommendations

Finally, the 6th chapter contains directions for future research.

2. Literature Review

2.1 Remote work

Remote work has acquired multiple definitions. It is frequently referred as telecommuting, distance working, telework, teleworking, working from home (WFH), mobile work, remote job, work from anywhere (WFA), and flexible workplace.

Additionally, remote work can be defined as proposed by the International Labor Organization, type of employment in which work is not conducted within central office headquarters or production lines. Thereby the employee lacks face-to-face interaction but on the other hand modern technology enables the distance existence by enabling new kinds of communication (Beno, 2018).

2.1.1 The development of remote work

In his book "The Telecommunications-Transportation Tradeoff," published in 1972, physicist Jack Nilles established the notion of remote labor for the first time. Nilles, a former NASA engineer, proposed that remote work be utilized as "*an alternative to transportation - a creative solution to traffic congestion*" (Pasini, 2018). Working from multiple locations other than the employer's facilities became conceivable throughout the 1980s as telecommunications such as online chat and file-sharing systems developed.

Telecommuting became a popular topic in pop culture in the 1990s. The slogan "*work is something you do, not something you go to*" was coined in 1995. [4] "*Work is something we DO, not a location we GO*"[5] and "*Work is what we do, not where we are*" are two variations of this phrase. [6]

Although the terms "telecommuting" and "telework" are sometimes used interchangeably, there is a distinction between the two. Telework refers to any sort of work that is aided by technology and is done out of a primary workspace—including work done from home, outside calls, and so on. Telecommuters frequently have a regular workplace and work from a different location one to three days a week—Hill, Miller, Weiner, Colihan, (1998).

Telecommuting is a term that refers to work that is done at a place that decreases commute time. These sites can be within the house or at a remote office, and they can be accessed by a high-speed Internet connection, computer or phone lines, Ellison and Nicole (2004), or any other kind of technological communication and interaction, Gajendran and Harrison (2007).

Telework, as a larger notion than telecommuting, includes four dimensions: work location, information and communication technologies, time distribution and a variety of employment relationships between employer and employee, Garrett and Danziger (2007).

With the introduction of the computer and the internet in the 1990s, the possibilities for remote work expanded dramatically, and - with the support of growing environmental consciousness – remote work became a viable option to working at the employer's location (Pasini, 2018). New technologies like social networking, third-generation mobile devices, and streaming technology made communication much quicker and easier in the 2000s, and remote work became popular at this time. The number of Americans who worked from home climbed by 115% between 2005 and 2015, Abrams (2019).

Furthermore, the results of the Regus Global Economic Indicator, released in September 2013, revealed that 48 percent of corporate managers throughout the world work remotely for at least half of the week. Over 26,000 corporate managers from 90 countries participated in the survey, with 55 percent of survey participants believing that efficient management of remote employees is an achievable aim.

When it comes to European statistics, the graph below depicts the yearly change in the usage of remote work in numerous European nations, between 2019 and 2020.

Annual change in the share of people usually working from home, 2020
 (percentage points change compared with 2019, people in employment aged 20-64 years, by NUTS 2 regions)

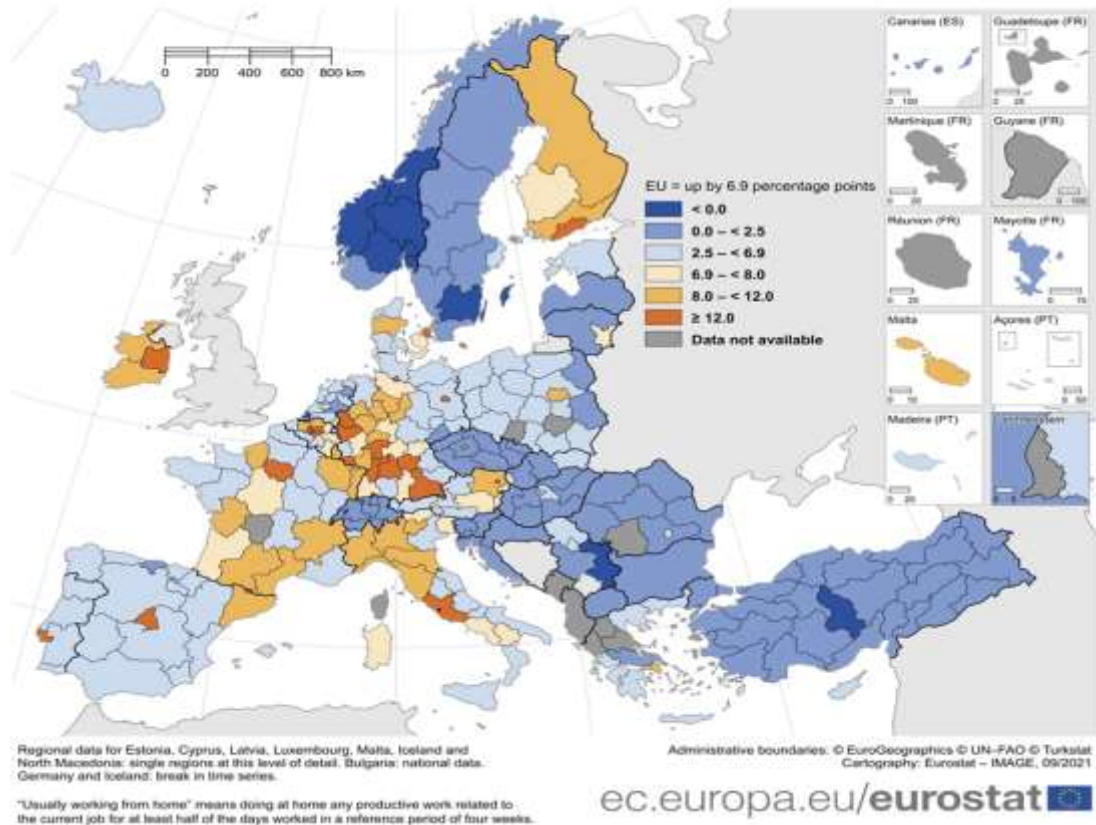


Figure 1: Annual change in the share of people usually working from home (Image extracted by Eurostat, 2020)

Remote work was used to a pretty high level in 2019, particularly in Northern European nations. The variable degree of usage of remote work among European nations is connected to their economic structure, according to 2020 research by the European Commission's Joint Research Centre for Science and Knowledge Services titled "Telework in the EU before and after the COVID-19." The more people are employed in information and ICT-intensive services; the more distant work becomes common, Milasi (2020). It is also a notable fact that with the start of the COVID-19 crisis, remote employment has never been more popular. According to estimates from the European Commission, approximately 40% of all EU employees are now working solely from home due to coronavirus, Milasi (2020)

2.1.2 Environmental and economic benefits of remote work

Remote work is more than just a way of working that gives employees more freedom in terms of where they work. Remote work also saves money and time, as well as has a good influence on the economy and the environment.

Congress passed an appropriations bill in 2004 to encourage federal agencies to use telecommuting. The measure threatened to deprive agencies of funds if they did not offer to telecommute to all eligible employees. If 40% of Americans decide to partially work-from-home, in case their professions are applicable to distance working, the following would happen:

- The country would save 280 million barrels (45 million m³) of fuel (37 percent of Gulf oil imports).
- The energy reserve would almost reach the double production of the alternative energy sources within US.
- Environment would be spared by removing 9 million automobiles from the road forever.

In the United Kingdom, it is anticipated that increasing the number of workers who work from home may save over 3 million tons of CO₂ per year, in addition to the economic advantages of saving GBP 3 billion per year for UK firms and employees. [70] During the coronavirus epidemic, when most people throughout the world were forced to telecommute, worldwide CO₂ emissions fell dramatically in the first few months of the lockdown—Holmes, Lord, Ellsworth-Krebs (2021).

Nonetheless, there seem to be reasons to be concerned of misrepresenting the benefits of remote working, as this has had an impact on domestic consumption. According to an article published in the journal of consumer culture, the pandemic also contributed in the highest sale point of ICT, duplication of appliances, and relocation out of cities to larger homes with room for home offices, as well as the implementation of locking-down practices. To sum up, most studies show that remote work reduces total energy consumption by reducing time spent on energy-intensive personal transportation, Hook, Sovacool, Sorrell (2020)

Coming to the economic benefits, anyone can identify that remote work helps employees save money on motorized transportation – if the job is done from home or close to home

rather than in a centralized office space. This advantage is in addition to the time saved by employees by not having to go to the centralized employer's location. As a positive side effect of the drop in motorized transportation, traffic congestion and air pollution will decrease as well making remote work also a sustainable alternative to working at the centralized employer premises—Belzunegui-Eraso, Erro-Garcés (2020).

Telecommuting benefits businesses in many aspects, according to an article on [onlineMBA.com](https://www.onlineMBA.com), by expanding their talent pool, improving employee morale, lowering turnover and absenteeism, reducing the spread of illness, lowering costs, lowering carbon footprint, and energy usage, enhancing continuity-of-operations strategies, enhancing their ability to handle business across multiple time zones, and augmenting their cultural adaptability. According to some estimations, full-time telework may save firms up to \$20,000 per person in the US.

Furthermore, the fact that people are spending more time at home and less time at work may have a significant influence on urban economies. Fewer individuals drive between home and work every day or go to various areas for work as a result of more people working remotely. This might have enormous economic implications, not just for mobility, as previously said, but also for fuel and vehicle sales, restaurants and retail in metropolitan areas, office real estate demand, and other consumption habits.

According to a May 2020 McKinsey survey of office space managers, they estimate a 36% increase in work time outside their workplaces during the pandemic, hitting both main offices and satellite sites. As a result, businesses will require less office space, and many are already making plans to minimize their real estate costs. By the end of 2022, according to Moody's Analytics, the office vacancy rate in the United States will have risen to 20.2%. One-third of 248 US chief operating officers expect to cut office space in the next years when leases expire, according to another survey.

This will have repercussions in bars, restaurants, stores, and other firms that cater to office employees, as well as a negative impact on state and local tax revenues. Amazon, on the other hand, recently announced agreements for 900,000 square feet of office space in six locations across the US, citing the lack of spontaneity in virtual teaming as a reason.

Finally, teleworkers had reduced turnover intentions, or a willingness to leave the company, Gajendran and Harrison (2007), and people working from home who felt more professional isolation were less likely to leave their jobs—Golden, Veiga, and Dino (2008).

According to one research, through explicit communication of goals, objectives, and expectations, feedback and task identification aim to reduce teleworker churn while improving the quality of work production— Ilozor, Carr (2001). Therefore, the lower turnover intention coming from employee satisfaction increases profitability for organizations, because they invest less time and money in recruiting and headhunting processes.

2.1.3 Remote work; the positive impact on employees' productivity

The freedom that remote work provides is a significant motivator for many individuals. When the individual is not bound by the employer's centralized premises, he or she has more autonomy and discretion over how to schedule the working day, making it simpler to fit work around personal responsibilities, Duxbury (1998).

A high degree of autonomy, according to Lupu (2017), has a favorable impact on employee performance and motivation, whereas Employees with a lot of obligations at home, according to Bailey and Kurland (2002), gain the most from the flexible scheduling that remote work provides since it greatly improves their work-life balance. 6 A consistent work-life balance, according to Trivett (2019), might be defined as another productivity factor. *“Flexibility promotes an employee's feeling of autonomy, and higher autonomy boosts intrinsic motivation and hence induces more work effort”*, according to Hackman and Oldham (1976).

According to Fehr, Gächter (2000), and Dahlstrom (2013), many workers see the ability to utilize remote work as a working style as a sign that the employer is prepared to consider the particular requirements of the employee, and therefore as a representation of gratitude and trust in the employee. When an employee believes that their boss is “going above and beyond” for them, they are more likely to want to do the same for them, which boosts productivity.

This is backed up by the findings of research conducted by Kazekami (2020), which indicated that remote work improves both life and career happiness. A rise in both measures of satisfaction, according to this research, leads to an increase in work effort. It's crucial to note, however, that this is only true if remote work is optional, and the

employee chooses whether or not to use it. Compulsory remote employment might lead to discontent, Bélanger (1999).

Furthermore, data from a 2015 experiment published in *The Quarterly Journal of Economics* indicate the favorable impact of remote work on job effort. The trial, which involved 249 people, took place in a Chinese contact center in Shanghai. The personnel were divided into two groups, with the sole variation being their work locations. *“The workers’ performance increased up considerably, increasing by 13% throughout the nine months of the experiment”*. This increase in productivity was due to a 9% increase in working hours due to reduced commute time and a 3.5% increase in efficiency due to calmer working circumstances. The survey also discovered that home employees had much greater job satisfaction and had a nearly 50% lower quit rate. However, due to apparent performance reductions, home employees’ promotion rates declined by half, indicating a possible career penalty of working from home. It’s important to note that these findings only apply to a small fraction of employees in a certain industry, so they should be interpreted with care.

Therefore, while evaluating the influence of remote work on productivity, it’s also important to consider the industry, as well as the individual’s tasks and family circumstances. Remote work has the greatest beneficial influence on productivity in knowledge-based work, according to CEPR Press research (2020). Similarly, a study by Dutcher (2012), which used experimental data to estimate causal effects discriminating between creative and boring jobs, found that although remote work enhances productivity when dealing with creative tasks, it has the reverse impact when dealing with monotonous ones.

According to a McKinsey consumer poll from May, 41% of employees stated they were more productive working remotely than in the office. Employees’ trust in their productivity has improved as they acquired experience working remotely during the epidemic, with the number of persons stating they worked more effectively jumping by 45% from April to May 2020. Remote employees are proving to be considerably more productive for a growing number of firms. Chief executive interviews on remote work yielded a diverse bag of responses. Some people are optimistic about the future of remote employment, while others believe it has few advantages.

2.1.4 Remote work and its negative impact on employee productivity

Coming back to the initial question of whether remote work is beneficial to productivity in general, we could say that given the extended period of declining worker productivity that preceded the epidemic, the response may ultimately decide its popularity. So yet, despite the promising findings from various studies that were touched upon in the 2.1.3 section, there is little certainty, concerning the impact on productivity, because many studies advocate the negative impact of remote work on productivity.

"High-quality supervisor-employee interactions provide physical, cognitive, social, and psychological resources. They promote reciprocity and aid in the fulfillment of the fundamental urge to belong." according to Bono and Yoon (2012). Furthermore, according to Barry & Crant (2000), regular face-to-face encounters are required to facilitate these types of connections. That being said, one disadvantage of remote work is the possibility of strained relationships between coworkers and between employees and their employers.

Working from home or elsewhere away from coworkers limits social connection, which can contribute to personal and professional isolation for individuals, according to Hill (2003). Employees may feel less integrated into the team and have a lower organizational commitment as a result of a lack of face-to-face encounters with colleagues and supervisors, which is also important for establishing informal communication networks, Bailyn (1988).

In the same direction, employees are more prone to feel alienated from their coworkers and the organization's aims and values when face-to-face interactions are limited, according to Ford and Butts (1991). This could potentially drive employees to *"loss of identity with the company's culture and a lack of team spirit"*, both of which are detrimental to productivity. These statements are backed up by an online poll done in 2012 with 11,383 employees from 24 countries, which indicated that *"62% of respondents considered remote work socially excluded, and 50% worried remote employment would hurt their prospects of advancement"*, Reaney (2012).

Cooper and Kurland (2002) claim that when an employee works at a location away from the employer's premises, the physical distance between the employee and the employer may cause the employee to believe that because he or she is "out of sight," he or she is

also "out of mind," limiting his or her opportunities for promotion and organizational rewards. Such sentiments have a detrimental impact on an employee's degree of organizational commitment, which might result in a reduction in job effort.

According to Greer (2014), many managers see distractions in the employees' home environment having a negative influence on productivity and therefore being a disadvantage of remote work. This is likely to be true in many circumstances given the current scenario, in which many employees work side by side with their children, who are forced to remote learning due to the current pandemic school closures. Another disadvantage, as recognized by managers and employees is the inability to carefully monitor their staff and offer them timely feedback, Cooper and Kurland (2002).

People who work remotely may feel pressured to create greater useful output, which reduces the perception that they are doing less work than their coworkers. Teleworkers' job engagement is lower due to the pressure to create output, as well as a lack of social support from restricted colleague connections and sentimental isolation—Sardeshmukh, Sharma, Golden (2012). Furthermore, remote workers' job satisfaction was lower when they had better ties with their coworkers, maybe due to problems with exchanging contacts via technology, according to Golden (2006). According to Bailey and Kurland (2002), nonetheless, colleague support and virtual social groups for team building have a direct impact on enhancing job happiness, possibly owing to increased skill diversity from cooperation and increased task relevance from greater working connections.

A more intricate link might explain the contradictory findings on telework and satisfaction. Initial job happiness rises as the number of telecommuters rises, presumably due to the impacts of autonomy; but, when someone decided to increase the distance working rate, simultaneously he lacks in feedback and task relevance cause job satisfaction to level out and somewhat diminish—Golden, Veiga (2005). Therefore, the quantity of time spent teleworking has an impact on the job satisfaction connection.

According to a Rosenberg article (2012), there are two extra barriers to the further expansion of telecommuting; employer suspicion and employee personal disconnect. When everyone works in the same environment, communication comes easily, but when employees and supervisors work remotely, they must try harder to maintain connections with coworkers. This is quite helpful for new workers since it allows them to adopt organizational behaviors while working remotely. Harpelund (2019).

People might become estranged from one another when they work remotely, and essential talks can be transferred to chat and email, according to Azasu (2020). Employees who do not telecommute may feel isolated from the firm's everyday operations, which may lead to a lack of knowledge of other things going on in the organization. There may also be resentment from other employees. Some people regard telecommuting as a *"supplement rather than a substitute for employment in the office"*, Pliskin (1998).

Remote work has the potential to harm a person's career. According to a recent poll of 1,300 executives from 71 countries, those who telework feel they are less likely to get promoted. According to a book on organizational behavior, companies seldom advance people into leadership posts who haven't been routinely observed and measured. A drop in productivity due to procrastination combined with a lack of monitoring will result in the employee's work being of low quality. These are some of the variables that might have a detrimental impact on a person's career if they telework.

Finally, teleworking has been observed to interfere with the process of sensemaking, or the formation of a shared worldview, from an anthropological perspective, Tett (2021).

2.1.5 The extent of remote work

When evaluating the influence of remote work on employee productivity, it's important to consider the scope of the situation. According to Bailey and Kurland (2002), the more often an employee works remotely, the greater the output in terms of job effort and performance. Furthermore, Gajendran and Harrison (2007) found that the impact of remote work on job satisfaction is dependent on the extent of remote work, with a higher degree of remote work being connected to a higher level of job satisfaction.

Furthermore, Golden and Veiga (2005) discovered a curvilinear relationship between job satisfaction and remote work frequency, indicating that job satisfaction is highest at moderate levels of remote work, around 15 hours per week, and that job satisfaction is negatively impacted at either very low or very high levels of remote work.

According to the same study, this is due to the individual's personal and professional isolation in the case of high-frequency distant work, and it is related to the limited influence remote work has when it is conducted at a very low level in the case of low-frequency remote work.

All in all, long after COVID-19 is defeated, some types of remote work are likely to endure. Despite the promising findings that remote work favors flexibility, autonomy, job satisfaction, and work-life balance, it runs the danger of exacerbating inequalities and causing additional psychological and emotional pressures, including isolation, among employees. For most businesses, allowing workers to work outside of the office will need the re-invention of several procedures and regulations in the future.

2.2 Team management

According to businessdictionary.com, *“Team management is the ability of an individual or an organization to administer and coordinate a group of individuals to perform a task.”* Team management entails teamwork, communication, trust, objective setting, and performance appraisals. Furthermore, team management is the capacity to recognize and handle conflicts inside a group. A team manager can use a variety of strategies and leadership styles to boost employee productivity and develop an effective team.

Teams within the premises of an office might take numerous forms and sizes, but they are all dependable and ready to collaborate. They communicate and work together to achieve a common objective. Management teams are a sort of group that manages and advises other employees and teams with whom they collaborate. Temporary teams for project purposes are in charge of achieving a goal directly, whereas management teams are in charge of giving overall guidance and help to those teams, Aamodt (2015).

2.2.1 Communication

Communication can be defined as *“the exchange of information, ideas, and mutual understanding and it is essential to be ensured within the workplace”*. However, it should not be taken for granted that effective communication occurs at all times, Dunn (2002). Especially during the Covid-19 era, managers seem to have neglected to foster a positive work culture, and the problem has been exacerbated owing to a lack of face-to-face engagement. As a result, trust and productivity have suffered as a result of this.

Former dean of executive and professional education at Massachusetts Institute of Technology, Jennifer Stine, has claimed that *“Close attention to relationship-building and a process to ensure good communication is really important. When the group or the*

organization has a strong culture that supports collaboration, this can stand in for many of the detailed steps - it helps”.

To build a successful team, good communication from the top to the bottom of the chain of hierarchy, as well as vice versa, is required. A successful communication channel will allow messages to be sent properly and without delay to the appropriate recipient, speeding up decision-making and team activities.

Furthermore, good communication will boost an organization's flexibility and make it less sensitive to external changes, since a speedier decision-making process will provide companies more time to adjust to changes and implement contingency plans. Social media use at work also has a favorable impact on effective communication, information sharing, and coordination.

2.2.2 Trust

Cummings and Bromiley (1996) define trust within collaboration as the worker’s belief that their team:

- is truthful in any talks that preceded such promises
- does not take unfair advantage of others, even when the chance exists
- makes a good faith attempt to follow through on any explicit or implied agreements

Trust is the most important factor in all facets of teamwork. Trust impacts whether team members ask for help, exchange comments, and address concerns and disagreements (Breuer, Hffmeier, Hertel) (2016). Crisp, Jarvenpaa: *"Team trust has a major impact on team performance and can be called the "glue" that ties collaborations together"* (2013). According to Treinen and Miller-Frost, creating mutual trust and personal understanding of collaborators is more crucial than addressing technical challenges in good cooperation (2006).

Furthermore, trust is especially vital in virtual teams since interactions take place over the internet. Trust for both employers and employees may be shown in a team as natural engagement in the pursuit of a common objective. Trust concerns may occur when it comes to remote work and impersonal contact via email and phone calls. At the same

time, a lack of trust is linked to a lack of dedication and collaboration, Mark and Bradner (2002).

Building trust among team members is one strategy to overcome basic trust issues within teams. A manager may evoke trust by promoting discussion within team members. When they are upright with the issues they are dealing and are asking for help, they are also becoming more confident within the team. However, in order for the team to develop a well based trust, the team leader must initiate the process. The rest of the team will be hesitant to follow if the team leader is unwilling to be vulnerable, Lencioni (2002).

It is very important to mention also that conflict is a positive pillar in a team as it uprisers questions, an important trust element. Team members disputing with one another or disagreeing with the team leader is the source of conflict dread. If team members are not willing to challenge their manager or colleagues, the notion of a team becomes meaningless since there is just a one-side contribution and no new ideas come on the surface through conversations, Lencioni (2002).

Lack of trust, especially vulnerability-based trust, causes a team's dread of confrontation. When team members are reluctant to appear vulnerable in front of one another, disagreements can be used to manipulate and embarrass the other team member. Debates, on the other hand, may be a pursuit of a better and more successful technique to accomplish a goal if team members trust each other and are comfortable being vulnerable in front of one another, Lencioni (2002).

2.2.3 Trust and communication in virtual environments

Building trust early in virtual cooperation, according to Maurping and Agarwal (2004), is crucial for generating optimal group functioning and the ability to handle social activities. Furthermore, virtual teams that create trust early may detect information that confirms their team members' competency while ignoring contradictory data—Zolin, Hinds, Fruchter, Levitt (2004). Members of these teams get the confidence to engage in normative acts that sustain both trust and subsequent performance as a result of their early building of trust, Crisp and Jarvenpaa (2013).

While studies have revealed a higher link between early trust and performance in highly virtual teams than in less virtual teams, whether or not performance increases is debatable—

Marlow, Lacerenza, Salas (2017). Moreover, Kanawattanachai and Yoo have found favorable impacts of trust on performance (2002), while other studies have not identified the same findings—Jarvenpaa, Shaw, Staples (2004). Trust, on the other hand, affects performance perception, such that when trust is strong in cooperation, the team's impression of performance is greater according to Newman, Ford, and Marshall (2019).

The frequency of contacts is also a trust factor, which may be lower in virtual teams according to Zolin, Hinds, Fruchter, and Levitt (2004). Because of the unanticipated interruptions and disparities in time, location, organization, and culture in virtual teams, trust is especially fragile—Watson, Manheim, Chudoba, and Crowston (2012). Apart from that, virtually interacting teams are far less likely to create trust—Robert, Denis, and Hung (2009)—while Kuo and Yu argue that in co-located teams, trust grows sequentially, but in virtual teams, trust develops on an unexpected basis (2009).

According to several studies from Olson & Olson (2006), Kiel (2003), Jarvenpaa & Leidner (1998), Herbsleb & Grinter (1999), this difficulty in establishing trust has far-reaching consequences:

- Lower collaboration, i.e., corrosion of task coordination and cooperation
- Fewer people ready to take initiative
- Lack of empathy for teammates
- Lower quantities of input from collaborators

Other research, Kotlarsky & Oshri (2005)-O'Leary & Mortensen (2010), found that workers' identification of themselves as belonging to a multi-location team was harmed by poor trust caused by distance. These concerns harm cooperation and might cause a project's development to be slowed or even halted.

According to Bradner and Mark (2002), lack of trust is greatest at the outset of the collaboration and progressively decreases during the project, indicating that there are aspects that minimize the effect of distance on trust. Using social tactics to build trust, such as encouraging social exchanges early in the project's life cycle or providing opportunities for informal, non-work-related encounters among collaborators, can be beneficial, but face-to-face encounters are more common for these types of casual

interactions— Olson & Olson (2006). Face-to-face contact, according to O'Hara, Devereaux, and Johansen, is essential in creating and maintaining confidence (1994).

Because face-to-face communication is not always possible in distance collaborations, Bos, Olson, Gergle, Olson, and Wright (2002) evaluated four communication methods commonly used in distance collaborations: face-to-face, audiovisual (e.g., Skype, Google Hangouts, FaceTime), audio (telephone), and text-based tools (email, slack). They discovered that the lack of body language, subtle voice inflections, facial expressions, and other nonverbal cues causes workers to take longer to decide whether or not to trust a new partner and impedes their ability to demonstrate their trustworthiness. his study supports Olson and Olson's (2006) statement that using video while communication helps in instances when personnel is unfamiliar with one another.

The effect of removing body language, subtle voice inflections, facial expressions, and other aspects of communication from communication was demonstrated by the performance of people who used distance technology to communicate in a social dilemma game—these collaborations displayed significantly more fragile trust than those who communicated face-to-face. Textual communication performed particularly poorly in terms of developing and keeping confidence, however audiovisual and audio technology had some impact on delayed and brittle trust. It's no surprise, however, that arranging an initial face-to-face contact at the start of a team's relationship improves trust growth—Marlow, Lacerenza, Salas (2017). The amount of autonomy in a team, as well as the personal traits of team members such as competence, ability, integrity, openness, fairness, and honesty, play a crucial role in developing trust as argued by Choi and Cho (2019).

Isharo, Gregg, and Ramirez (2017) recognized team communication as one of the key issues related to virtuality in their previous research. According to Ferrell, Herb (2012), communication in virtual teams is a critical predictor of many outcomes such as enhanced performance and higher commitment, whilst Herbsleb, Mockus (2012) claim that informal communication accounts for up to 75 minutes of a workday in co-located collaborations (2003). These essential conversations frequently take place after meetings or during spontaneous contacts in the corridor, and they have a significant impact on collaboration, according to Armstrong and Cole (1995).

Due to the limited opportunities for informal and unintentional information exchanges that often occur in shared spaces such as the hallway, water cooler, or parking lot, virtual

team communications are often more formal than in collocated settings and focus more on work-related issues, limiting a virtual team's ability to share knowledge, Berry (2011). Informal contact has also been shown in an interesting study by Egerfalk, Fitzgerald, Holmstrom, Olsson, Lings, Lundell, Conchür (2005) to foster the feeling of being a part of a cohesive team, especially in unstable and dynamic groups, and assist in the provision of corrective feedback, according to Armstrong and Cole (1995).

Face-to-face communication has been defined as "crucial" or "indispensable," particularly at the start of a project, by Dubé, Robey (2009) & Battin, Crocker, Kreidler, and Subramanian (2001). Additionally, Informal communication is related to face-to-face interactions according to Espinosa and Carmel (2004). Frequent face-to-face encounters facilitate cooperation in virtual teams, according to Vincent, Lawn, Nicholls, Scodanibbio, and Prakash (2019), and are attributed with the capacity to drastically improve the strength of work and social bonds inside the team, as claimed by Kiesler and Cummings (2002). This promotes a worker's sense of belonging to the team and awareness of group activities, as well as boosting mutual trust and understanding, which is critical for preventing conflicts—Armstrong, Cole (1995).

Furthermore, asserted by Gibson, Huang, Kirkman, and Shapiro (2014), face-to-face communication is linked to better levels of group consensus, higher perceived quality, more discussion, and improved task efficiency. As a result, several writers propose that virtual team members meet face-to-face whenever feasible, especially during the first launch when a face-to-face encounter can form a lasting bridge across geographical, temporal, and socio-cultural distance. Crowston, Watson-Manheim, and Chudoba (2002). As a result, it's predictable that Holmstrom, Conchür, Agerfalk, and Fitzgerald (2006) believe that traveling for face-to-face communication is critical to work success.

2.2.4 Practices for successful team management

- Hire the Right People

Because 'people make the place' (Schneider, 1987), good staff selection is vital to any organization's success. The interview process is an excellent technique to assess someone's way to communicate. The ability to communicate is critical to the success of virtual teams. It's difficult to accurately assess communication abilities with only one interview. As a result, managers should consider doing multiple rounds of interviews.

If the applicant will be solely working out of the office premises, it's critical to evaluate the way of communication and its escalation. Face-to-face communication, on the other hand, could be instructive. If at all feasible, set up an in-person interview. Have many individuals interview fresh prospects so that may gain a variety of perspectives. This also gives prospects a glimpse to company's ideals and it might assist them determine whether they are a good match.

- Define team roles and responsibilities

The second most important roadblock to a successful team is a lack of clearly defined duties. If team members are unsure of their tasks, their contributions will be minimal. It is the team leader's responsibility to clarify the roles and responsibilities of each individual within the team and ensure that they function as a cohesive one.

A leader in a successful team will first assess the team's objective to determine what is required to complete the assignment. Then they'll assess each team member's skills and shortcomings and allocate duties appropriately. Finally, they must ensure that all team members are aware of each other's roles to minimize misunderstandings and establish an efficient communication channel.

Individuals in a team can take on a variety of roles, each with its own set of duties. When someone in a task-oriented job proposes new ideas, coordinates activities, or seeks out fresh information to share with the team, they are in a task-oriented role. When an individual plays a social-oriented function, he or she encourages team members to work together. They also promote communication and involvement. When a single person obstructs the team's actions, this is known as an individual role. They have a proclivity for drawing attention to themselves and avoiding engagement with others.

- Appraisals

Appraisals may be a mechanism for team members to offer feedback to one another or for team members to provide suggestions to the leader, according to Gray's essay about "Team vs Individual Performance Appraisals." This allows team members to reflect on their performance and strive to improve by correcting their faults. Also, assessments establish an atmosphere in which the chain of command is absent and team members may be honest with one another. This is beneficial because each team member can give progressive feedback to others and advise the leader on how to enhance leadership.

After reading their appraisals, each team member will see how they may develop to help the team achieve its goals. Performance assessments, peer appraisals, and 360-degree feedback are the most prevalent types of appraisals.

- Foster a Culture of Communication

Make clear how employees should communicate. Provide written standards that describe what kind of communications should be communicated through certain channels and how team members should engage with one another to eliminate the ambiguity that frequently surrounds workplace communication.

It is a leader's obligation to cultivate a culture of communication throughout the business by giving regular updates and check-ins with the team to set an example. If coworkers see there is excellent communication, they'll take up on positive practices.

Make it a point to bring the whole team altogether in person once or twice a year, if feasible. This is an excellent method to strengthen your team because this practice helps distant employees to get to know each other outside of their jobs.

- Establish a Shared Goal

Have a single goal or a number of them. Whatever the case may be, it's critical that the team has a shared goal and knows how to succeed will be monitored.

These objectives will most often be determined by larger corporate objectives, but they may also be set by team leaders and team members. If at all feasible, this is an excellent time to meet in person, get to know one another as colleagues, and go through a strategic planning process. If meeting in person is not possible, this job can be done by video conferencing.

- Establish a Mission Statement

Document why the company is doing what it is doing. This should ideally speak to the larger welfare of humanity while but at the same time being tied to the corresponding industry.

Millennial employees favor mission-driven companies because they want to know that their time is being put to good use. Declare objectives and incorporate it to all processes. Donate to charity, host volunteer days or incentives, or work with NGOs that share common vision.

- Ensure Accountability

Setting clear objectives for the tasks and combined with frequent intermediate checks to measure success are the best ways to ensure everyone is performing their job without infringing privacy. It's a fact that not all people process the same amount of workload but nevertheless being familiar with the activities' length and how much each individual does on a pre basis is essential.

Consider having team members log their hours, particularly when they manage a customer. This way there will be better picture of spent hours that need to be charged.

It's a good tactic even for those not evolved with customers, keeping track of their hours gives an unprecedented amount of transparency. Benchmark expectations can also be created for current or future positions by looking at how long it takes to execute specific tasks.

- Encourage Collaboration and Team Building

The highest point of collaboration takes place with profound trust when colleagues know each other tasks and way of implementation. Relationships develop when employees can build on one another's strengths.

To begin, having well-defined teams is advantageous. This establishes the assumption that individuals will work together, even if they are separated geographically. It may seem obvious, but failure to build teams inside a startup or small organization can sabotage cooperation. Employees may get perplexed and cooperate less as a result, so they need to acknowledge their team leader while working remotely.

Managers must convey expectations to each team so that everyone is on the same page and transparency exists. Moreover, even on virtual basis there should be team bonding meetings with the use of video conferences. Face-to-face meeting cannot be replaced nonetheless there is greater sense of belonging and team.

- Form Supportive Structures

Put emphasis on the top performers just as much as it is done on the rest of the team. These could be the ones who are about to become overloaded. Team's achievers may have workdays that rarely stop, even outside the office premises, putting themselves up for burnout against the firm.

Urge employees to adopt work-life balance utilizing also their days off. Make sure no one is working until the small hours of the morning. The unpredictable or unpleasant behavior of a remote worker, emails sent at odd hours, and a reduction in job quality are all signs that he or she needs a break.

- Develop Processes

Daily stand-ups, also known as daily scrums or huddles, are important for many organizations to enhance productivity, trust, and collaboration. It is very essential to perform every day a typical group check-in to keep the team on track on daily tasks.

Along the team meetings, try to plan additional one to one discussion every month or quarter. This reduces the stress of an unexpected meeting request and allows employees to discuss their project progression, what they may have come across or any queries they may have about their job.

- Choose the Best Tools

Virtual teams are made feasible by leveraging technology; thus, managers should use tools and technology to help the teams inside the firm execute the work more efficiently.

Not every tool will be appropriate for every team, so managers should consider trial periods or assign people to investigate all the alternatives to see which ones best fits. Employees should be provided with training on the chosen tools to ensure that they are used consistently and to their maximum potential.

It can be difficult to develop communication tactics that connect throughout the whole business, including in-person and virtual teams. Some of the professional development programs are especially geared to assist leaders in communicating with their teams clearly and cohesively.

2.3 Computer-Supported Cooperative Work (CSCW)

Irene Greif and Paul M. Cashman invented the term computer-supported cooperative work (CSCW) in 1984 during a workshop for persons interested in utilizing technology

to assist people in their job. Dr. Charles Findley proposed the notion of Collaborative Learning-Work about the same time, in 1987. CSCW covers "how collaborative activities and their coordination may be facilitated by computer systems," according to Carstensen and Schmidt (1999). On the one hand, many authors regard CSCW and groupware to be interchangeable terms. CSCW, on the other hand, according to several writers, focuses on the study of groupware tools and techniques as well as their psychological, social, and organizational consequences, whereas groupware refers to actual computer-based systems. Wilson (1991) defines the distinction between these two notions as follows:

“CSCW [is] a generic term, which combines the understanding of the way people work in groups with the enabling technologies of computer networking, and associated hardware, software, services, and techniques.”

2.3.1 CSCW during the pandemic

Since its introduction, the concept of CSCW, or computer-supported cooperative work, has proven effective, particularly in the current issue of the Covid-19 epidemic. The steps used to stop the spread of the disease resulted in strong closures, which boosted the rate of remote working and learning. This implies that CSCW, particularly a group virtual workspace, could not be more valuable. In a group-centered design, participants will share a shared workstation, have workshops, view and hear each other's actions and voices in a common simulated workspace. A CSCW framework only seems complete to the customer when advanced and generic approaches are coupled.

CSCW research has been advocated for decades, utilizing a range of technologies to facilitate collaborative work, ranging from shared data services to video-mediated networks for synchronous operations. The Audio/Video Conference Module (AVM) has been beneficial in facilitating audiovisual communication via online apps used to debate and carry out work activities, such as Zoom, among the many disciplines of CSCW.

Furthermore, owing to the present economic climate, many firms are being pushed to reduce their travel expenditures. People working at critical facilities frequently have to learn new methods of working, such as avoiding direct contact or working near others, both of which are normally regarded essential for accomplishing everyday activities. Others will be required to work from home. People have had to quickly re-negotiate new ways of being together at home, balancing the house's functions as a workplace, a

classroom, a family space, and a venue for large social events. According to Reinhard, Schweitzer, Volksen, and Weber (1994), companies have devoted significant resources to enhancing manufacturing procedures, increasing product quality, and reducing time-to-market. Working circumstances that are optimally created are required and necessary, thus expanding the range of feasible applications (CSCW). Video conferencing is the most cost-effective option for face-to-face meetings for these companies.

2.3.2 CSCW Advantages

While there are certain disadvantages to working in a CSCW setting, there are also numerous benefits. Teams that collaborate asynchronously, for example, provide members the freedom to participate whenever they want, from anywhere they want, removing the requirement for members to "synchronize schedules", Thompson and Coover (2003).

Companies that deploy virtual teams and allow workers to work from home may save a lot of money by removing the need for travel, rented office space, parking, power, and office equipment. Conversely, commuting costs and time are eliminated from the employee's standpoint.

According to Bordia (1997), using several communication threads may boost group engagement and contribution, as well as develop a more equitable communication system. Text-based CSCW communication, such as email, allows users to preserve a record of dialogue and can encourage long-term cooperation and learning by observing others according to Olson and Olson (1999).

2.3.3 Using the right tools

Consider a manager who has recently been tasked with picking a software package. The budget is limited, the deadline is approaching, and the choices are overwhelming. The manager is aware that sales representatives from a variety of commercial vendors would be eager to get him set up as soon as possible. He's also heard that open-source software can give a solution for a low cost—or perhaps for free. But can he spare the time to learn about the open-source alternatives? Is he able to cover the cost of licenses? In any case, he must find out how to compare open-source programs to commercial products from

vendors and explain the risks, advantages, and ramifications of each decision to the principal.

It's critical for a manager to look at what's currently accessible before picking acceptable tools, whether open-source or vendor-provided. If the firm has to move quickly, the technologies that are currently in place can help the manager gain a jump start on complete adoption. If they are not accessible, or if they prove to be ineffective or inapplicable, managers can install user-friendly short-term solutions that have all of the necessary functionality. They should always consider what the organization needs, not what is trendy. Every corporate culture is unique, and different tools may be required to maintain high productivity.

The following step is to expand on this. Begin the adoption procedure. Organize staff training sessions over multiple days, listen to comments, and make appropriate adjustments. This method of structural implementation is really necessary. But coming to the first question, vendor-provided software or open-source software is better?

2.3.4 Vendor-Provided Software

Vendor-supplied software is a concept most people are acquainted with. Because these packages fall into so many distinct categories, it's impossible to generalize about them. The software may be a one-size-fits-all package that can be easily installed on a desktop, like Microsoft Word, or a comprehensive, adaptable system, like Blackbaud's Raiser's Edge, that takes time and effort to roll out across an organization. Rent a system by the month and use it through the Internet under a Software-as-a-Service paradigm. Salesforce, for instance, might be highly adaptive to your requirements. It may be fully free, like Google Apps, or hundreds of thousands of dollars each year. It might be largely supported by the vendor, or it could be part of a bigger ecosystem of suppliers, consultants, and implementers that can assist in installing.

These software products all have one thing in common: they're all sold by a company. First, a license is received to use the software package from the manufacturer or an authorized distributor, which normally comes at a cost. Employees assigned to delivering software work for vendors, and they may regularly aid in understanding what the program does, giving technical support, and even working together on strategic decisions.

- Strengths of vendor-provided software

Getting started ease

Commercial software typically provides a less-daunting path to getting up and running for organizations that have no prior experience with open-source initiatives. Vendors frequently supply sales support and engineering personnel who have been educated to do so.

Documentation

Finding current, well-written, and user-friendly documentation for any product may be difficult. Vendor-provided software, on the other hand, often includes better documentation since it must be created and updated for each product's launch or variant.

Accountability

Bugs and faults are expected in a software product, unlike a piece of electronic equipment or an automobile, and are freely addressed as a danger of using it. While there is usually no support in case of a problem with an open-source product, commercial suppliers usually provide warranties against software faults that might harm the user.

Mature ease-of-use

While it varies per product, paying members and a team of customer-facing salespeople frequently press vendors to improve user interfaces and simplicity of use in vendor-provided software.

2.3.5 Open-source software

A loosely organized collection of persons usually creates, promotes, and distributes open-source software. The term "open source" refers to the program's source code, or the commands that allow it to work. The source code can be seen, modified, or downloaded by anybody with technical knowledge. Open-source software is sometimes referred to as Free software or FOSS because of four principles of freedom that are a fundamental feature of the open-source movement's philosophy (Free and Open-Source Software). Second, the source code is open source, meaning it is easily examinable and learnable. Third, there is complete control over the package's duplication and distribution. Finally, the software is modifiable, and the results can be delivered too.

- Strengths of open-source software

Free to try, buy and update

Without paying anything, the full version of an open-source software package can be downloaded and then be discovered. Without paying also, anyone can build a prototype or implement the whole system. And, as long as there is careful tweaks management, newer versions are probably able to get upgraded and access to community-created features is for free. Of course, there is a minimum time and money investment as well as configuration and software update, but with open source, there are more choices in terms of range and time flexibility.

Ability to customize and control

Developers usually focus on providing a flexible data model, an extensible and/or modular code base, and APIs (application programming interfaces) allowing clients to customize and adjust the system to match their individual needs. Furthermore, while vendor-provided alternatives frequently bind the organization to the vendor's vision for the product, and even sometimes bind customer to conditions that make it impossible to use other options, open-source solutions give more control over the destiny whenever an alternative choice is preferred.

Community-driven solutions

Since open-source software is developed by a society with common aims, it is easier to grasp what is required—and what isn't. In a Darwinian sense of value screening, the best ideas are implemented, while the worst are not. Communication and collaboration on the community's Web site, chat groups, meetings, and workshops generally direct the most pressing concerns directly to the developers, who handle problems without the need for promotional, administrative, or sales intermediaries.

Alignment of philosophy

For cultural reasons, most non-profit organizations are drawn to the notion of open source. It's a logical match that open-source software symbolizes value developed without a business motive. If a company has to invest time and money in software, they may decide to support a free package.

2.3.6 Evaluation of open-source and vendor-provided software

The essential procedures for evaluating respectively open source and vendor-provided software are identifying prospective software, reviewing current reviews, immediately comparing the leading programs' qualities to business goals, and completing an in-depth investigation of the top candidates.

A strong technical grasp of software development is not required for the majority of the procedures discussed here; nevertheless, there are a few stages that are better done by somebody else skilled at software development. How much work and resources should be spent on evaluating software is primarily dictated by how tough and important the product is.

The overall method is the same; the level of rigor (and consequently work) put into each phase differs. Before starting the evaluation process, someone should be well familiar with what is required. If not, it is essential to figure out what the most basic requirements are. During the examination process, it is likely to be discovered skills that hadn't been considered previously, which will help managers enhance their knowledge of what they require. When comparing needs to products, however, some wiggle room is essential; a service that meets 80% of the needs may have additional benefits that make it superior to a service that satisfies 100% of the criteria.

- Identify candidate software

The initial stage is to be educated on the various options. To ensure that nothing vital is missed, a certain variety of strategies should be employed. Asking friends and coworkers, especially whether they need or have used such a product, is an easy approach to start. If they've done it before, their feedback is very important, because this will help the manager with the following phase, which is getting reviews.

Aside from vendor-supplied software, the manager should look through Open-Source Software (OSS) listings, especially those tagged as "generally recognized as mature" (GRAM) or "generally recognized as safe" (GRAS) (GRAS). And besides, some OSS products are well-known that this could be a tremendous mistake to miss them.

There are different types of search methods to attempt while looking for software lists on the internet. A manager can use specialist sites that track OSS initiatives and sites that

house or incorporate a large number of OSS projects to search. Also, search for the product by using a decent general-purpose Internet search engine. Search engines that have clear conflicts of interest should be avoided; For example, a search engine run by a product maker is unlikely to improve skills to discover regarding the rivals.

If all else fails, a manager should ask others for advice. If somewhat similar or related programs are found, then it is appropriate to ask for what is being looked for on their mailing lists. There is also the option of employing individuals to conduct a more thorough investigation.

Read existing reviews

A manager should read other people's thoughts on the options after they have been reduced down. Learning about a program's best qualities and limits from a few assessments is far more effective than trying to find out such information from project webpages alone.

A simplest way to find these reviews is to use a search engine and hunt for a publication that has the identities of all of the contestants. Websites that attempt to hide that market or business function, as well as any published reviews, should be investigated. Credible candidates who were overlooked earlier in the process can be found this way.

It is essential also to know that many assessments are skewed or irrelevant to the situation. Most publications rely on advertising to survive, so they're less inclined to bite the hands that feed them. Someone focused on biasing systems that enable several individuals to remark can easily bias them. Even so, it's good to hear a few other perspectives. Evaluations can provide vital information about programs that would not have been observed otherwise.

The popularity of a product, also known as market share, is a significant but indirect "review" of that product. In general, in any review, the goal is to cover the most popular items. Products having a big market share are more likely to meet a wide range of requirements and are frequently easier to support and integrate. Several designers start out as users, therefore even if only a small percentage of users go on to become designers, having more users often corresponds to getting more designers. Developers really don't prefer their efforts to go to waste, therefore they'll prefer to work on projects that have a

positive public image. A product that is rapidly losing market share, on the other hand, poses a greater risk because customers are leaving for a reason.

- Compare the leading programs' attributes to the needs

After previous reviews have been read and the top software candidates have been discovered, it is good to start comparing them to determine which one best suits the manager's needs. The idea is to narrow the field of viable options down to a few contenders. It is worth noting that a manager should do this after studying a few critiques, as the critiques may have revealed several essential aspects that had previously been overlooked.

The first step is to find the software project's webpage. An OSS project's website contains more than just a version of the software; it also includes a plethora of data that may be used to assess the software. The same can be said about software delivered by a vendor. Project websites typically include a brief description of the project, a list of frequently asked questions (FAQs), project documentation, online links to related/competing projects, email lists for providers and testers to discussing the software project. The project and its program can then be evaluated based on a set of essential features to determine the benefits, drawbacks, and risks of putting it into action.

Functionality

A manager should think about how effective each piece of software integrates and works with the other components he already has. He should also think about what kind of hardware, operating system, and related applications it takes, and whether there is fulfillment with them (are they existing or need to be obtained)? Only a few applications offer all the essential features.

It's generally possible to select whether to go without, add a method to replace the missing function or utilize a different application to replace the missing feature. One further possibility, which is virtually unique to OSS, is that anybody may change the program's code to add the missing feature. An institution can add convenience by either creating it in-house or contracting others to do it for them.

Cost

In a strict sense, most OSS products are free to download; nevertheless, the adjective "free" in the phrase "free software" refers to "freedom" rather than price. Because initial

license charges are a small part of most software deployments, OSS projects nonetheless cost money to implement in the real world. As a result, all expenditures associated with implementing software when calculating costs should be included. This is usually done over a specific timeframe by determining the total cost of ownership or a return on investment.

Support

Support includes things like teaching clients how to apply the service, installing it, and responding to users who have specific problems using a functional product. This includes the product's documentation, as well as user documentation, reference guides, and any other sources of knowledge. Any guarantees and indemnifications can be included as well.

A manager should examine the product's documentation, such as user manuals, "quick start" materials, administrator manuals, reference guides. He should also look for additional material; many OSS applications only have rudimentary documentation, and it is needed to purchase books on them from other sources.

Reliability

A well-known program is significantly more probably to be trustworthy. The project's website will almost definitely try to describe the software's quality; if the project states the product is still not prepared for end-customers, it is almost always true.

Performance

Performance statistics may be found on many project websites. More specific performance information may be included on project email lists. The best method to assess performance is to put it through a "real" workload that is tailored to each one's needs.

Scalability

In this sense, scalability refers to the amount of data or problems that the software can manage. If the software is expected to handle extremely large datasets or run on enormously concurrent or decentralized systems, it needs to be backed up by evidence that it has been deployed in this capacity before.

Usability

The usability of a human-machine interface is a measure of how well it works for the person who will be using it. A highly usable application is one that is simple to understand and use. Finally, assessing usability necessitates hands-on testing.

Maintenance/Longevity

There aren't many useful applications that are fully static. Needs evolve, new applications emerge regularly, and no program is flawless. It is really vital that a software is kept up to date and will be kept up to date in the foreseeable. It is, of course, quite hard to predict the future. Nevertheless, if software is frequently updated and preserved, today's program is much more likely to be useful tomorrow.

The OSS project site provides a central location for users to share their contributions. As a result, the project's online presence can provide insight into the quality of program maintenance. A manager should test the archives of the developer email list, whether developers make frequent improvements and problem fixes, as well as how bug complaints are handled, if their version management information is public. *"If a project has an active mailing list, bug tracking system, and public wiki," Ken Krugler concludes, "it typically has sufficient structure and commitment from a community to be successful in the short future." A fourth question is if the project/component has been documented in a book."*

Security

It's difficult to evaluate a product's or service's security, partly due to the fact that different users or settings can place alternative security demands on the similar device. Concisely identifying the security requirements is one step toward tackling this challenge. Then seek proof that the product meets those requirements, as well as that it addresses weaknesses in general. Independent software assessments can provide useful information. Simply reading the user's guide to see if it addresses how to build and maintain the application security, as well as whether the project has a method for reporting security flaws, is one suggestion. Another tip is to go through developer email groups to see whether they talk about security vulnerabilities and try to make the product safe.

Flexibility/Customizability

Flexibility and customizability are two characteristics that are closely linked. Flexibility refers to how well a program may be utilized to deal with situations for which it was not planned. Customizability is a metric that assesses how well a product may be tailored to fit into a certain setting.

Interoperability

There is no such thing as a vacuum, so the manager should be sure that the product will function with the other ones.

3. Material and methods

As a first step, we concluded that the scope of our work would be to examine challenges that are brought to the surface in collaborative distance working and team-management with higher interest in the questions below:

- 1) How does remote working affect virtual teams in terms of communication, trust, and productivity?
- 2) How can autonomy or flexibility increase the prementioned variables?
- 3) What are the best collaborative tools to preserve virtual teams' communication, trust, and productivity while adopting remote work? (Open-source and vendor software tools)
- 4) Are there aspects of better performance in open-source or vendor software better?

In order to determine our literature review, we made multiple keyword research through recent academic sources like “distance-working”, “remote working” “collaborative

working environments”, “remote team”, “modern management techniques”, “open-source tools”, “vendor-provided tools” etc.

Then, we aimed to identify the beliefs and the patterns adopted in contemporary society. As a result, we conducted quantitative and qualitative research method through questionnaires. The questionnaires were created in Google Forms and carried out online. Finally, through descriptive statistics we analyzed the answers gathered and listed significant findings by highlighting relationships among variables and comparing them to the initial literature review.

3.1 Description of the questionnaire

The questionnaire consisted of a series of 26 questions. Not all questions were applicable to every participant. Each responder, depending on the answer, was transferred to the next corresponding section. The segmentation and questions are found below:

Part A

Section 1: Demographic characteristics and brief background

These variables gave us a better understanding of our sample and were examined whether they affect their answers.

1. What is your gender? (Male, Female, Prefer not to say)
2. What is your group age? (18-26, 27-35, 36-44, 45-53, 53+)
3. Professional experience (<1, 1-3, 4-10, 11+)
4. Type of Employment (Freelancer, Employee)
5. In which industry do you work this moment? (Technology (IT), Agriculture Commerce, Construction, Education, Energy, Finance, Health Insurance, Legal/Law, Media, Oil & Gas, Public sector, Telecommunication, Transport, Utilities (water, electricity, natural gas, etc.), Other_)

Part B

Section 2: Qualifying question

This question validated the questionnaire was answered by the appropriate candidates. If someone responded negatively, he was transferred at the end of the questionnaire.

6. Have you ever worked remotely? (Yes, No)

Section 3: Remote work

It was examined whether experience affect the answers followed.

7. Remote work experience (<6 months, 6 months to 1 year, 1-2 years, 2+ years)

Section 4: Qualifying question no2

This question distinguished respondents with current teamwork experience. When someone selected the negative answer, he was transferred to question over the tools.

8. “While you were working remotely, were you member of a team?” (Yes, No)

Section 5: Team member questions

In this section, we seek information for three main factors of our research: trust, productivity and communication, on individual aspect and regarding their colleagues. We used scale of (Very low, Low, Neutral, High, Very high) and answers were used to give a better understanding over their impact during distance working. At this part, we requested further insights by respondents concerning factors that can boost the referred factors with closed-ended and open-ended questions. All variables were examined for their interconnection and their effect on next questions over ideal remote work frequency and overall distance working experience.

Part C

In this part we examined the software tools. We considered the factors of trust and communication through tools with purposes of email, messaging tool, online conferences, instant messaging & videoconferencing. On the productivity basis, due to large dispersion in industries, we concluded in tools for daily tasks like integrated office suite, PDF viewer, customer relationship management. Another important factor was to find tools of the same purpose both vendor-provided and open-source. We also gave the choice to fill out tools we did not include.

Main Purpose:	Vendor-Provided	Open Source
Email	Microsoft Outlook	Mozilla Thunderbird
Messaging Tool	Slack	Element (formerly Riot)
Online Conferences	Zoom/Webex	Jitsi Meet/Apache OpenMeetings
Instant messaging & Videoconferencing	Microsoft Teams/Skype	Rocket.Chat/Signal
Integrated Office Suite	Microsoft Office	Open Office
PDF Viewer	Adobe	SumatraPDF
Customer Relationship Management (CRM)	Salesforce/SAP	SugarCRM/CiviCRM

Table 1: Tools' Selection

Section 6: Vendor-provided software tools questions

All respondents are part of these questions, team members and individuals. The participants selected the tools they used while working remotely and an evaluation is followed according to the main attributes, we extracted by our literature review. A scale of (Very low, Low, Neutral, High, Very high) is requested for attributes of functionality, cost, support, reliability, performance, scalability (ability of software to manage lots of data), usability (quality of interface), maintenance, security, flexibility and interoperability (the product functions properly together with others).

Section 7: Open-source software tools questions

Firstly, we validate the awareness of these tools because they are not widely used unlike vendor-provided that are more commercial. So, we added a short definition and asked them whether they have used them. When they responded negatively, they continued to the next question otherwise they skipped to section 7.

Section 8: Open-source software tools (not for users) questions

On a Likert Scale 1 to 10 (from very unlikely to very unlikely) we wondered whether according to previous description, they would use an open-source tool in the future. We also asked on what scale (Not important at all, Less important, Neutral, Important, Very important) are the attributes mentioned in vendor-provided tools deciding factors. Skip to section 10.

Section 9: Open-source software tools (users) questions

Participants familiarized with open-source tools answer respectively the same questions of vendor-provide tools. Tool selection and evaluation.

Section 10: Digital software tools

Lastly, we asked for an overall experience of Software tools (Positive, Neutral, Negative). It will be examined whether software tools' experience affected their overall remote work experience and the response of ideal remote work frequency.

3.2 Description of the sample

Following our questionnaire survey, we accumulated 78 responses. The 8 responses were from people with lack of remote work experience and were not taken into account. Consequently, our sample is considered a total of 70 (n=70).

The majority of our sample is women with n=42 followed by men with n = 27 and 1 participant that preferred not to convey his gender. The equivalent percentages are shown in Figure 2.

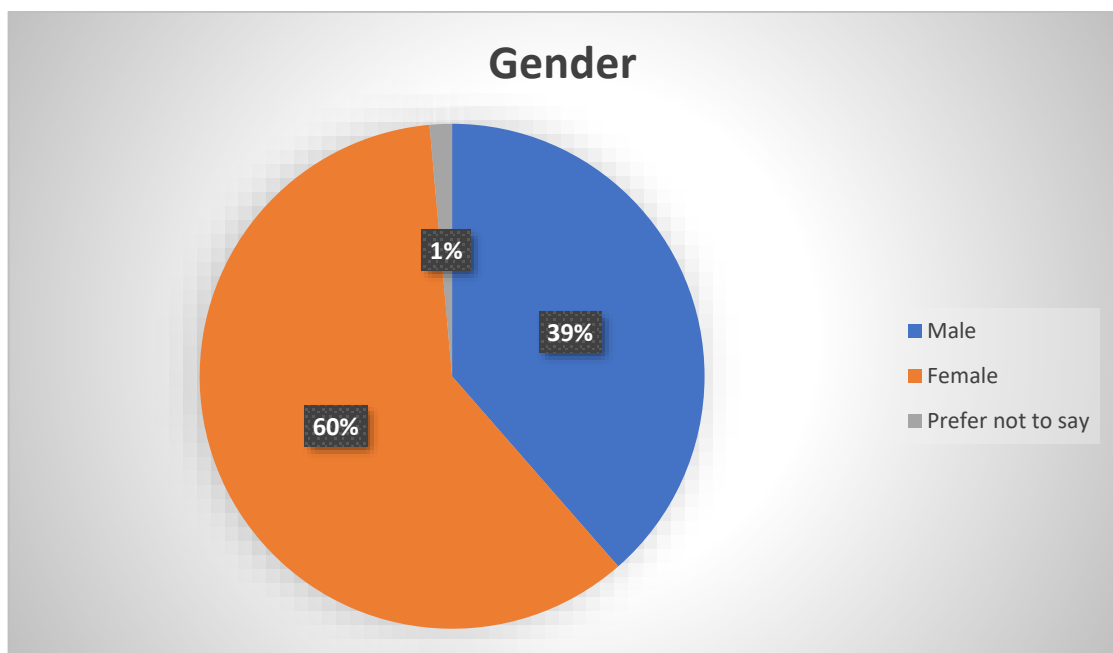


Figure 2: Participants' gender

In addition to the gender, in Figure 3 we present the age groups. Most of the participants belong to the middle age group of 27-35 years old (n=55) and in particular 31 of them are women.

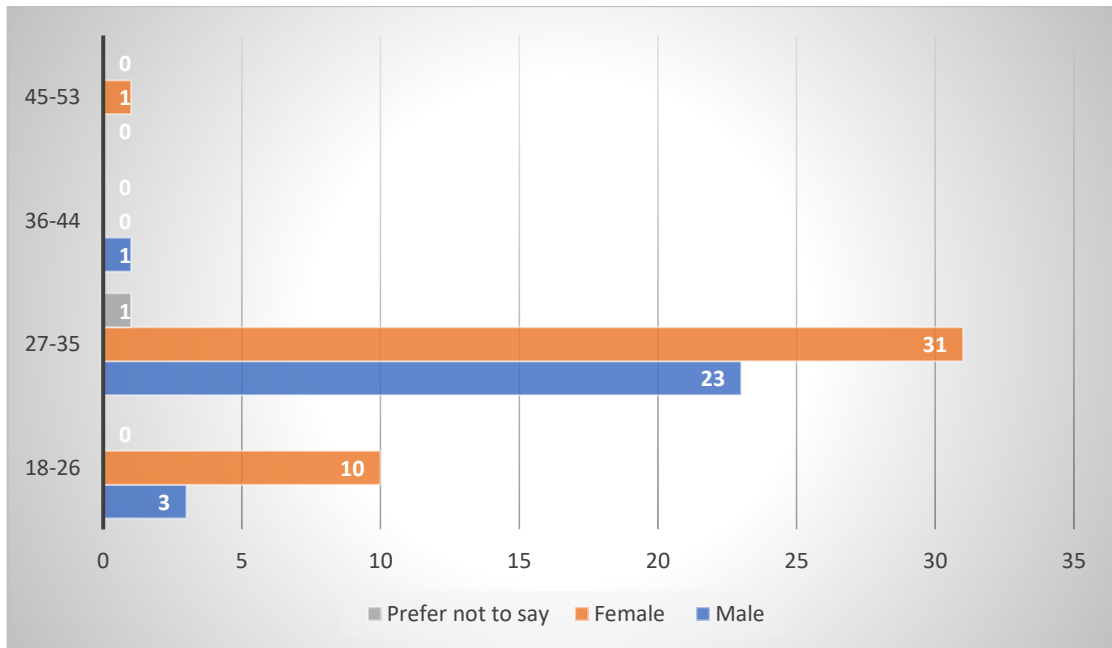


Figure 3: Participants' age group

Next, we take a glance at the professional experience that is also an indication of management level. In Figure 4 we can see most of the participants have 4-10 years of experience and the frequency of participants with 1-3 years of professional experience also appears significant.



Figure 4: Participants' professional experience

Furthermore, we requested their type of employment. The overwhelming percentage of 90% is employees and 10% are freelancers.

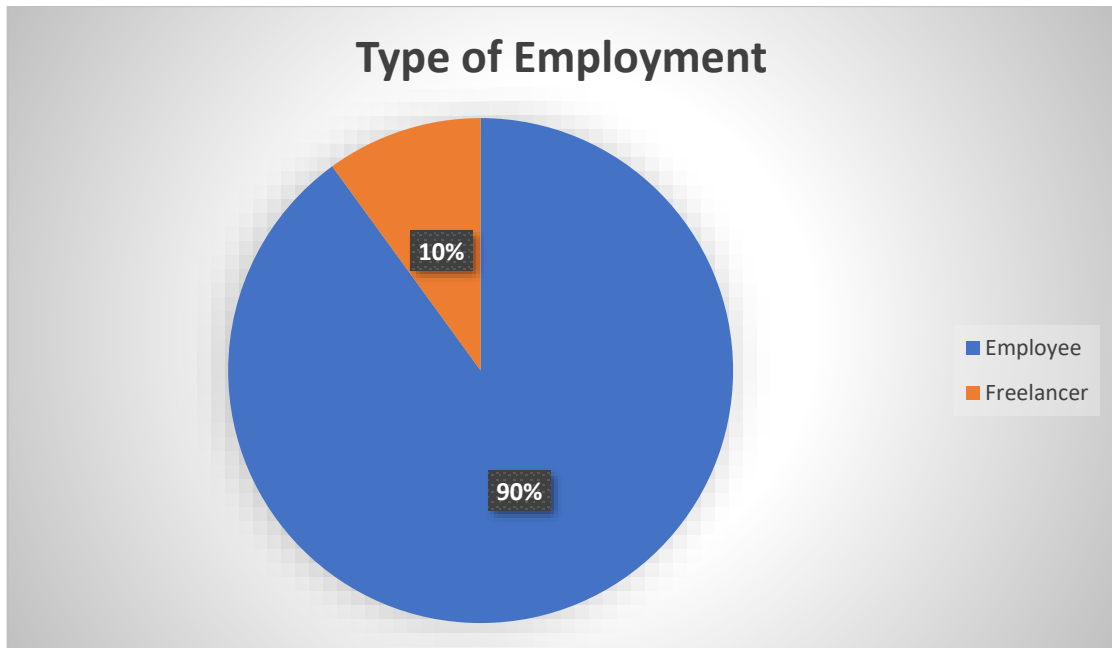


Figure 5: Participants' employment type

In Figure 6, there are the top 10 industries with the majority originating from the IT industry and accompanied by Education and Finance.

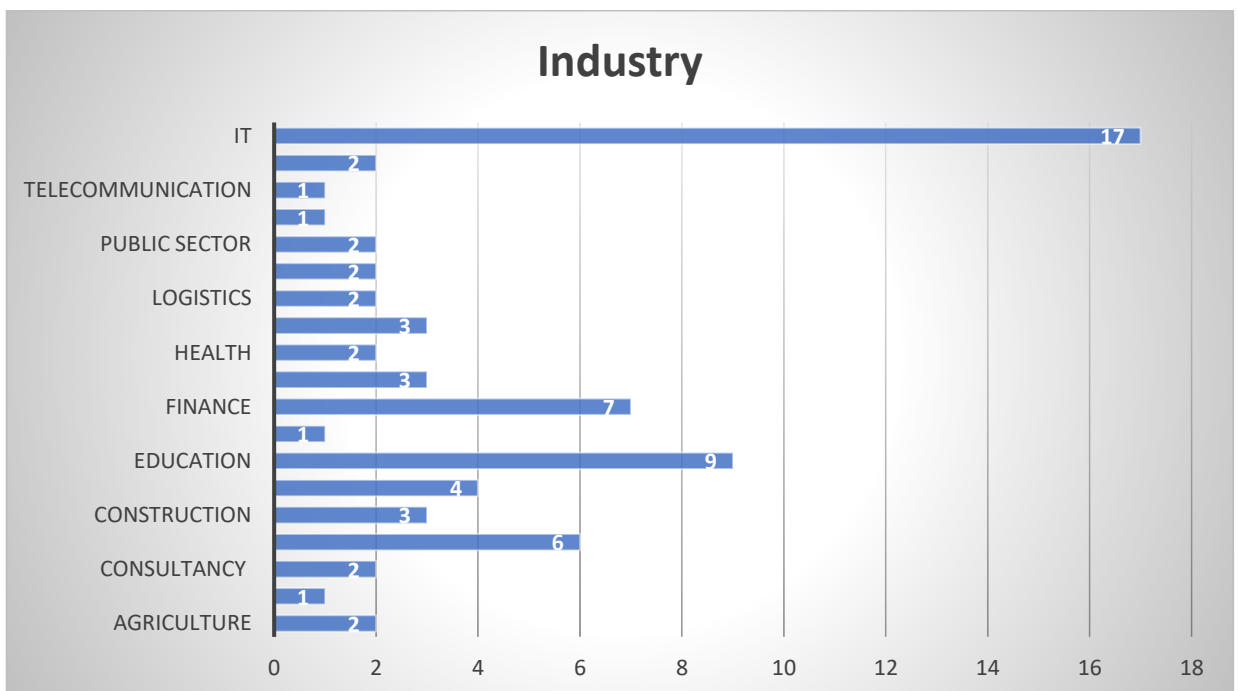


Figure 6: Participants' industry

3.3 Statistical analysis

For this master thesis the data analysis was conducted with the assistance of SPSS.

To begin with, all answers by the questionnaires were coded and converted to dataset format. It is necessary to mention that prior to any type of statistical test, each sample was tested for normally distributed data. In terms of normal distribution test, we conducted the Shapiro-Wilk. When p-value is more than 0.05 ($p > 0.05$), we shall proceed with parametric tests. When p-value is less than 0.05 the assumption of null hypothesis is violated and we shall proceed with non-parametric tests.

The next step was to extract some insights by measuring some quantitative data (minimum and maximum value, mean value). This method was used for the main responses of our survey,

Another test implemented for the purposes of this research is Spearman's rank correlation test for association between two variables. When two attributes are statistically correlated mean that any modification to one variable affects the other one with the same way, positively or negatively.

Finally, other tests were also conducted. For example, we monetized the demographic characteristics and ran Kruskal Wallis for each feature (gender, age group). However, they did not bring any valuable outcome. We also have to mention, there is also margin of error (5%).

4. Outcomes of the research

This chapter is divided into two sections presenting the main results of our analysis. The first sub-chapter includes the current teamwork experienced participants (n=66) and the second sub-chapter is about software tools where all have participated (n=70).

4.1 Remote work

In following section, our sample consists of 66 respondents. In Table 2, we present valuable insights concerning the degree of satisfaction of the three main factors: productivity, trust to the team, communication. The possible answers were coded: Very low (0), Low (1), Neutral (2), High (3), Very high (4). According to the answers the mean value is approximately the same, classifying the level of satisfaction is neutral to high. Although, it is important to note that the factor of communication has the lowest mean value both regarding individual communication and regarding their colleagues'. Literature review reports that the problem has increased due to lack of face-to-face engagement and should not be neglected because it will have a negative effect on trust and productivity. Nevertheless, the individual productivity has the highest score. This fact corroborates the theory of positive impact of the freedom of remote work. Another observation is that there are some exceptions at the last two questions, where none of the responders chose the first answer (Very low).

Q: While working remotely, what was the degree of satisfaction as regards... *Colleagues correspond to both managers and team members

Questions	Minimum Value	Maximum Value	Mean Value
YOUR Productivity	0	4	2.7273
YOUR Trust to the team	0	4	2.6970
YOUR communication	0	4	2.4091
COLLEAGUES' Productivity	0	4	2.5152
COLLEAGUES' Trust to the team	1	4	2.6061
COLLEAGUES' communication	1	4	2.2879

Table 2: Main questions of the research

For further analysis and better understanding of the interconnection of the factors above, we implemented a Spearman's correlation analysis for our non-normal distribution and created the matrix below (Table 3). The variables coded as: YOUR productivity (1), YOUR trust to the team (2), YOUR communication (3), COLLEAGUES' productivity (4), COLLEAGUES' trust to the team (5), COLLEAGUES' communication (6). Nearly all factors are positively correlated with the most statistically significant being individual productivity with colleague's productivity, individual trust to the team with colleague's trust to the team and individual communication with colleague's communication.

	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Value 1	1					
Value 2	0,205	1				
Value 3	0,316	0,453	1			
Value 4	0,493	0,392	0,153	1		
Value 5	0,298	0,697	0,414	0,413	1	
Value 6	0,164	0,460	0,649	0,333	0,489	1

Table 3: Correlation Matrix with Spearman test

Additionally, correlation was found between “Professional Experience” and “YOUR communication” ($r=.256^*$, $n=66$, $p=.038$) and “YOUR productivity” ($r=.313^*$, $n=66$, $p=.011$). This can be easily explained because by gaining work experience, potentially there is more confidence in matters of communication and more dedicated when productivity is concerned.

Defining our analysis as an additional testimonial that main components of our research need further optimization, the next part is important in order to enhance weak points. At this point, we have to mention that some factors stated on grounds of improvement may be found in multiple categories. For example, accountability can be found both in trust boost and communication boost or digital tools & technology provided by the employer can be found in productivity and trust boost. This is another hint that trust, communication and productivity are interconnected. Additionally, someone could think of implementing factor that combine multiple advantages.

Among the factors given for productivity boost, respondents answered with frequency of occurrence first the selected digital tools & technology provided by the employer (65,2%), better communication (60,6%), home office equipment (53%), working hours flexibility (50%) followed by factors appeared at figure 6. Whereas, through open-ended question further factors were given such as bonus pay, training and development for employees etc.

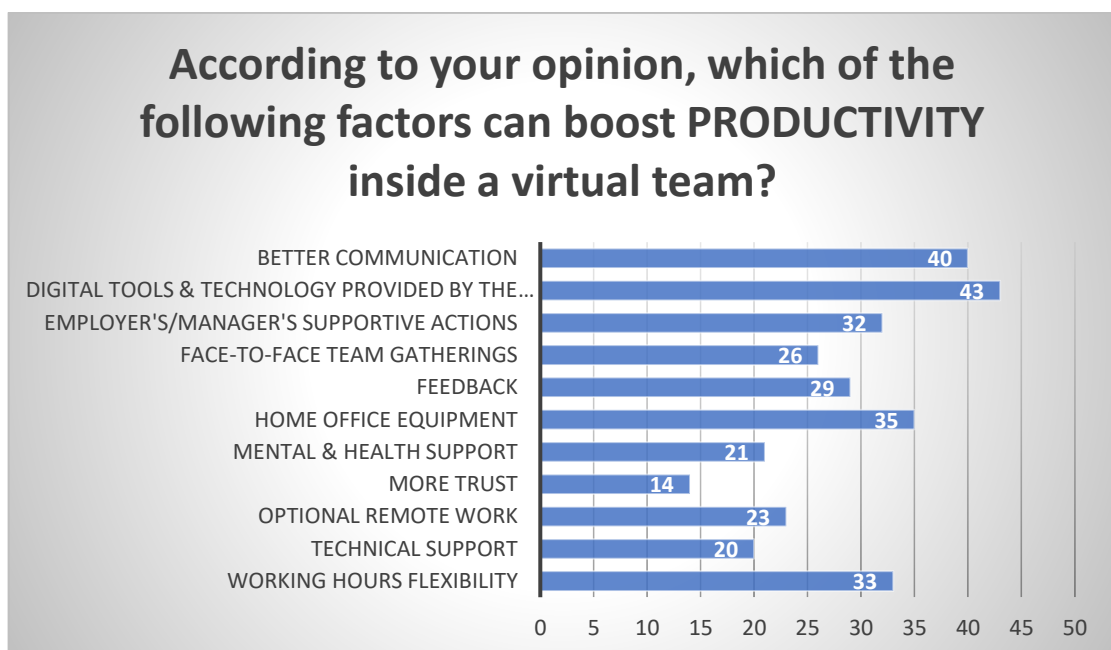


Figure 7: Factors that can boost productivity

As trust boost is concerned, most common answer is the establishment of shared goals (66,7%), feedback (59,1%), accountability (57,6%) and employer's/manager's supportive actions (57,6%). Meanwhile, other factors collected are transparency among colleagues' and team building events.

According to your opinion, which of the following factors can boost TRUST inside a virtual team?



Figure 8: Factors that can boost trust

Lastly, communication boost is believed to be achieved by face-to-face gatherings (56,1%), feedback (56,1%) and digital tools & technology provided by the employer (53%). There was a similarity to the additional factors that may help communication like team building events and clear communication strategy.

According to your opinion, which of the following factors can boost COMMUNICATION inside a virtual team?

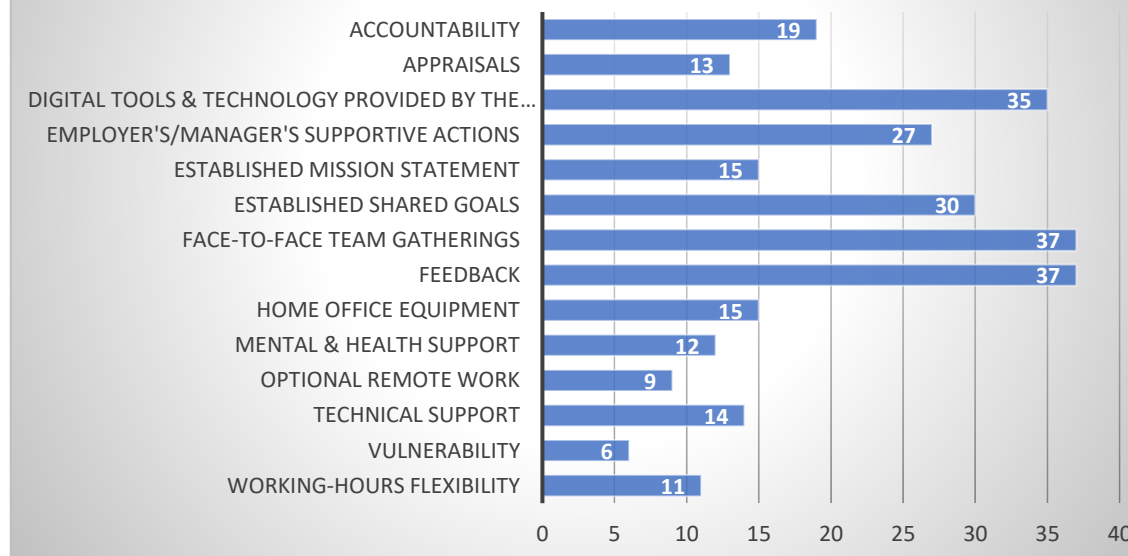


Figure 9: Factors that can boost communication

On general from the total number of participants, 63,6% had a positive overall distance working experience, 34,8% was neutral and only 1,5% had a negative experience. Alongside, the same percentage of 1,5% believes there should be no future remote work and 7,6% prefers once a week. Nonetheless, the majority prefers to adopt higher flexibility. Particularly, 27,3% sets twice a week as ideal remote work frequency, 25,8% three days a week, 12,1% four days a week and 25,8% prefer complete flexibility.

The above is confirmed with Spearman's correlation analysis where the answers of ideal remote work frequency are correlated to overall distance working experience ($r=.362^{**}$, $n=66$, $p=.003$). There is also added the parameter of remote work experience ($r=.243^*$, $n=66$, $p=.050$). According to our test as someone gets familiarized with remote work his ideal remote work frequency also increases.

At the same time, remote work experience is also correlated with the overall distance working experience ($r=.269^*$, $n=66$, $p=.029$), probably a subtle sign of force of habit.

Finally, overall distance working experience is also affected by the primary factors of "YOUR productivity" ($r=.392^{**}$, $n=66$, $p=.001$), "YOUR communication" ($r=.248^*$, $n=66$, $p=.045$), "COLLEAGUES' productivity" ($r=.319^{**}$, $n=66$, $p=.009$) and "COLLEAGUES' communication" ($r=.334^{**}$, $n=66$, $p=.006$). Thus, communication and productivity become prominent in the future of teleworking.

4.2 Vendor-provided Software Tools

In the previous chapter, we observed that "digital tools and technology provided by the employer" was among the top answers for productivity and communication improvement. This brings to the surface the dominant relationship among software tools and aspects of team management and collaborative distance working. For the following section of vendor-provided software tools, we remind that our sample consists of 70 respondents. First, we will take a glance at the most common vendor-provided software tools used. By descending assortment Microsoft Office and Microsoft Outlook (81,4%), Microsoft Teams (71,4%), Zoom (68,6%), Adobe (41,4%), Slack (40%) etc.

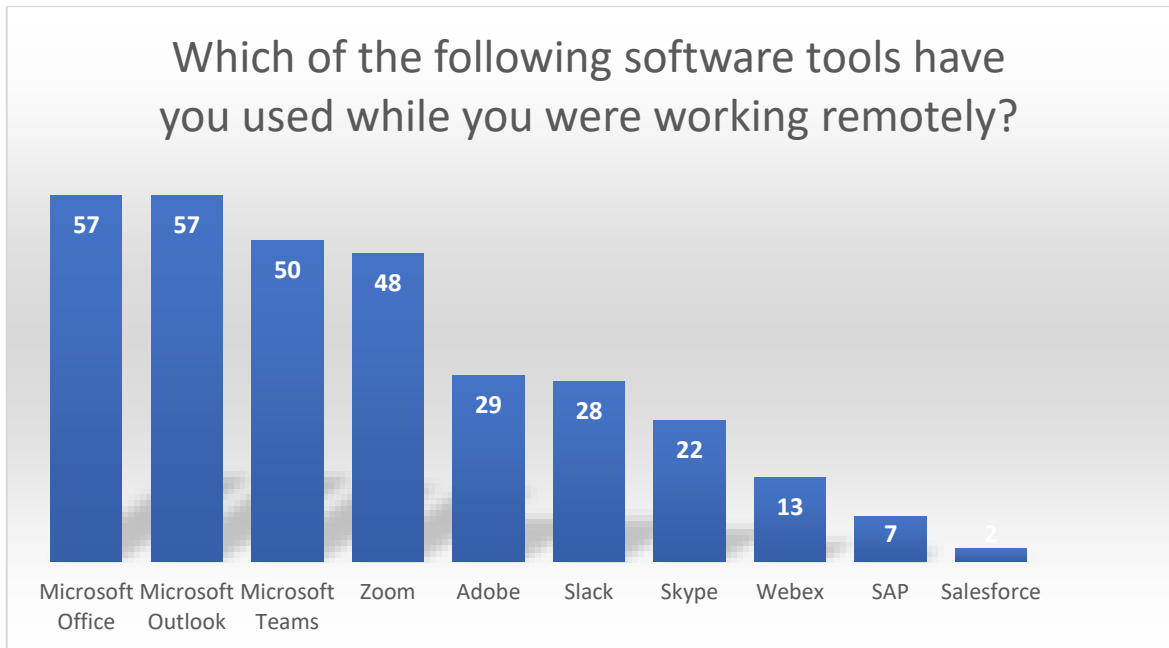


Figure 10: Vendor-provided software tools used

When it comes to tool evaluation, we requested from the participants to select the importance of eleven main attributes for further insights. Their answers are coded as follows: Very low (0), Low (1), Neutral (2), High (3), Very high (4). In Table 3 we present the main descriptive statistics. The mean value of answers fluctuates from Neutral to High. Explicitly, according to the majority of those who took part in the survey, the higher rating attributes concerning vendor-provided tools are performance, usability, functionality, reliability and flexibility.

On the contrary, the lowest mean value belongs to cost. Moreover, cost there is also maintenance that are the only attributes that scored the minimum existing value of Very low.

Question: Rate the chosen software tool in terms of the following attributes...

Questions	Minimum Value	Maximum Value	Mean Value
Functionality	1	4	3.1857
Cost	0	4	2.0857
Support	1	4	2.6000
Reliability	1	4	3.1143
Performance	1	4	3.1000

Scalability (ability of software to manage lots of data)	1	4	2.8286
Usability (quality of interface)	1	4	3.0429
Maintenance	0	4	2.5714
Security	1	4	2.7000
Flexibility	1	4	2.8857
Interoperability (the product functions properly together with others)	1	4	3.000

Table 3: Evaluation vendor-provided software

Attempting to discover deeper connections of software tools and aspects of team management and collaborative teleworking we found the following correlations. The attribute “performance” is correlated to individual trust to the team ($r=.256^*$, $n=66$, $p=.038$), individual communication ($r=.357^*$, $n=66$, $p=.003$), colleagues’ trust to the team ($r=.255^*$, $n=66$, $p=.039$) and colleagues’ communication ($r=.283^*$, $n=66$, $p=.022$).

Additionally, the attribute “usability” is correlated to individual trust to the team ($r=.244^*$, $n=66$, $p=.048$) and colleagues’ trust to the team ($r=.273^*$, $n=66$, $p=.027$).

4.3 Opens-source Software Tools

Open-source tools aren’t very common. Nevertheless, from 70 people that took part in our questionnaire, 35.7% ($N = 25$) have used Open-Source software, whereas 64.3% ($N = 45$) haven’t. Our positive respondent’ answers with descending assortment used Open Office (34,8%), Signal (6,06%), Sumatra PDF (4,54%) etc.

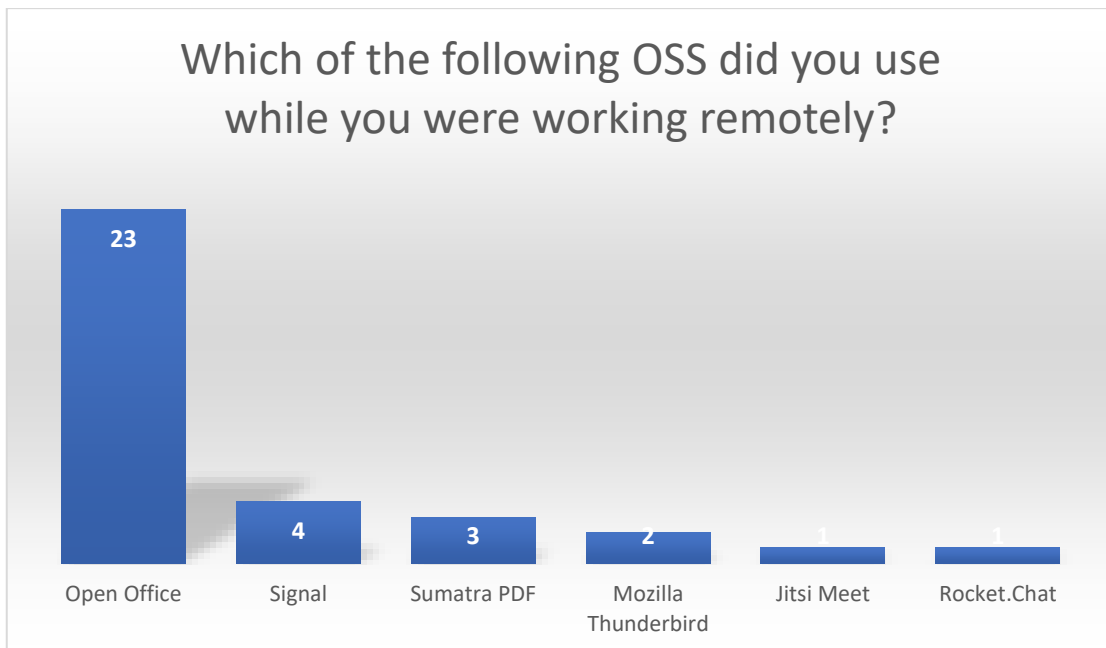


Figure 11: Open-Source software tools used

The mean value of evaluation answers fluctuates from Neutral to High, reminding the coding was Very low (0), Low (1), Neutral (2), High (3), Very high (4). Generally, the evaluation of open-source users was slightly decreased compared to the vendor-provided systems maintaining its consistency per attribute. There were two exceptions that may constitute as open-source advantages, cost is significantly lower and security is higher rated.

Question: Rate the chosen software tool in terms of the following attributes...

Questions	Minimum Value	Maximum Value	Mean Value
Functionality	1	4	2.92
Cost	0	4	1.52

Support	0	4	2.28
Reliability	1	4	2.88
Performance	1	4	3.00
Scalability (ability of software to manage lots of data)	1	4	2.72
Usability (quality of interface)	1	4	2.80
Maintenance	0	4	2.44
Security	1	4	2.84
Flexibility	1	4	2.88
Interoperability (the product functions properly together with others)	0	4	2.92

Table 4: Evaluation of open-source software tools

For participants that haven't used open-source tool we used a Likert scale of 1 to 10 (where 1 is Very Unlikely to use an OSS in the future and 10 is Very Likely to use an OSS in the future). The mean value was $m=5.67$. Even though it leans towards the positive axis it doesn't highlight a clear tendency.

For the purpose of investigating which factors are critical in decision making of software selection Table 5 is created. Responders found important all the stated factors for the probability to work with an OSS software in the future. Functionality, performance and flexibility outstand with minimum value 3 (Important) as well as usability that belongs to attributes with the highest mean value ($m=3.60$). It has to be noted that the possible answers are coded: Not important at all (0), Less Important (1), Neutral (2), Important (3), Very Important (4).

Question: How much important would be the following factors to decide whether to work with an OSS software?

Questions	Minimum Value	Maximum Value	Mean Value
Functionality	3	4	3.72
Cost	0	4	2.84

Support	2	4	3.24
Reliability	2	4	3.48
Performance	3	4	3.60
Scalability (ability of software to manage lots of data)	1	4	3.00
Usability (quality of interface)	2	4	3.60
Maintenance	2	4	3.16
Security	2	4	3.52
Flexibility	3	4	3.60
Interoperability (the product functions properly together with others)	1	4	3.16

Table 5: Decision factors for future use of open-source software

Our ultimate approach is to combine the aforementioned factors with previous variables. The analysis emerged correlation between “security” as deciding factor and individual trust to the team ($r=.471^*$, $n=45$, $p=.020$), individual communication ($r=.517^{**}$, $n=45$, $p=.010$), and colleagues’ communication ($r=.437^*$, $n=45$, $p=.033$).

Another interesting point is the significant correlation between professional experience and decisive attributes of open-source tools, cost ($r=.463^*$, $n=45$, $p=.020$) and security ($r=.458^*$, $n=45$, $p=.021$). Likewise, attributes of vendor-provided evaluation are affected. Specifically, professional experience is highly correlated with the cost ($r=.310^{**}$, $n=70$, $p=.009$) and the security ($r=.359^{**}$, $n=70$, $p=.002$). The interpretation is that probably the higher experience means more probabilities in manager level and in this case those attributes become empowered as decision parameters.

Finally, in the last question most participants replied they had a positive experience with digital software tools (84.3%) whereas a percentage of 14.3% had a negative experience. Because of the latter we conducted another correlation analysis to determine the factors that affect their experience. The results revealed correlation to the industry ($r=.254^*$, $n=70$, $p=.034$), which probably has to do with the technology comprehension and experience. Meanwhile, it was correlated with the decisions factors concerning “performance” ($r=.452^*$, $n=45$, $p=.023$) and “usability” ($r=.457^{**}$, $n=45$, $p=.022$) that might radically impact productivity.

4.4 Limitations

This research has several limitations. First and foremost, the external validity of our findings should be questioned since the predicted conclusions are not generalizable to the entire population because the influence of remote work on communication, trust, and productivity varies depending on the job, company, and industry.

In addition, as Tan and Igarria (1998) point out, surveys without control factors such as age, gender, and family status have limitations. Personal and contextual variables, according to (Beauregard et al. 2019), have a major impact on the productivity of remote work. These characteristics are not taken into account in our questionnaire; hence this should be considered another study limitation.

Furthermore, because we cannot be positive that each employee's sense of communication, trust, and productivity is totally in line with reality, our technique for assessing these characteristics has a restriction. Furthermore, these variables may be measured using a variety of metrics. As a result, the findings of this study can only be used as a partial reflection of our requirements.

Also, it should be noted that the corona pandemic may be a research restriction since it may impair employees' mental health and daily lives, which might have a detrimental impact on productivity (Kazekami, 2020).

When it comes to the evaluation of the CSCW tools there are three main difficulties: logistical challenges in data collection, a great number of complicated variables to examine, and a focus on work practice re-engineering. Despite the fact that these problems are unavoidable, the results chapter offers various solutions for reducing their impact.

Finally, our sample is relatively small and we cannot be certain about the accuracy of our results.

5. Conclusions

We have reached the end of our research and some useful conclusions have been extracted. Successful remote work can be accomplished through founded communication, diffused by trust that will lead to ultimate productivity. Extension of productivity and workload process are the software tools. Poor decision making in tool selection can damage communication and trust. This highlights the fine balance and fragile

relationships among all elements. Neglecting any of the above could cause a domino effect on a large or small scale.

To conclude, optimization margins exist on all core components of team management and collaborative distance working. Managers should take the initiative to conduct similar internal anonymous surveys to acknowledge their weaknesses. Thereafter, they can refer the reinforcing factors that are included in our analysis depending on their issue.

Ultimately, tools have a great significance in terms of team management and collaborative distance working but no profound method of selection was defined. There was not a large deviation among the attributes of vendor-provided and open-source software. Therefore, the selection could be based on isolated criteria on the grounds of further details like industry, project etc.

6. Future work

Remote work is here to stay and there are always optimization margins concerning values of team management and collaborative distance working as well as further pursuit of more appropriate software tools. The next step in the research should be a specialized business plan of a company adopting an ultimate remote work plan while being able to maintain corporate culture. The research should contain a detailed SWOT analysis both for employers and employees. Another topic of great interest would be the research of specific software to maximize functionality and minimize costs tailored for each industry. In order to discover the most appropriate tools, it would be highly suggested to conduct interviews with real time tests focused on the attributes of each tool.

BIBLIOGRHAPHY

1. "Advantages and Disadvantages of Telecommuting to Work".
2. "Coronavirus could cause fall in global CO2 emissions". The Guardian. Marc 10, 2020. Retrieved November 25, 2021.
3. "Homeworking: helping businesses cut costs and reduce their carbon footprint". The Carbon Trust. Retrieved November 25, 2021.

4. "Locking-down instituted practices: Understanding sustainability in the context of 'domestic' consumption in the remaking". *Journal of Consumer Culture*: 1–19.
5. "[Mobile Worker Toolkit: A Notional Guide](#)" (PDF). GSA Enterprise Transformation. GSA. 2011. Archived from [the original](#) (PDF) on September 26, 2012. Retrieved November 25, 2021.
6. "[Remote working is here to stay - 2013 Regus Global Economic Indicator](#)". di-ve. Digital Interactive Limited. September 11, 2013. Retrieved November 25, 2021.
7. "Telework works: A Compendium of Success Stories". U.S. Office of Personnel Management, Office of Merit Systems Oversight and Effectiveness. October 15, 2001. Retrieved November 25, 2021.
8. "[What is telework?](#)", Frequently Asked Questions, [United States Office of Personnel Management](#), Retrieved November 25, 2021.
9. "Why Telecommuting is Good For Business". OnlineMBA.com. September 22, 2020. Retrieved November 25, 2021.
10. Aamodt, Michael (January 2015). "Industrial/Organizational Psychology an Applied Approach" (8 ed.). *Cengage learning*. p. 483.
11. Alsharo M, Gregg D, Ramirez R (2017) "Virtual team effectiveness: the role of knowledge sharing and trust". *Inf Manag* 54(4):479–490.
12. Armstrong DJ, Cole P (1995) "Managing distances and differences in geographically distributed work groups". In: Jackson SE, Ruderman MN (eds) Diversity in work teams: research paradigms for a changing workplace. *American Psychological Association*, pp 187–215.
Available from: <https://www.youtube.com/watch?v=1KxJop0A0vA>
13. Azasu, Babatunde (2020). "Open-ended: Office space and remote working in the age of COVID-19". *Journal of Property Management*. 85: 34.
14. Bailey, D. E.; Kurland, N. B. (2002). "A review of telework research: findings, new directions, and lessons for the study of modern work". *Journal of Organizational Behavior*. **23** (4): 383–400.
15. Baruch Y., (2002). "Teleworking: benefits and pitfalls as perceived by professionals and managers". *New Technology, Work and Employment* Volume 15, Issue 1 p. 34-49
16. Battin RD, Crocker R, Kreidler J, Subramanian K (2001). "Leveraging resources in global software development". *IEEE Softw*. 18(2):70–77.
17. Berry GR (2011). "Enhancing effectiveness on virtual teams: understanding why traditional team skills are insufficient". *J Bus Commun* (1973) 48(2):186–206.
18. Bordia, P. (1997). "Face-to-face versus computer-mediated communication: A synthesis of the experimental literature". *Journal of Business Communication*. 34: 99–120.

19. Bos N, Olson J, Gergle D, Olson G, Wright Z (2002). "Effects of four computer-mediated communications channels on trust development". In: *Proceedings the of CHI'02. ACM, New York*, pp 135–140.
20. Bradner E, Mark G (2002). "Why distance matters: effects on cooperation, persuasion and deception". In: *Proceedings of CSCW'02. ACM, New York, CSCW'02*, pp 226–235.
21. Breuer C, Hóffmeier J, Hertel G (2016). "Does trust matter more in virtual teams? A meta-analysis of trust and team effectiveness considering virtuality and documentation as moderators". *Journal of Applied Psychology* 101(8):1151–1163.
22. Business Dictionary. Team Management. [Online]. [Accessed 25 November 2021]. Available from: <https://www.businessdictionary.com/definition/team-management.html>
23. Business Horizons Organizational Behavior, eighth edition, McGraw-Hill "Common Disadvantages of Telecommuting". www.brighthub.com. Retrieved November 25, 2021.
24. Carstensen, P.H.; Schmidt, K. (1999). "[Computer-supported cooperative work: new challenges to systems design](#)". Retrieved November 25, 2021.
25. Choi OK, Cho E (2019). "The mechanism of trust affecting collaboration in virtual teams and the moderating roles of the culture of autonomy and task complexity". *Comput. Hum. Behav.* 91:305–315.
26. Crisp CB, Jarvenpaa SL (2013). "Swift trust in global virtual teams: trusting beliefs and normative actions". *J Pers Psychol* 12(1):45–48.
27. Cummings L, Bromiley P (1996). "The organizational trust inventory (OTI): development and validation". In: Kramer RM, Tyler TR (eds) *Trust in organizations: frontiers of theory and research. Sage, Thousand Oaks*, pp 302–330.
28. Dubé L, Robey D (2009). "Surviving the paradoxes of virtual teamwork". *ISJ* 19(1):3–30.
29. Egerfalk PJ, Fitzgerald B, Holmstrom Olsson H, Lings B, Lundell B, Conchür E (2005). "A framework for considering opportunities and threats in distributed software development". In: *Proceedings of the of DiSD'05. Austrian Computer Society*, pp 47–61
30. Ellison, Nicole B. (2004). "Telework and Social Change: how technology is reshaping the boundaries between home and work". *Westport, Connecticut: Praeger*, p. 18.
31. Espinosa JA, Carmel E (2004). "The effect of time separation on coordination costs in global software teams: a dyad model". In: *Proceedings of HICSS'04. IEEE, New York*, p. 10.
32. EY Global, "Why remote working is the way forward", https://www.ey.com/en_gl/alliances/why-remote-working-is-the-way-forward, Accessed on 25/11/2021.
33. Ferrell JZ, Herb KC (2012). "Improving communication in virtual teams". pp 1–7 <https://www.siop.org/Research-Publications/SIOP-White-Papers>

34. Gajendran, Ravi S.; Harrison, David A. (2007). "The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences". *Journal of Applied Psychology*. 92 (6): 1524–1541.
35. Gibson CB, Gibbs JL (2006). "Unpacking the concept of virtuality: the effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on team innovation". *Adm. Sci. Q.* 51(3):451–495.
36. Gibson CB, Huang L, Kirkman BL, Shapiro DL (2014). "Where global and virtual meet: the value of examining the intersection of these elements in twenty-first-century teams". *Annual Review Organizational Psychology Organizational Behavior*. 1(1):217–244
37. Golden, T. D. (2006). "Avoiding depletion in virtual work: Telework and the intervening impact of work exhaustion on commitment and turnover intentions". *Journal of Vocational Behavior*. 69: 176–187.
38. Golden, T. D.; Veiga, J. F. (2005). "The impact of extent of telecommuting on job satisfaction: Resolving inconsistent findings." *Journal of Management*. 31 (2): 301–318.
39. Golden, T. D.; Veiga, J. F.; Dino, R. N. (2008). "The impact of professional isolation on teleworker job performance and turnover intentions: Does time spent teleworking, interacting face-to-face, or having access to communication-enhancing technology matter?". *Journal of Applied Psychology*. **93** (6): 1412–1421.
40. Gray, C. Team vs Individual Performance Appraisals.[Online]. [Accessed 25 November 2021]. Available from: <https://smallbusiness.chron.com/team-vs-individual-performance-appraisals-20040.html>
41. Harpelund, Christian (2019). "Onboarding: Getting New Hires off to a Flying Start." *Emerald Publishing Limited*.
42. Herbsleb JD, Grinter RE (1999). "Splitting the organization and integrating the code: Conway's law revisited". In: *Proceedings of ICSE '99. IEEE, New York*, pp 85–95
43. Herbsleb JD, Mockus A (2003). "An empirical study of speed and communication in globally distributed software development". *IEEE Trans Softw. Eng.* 29(6):481–494
44. Hill, J. E.; Miller, B. C.; Weiner, S. P.; Colihan, J. (1998). "Influences of the virtual office on aspects of work and work/life balance". *Personnel Psychology*. 51 (3): 667–683.
45. Holmes, T.; Lord, C.; Ellsworth-Krebs, K. (2021). "[Examining the Impact of Social Media Use on Project Management Performance: Evidence from Construction Projects in China](#)". *Journal of Construction Engineering and Management*. **147** (3).
46. Holmstrom H, Conchúir EO, Agerfalk J, Fitzgerald B (2006) "Global software development challenges: a case study on temporal, geographical and socio-cultural distance". In: *Proceedings of ICGSE '06. IEEE, New York*, pp 3–11

47. Hook, A.; Sovacool, B. K.; Sorrell, S. (2020). "A systematic review of the energy and climate impacts of teleworking". *Environmental Research Letters*. 15 (9): 1–31.
48. Human Resource Development Quarterly. 2008. Defining Team Roles and Responsibilities. [Instructor Guide]. Pennsylvania: Human Resource Development Quarterly.
49. IESE Business School. 2011. Patrick Lencioni: The Four Traits of Healthy Teams. [Online]. [Accessed 15 October 2014].
50. Ilozor, D. B.; Ilozor, B. D.; Carr, J. (2001). "Management communication strategies determine job satisfaction in telecommuting". *Journal of Management Development*. 20 (6): 495–507.
51. Jarvenpaa SL, Leidner DE (1998) "Communication and trust in global virtual teams". *JCMC* 3(4):791–815
52. Jarvenpaa SL, Shaw TR, Staples DS (2004) "Toward contextualized theories of trust: the role of trust in global virtual teams". *Inf. Syst. Res.* 15(3):250–267
53. Kanawattanachai P, Yoo Y (2002) "Dynamic nature of trust in virtual teams". *J. Strategy Inf. Syst.* 11(3–4):187–213
54. Kiel L (2003) "Experiences in distributed development: a case study". In: Proceedings of international workshop on global software development at ICSE'03
55. Kiesler S, Cummings JN (2002). "What do we know about proximity and distance in work groups? A legacy of research". In: Distributed work, vol 1. MIT Press, Cambridge, pp 57–80
56. Kotlarsky J, Oshri I (2005) Social ties, knowledge sharing and successful collaboration in globally distributed system development projects. *Eur J Inf Syst* 14(1):37–48
57. Kraut, R.E.; Fussell, S. R.; Brennan, S. E.; Siegel, J (2002). Hinds, P.; Kiesler, S. (eds.). "Understanding effects of proximity on collaboration: Implications for technologies to support remote collaborative work". Distributed Work.
58. Kuo Fy, Yu Cp (2009) "An exploratory study of trust dynamics in work-oriented virtual teams". *J. Comput. Med. Commun.* 14(4):823–854.
59. Lencioni, P. 2002. "*The Five Dysfunctions of a Team*". John Wiley & Sons.
60. Lowry PB, Zhang D, Zhou L, Fu X (2010) "Effects of culture, social presence, and group composition on trust in technology-supported decision-making groups". *Inf. Syst. Journal* 20(3):297–315 155.
61. Lund S., Madgavkar A., Manyika J., Smit S., (Nov. 2020), "What's ext for remote work: An analysis of 20000 tasks, 800 jobs, and nine countries", <https://www.mckinsey.com/featured-insights/future-of-work/whats-next-for-remote-work-an-analysis-of-2000-tasks-800-jobs-and-nine-countries>, McKinsey & Co Risk Insights, Accessed on 25/11/2021.

62. Marlow SL, Lacerenza CN, Salas E (2017) "Communication in virtual teams: a conceptual framework and research agenda". *Human Resources Management Review* 27(4):575–589
63. Maruping LM, Agarwal R (2004) Managing team interpersonal processes through technology: a task-technology fit perspective. *Journal of Applied Psychology* 89(6):975.
64. Matt Rosenberg (September 26, 2007). "Slow But Steady Telework Revolution". Cascadia Prospectus. Retrieved November 25, 2021.
65. Newman SA, Ford RC, Marshall GW (2019). "Virtual team leader communication: employee perception and organizational reality". *Int. J. Bus. Commun.*
66. O'Leary MB, Mortensen M (2010). "Go (con) figure: subgroups, imbalance, and isolates in geographically dispersed teams". *Organ. Sci.* 21(1):115–131
67. Olson JS, Olson GM (2006). "Bridging distance: empirical studies of distributed teams". *In: Proceedings of human factors in MIS'06*, vol 2, pp 27–30.
68. Olson, J.S.; Olson, G.M. (1999). "Computer-supported cooperative work". In F.T. Durso; R.S. Nickerson; R.W. Schvaneveldt; S.T. Dumais; D.S. Lindsay; M.T.H Chi (eds.). *Handbook of Applied Cognition*. pp. 409–442.
69. Pliskin, N. (1998). "Explaining the paradox of telecommuting", para. 5 [Electronic version].
70. R. Kelly Garrett; James N. Danziger (2007). "Which Telework? Defining and Testing a Taxonomy of Technology-Mediated Work at a Distance". *Social Science Computer Review*. 25: 27–47.
71. Reinhard, W.; Schweitzer, J.; Volksen, G.; Weber, M. (May 1994). "CSCW tools: concepts and architectures". *Computer*. 27 (5): 28–36.
72. Robert LP, Denis AR, Hung YTC (2009). "Individual swift trust and knowledge-based trust in face-to-face and virtual team members". *J. Manag. Inf. Syst.* 26(2):241–279
73. Sardeshmukh, Shruti R.; Sharma, Dheeraj; Golden, Timothy D. (2012). "Impact of telework on exhaustion and job engagement: A job demands and job resources model". *New Technology, Work and Employment*. 27 (3): 193–207
74. Telework Research Network. "Telework Savings Calculator". undress4success.com. *Telework Research Network*. Retrieved November 25, 2021.
75. Tett, Gillian (June 3, 2021). "The empty office: what we lose when we work from home". *The Guardian*.
76. Thompson, L.F.; Coover, M. D. (2003). "Teamwork online: The effects of computer conferencing on perceived confusion, satisfaction, and post-discussion accuracy". *Group Dynamics: Theory, Research, and Practice*. 7 (2): 135–151.
77. Traxia Partners, Inc. *Discovering Your Team Leadership Style*. [Online]. Accessed on November 25, 2021. Available from: <http://www.traxiapartners.com/>

78. Treinen JJ, Miller-Frost SL (2006). “Following the sun: case studies in global software development”. *IBM J. Res. Dev.* 45(4):773–783 250.
79. Vincent K, Lawn J, Nicholls RJ, Scodanibbio L, Prakash A, (2019). “*Large-scale transdisciplinary collaboration for adaptation research: challenges and insights*”. *Glob. Chall.* 3(4):1700132.
80. Watson-Manheim MB, Chudoba KM, Crowston K (2002). “Discontinuities and continuities: a new way to understand virtual work”. *ITP* 15(3):191–209.
81. Wilson, P. (1991). “Computer Supported Cooperative Work: An Introduction. Springer Science & Business Media”.
82. Woody, Leonhard (1995). “The Underground Guide to Telecommuting”. Addison-Wesley.
83. Zolin R, Hinds PJ, Fruchter R, Levitt RE (2004) Interpersonal trust in cross-functional, geographically distributed work: a longitudinal study. *Inf Organ* 14(1):1–26

Appendix

Appendix A. Questionnaire

1) What is your gender?

- Male
- Female
- Prefer not to say

2) What is your group age?

- 18-26
- 27-35
- 36-44
- 45-53
- 53+)

3) Professional experience

- <1 year
- 1-3 years
- 4-10 years
- 11+ year

4) Type of Employment

- Freelancer
- Employee

5) In which industry do you work this moment?

- Technology (IT)
- Agriculture
- Commerce
- Construction

- Education
- Energy
- Finance
- Health
- Insurance
- Legal/Law
- Media
- Oil & Gas
- Public sector
- Telecommunication
- Transport
- Utilities (water, electricity, natural gas, etc.)
- Other_

6) Have you ever worked remotely?

- Yes (Skip to question 7)
- No (end of questionnaire)

7) Remote work experience

- <6 months
- 6 months to 1 year
- 1-2 years
- 2+ years

8) While you were working remotely, were you member of a team?

- Yes (Skip to question 9)
- No (Skip to question 19)

9) While working remotely, what was the degree of satisfaction as regards YOUR...

- Productivity (Very low, Low, Neutral, High, Very high)
- Trust to the team (Very low, Low, Neutral, High, Very high)
- Communication (Very low, Low, Neutral, High, Very high)

10) While working remotely, what was the degree of satisfaction as regards your COLLEAGUES' (both managers and team members)...

- Productivity (Very low, Low, Neutral, High, Very high)
- Trust to the team (Very low, Low, Neutral, High, Very high)
- Communication (Very low, Low, Neutral, High, Very high)

11) According to your opinion, which of the following factors can boost PRODUCTIVITY inside a virtual team? (Check all that apply)

- Better communication
- Digital tools & technology provided by the employer
- Employer's/manager's supportive actions
- Face-to-face team gatherings
- Feedback
- Home office equipment
- Mental & health support
- More trust
- OPTIONAL remote work
- Technical support
- Working hours flexibility

12) Write any additional factors that can boost PRODUCTIVITY.

- _____

13) According to your opinion, which of the following factors can boost TRUST inside a virtual team? (Check all that apply)

- Accountability
- Appraisals
- Employer's/manager's supportive actions
- Established mission statement
- Established shared goals
- Face-to-face team gatherings
- Feedback

- Mental & health support
- OPTIONAL remote work
- Technical support
- Vulnerability
- Working-hours flexibility

14) According to your opinion, which of the following factors can boost TRUST

- _____

15) According to your opinion, which of the following factors can boost COMMUNICATION inside a virtual team?

- Accountability
- Appraisals
- Digital tools & technology provided by the employer
- Employer's/manager's supportive actions
- Established mission statement
- Established shared goals
- Face-to-face team gatherings
- Feedback
- Home office equipment
- Mental & health support
- OPTIONAL remote work
- Technical support
- Vulnerability
- Working-hours flexibility

16) Write any additional factors that can boost COMMUNICATION

- _____

17) According to your opinion, what is the ideal remote work frequency

- no remote work at all
- once a week

- twice a week
- three days a week
- 4 days a week
- 5 days a week
- Complete flexibility

18) How was your overall distance working experience?

- Positive
- Neutral
- Negative

19) Which of the following software tools have you used while you were working remotely?

(Please select all the software tools used)

- Adobe
- Microsoft Office
- Microsoft Outlook
- Microsoft Teams
- Salesforce
- SAP
- Skype
- Slack
- Webex
- Zoom

20) Rate the vendor-provided software tool in terms of the following attributes (Very low,

Low, Neutral, High, Very high)

- Functionality
- Cost
- Support
- Reliability
- Performance
- Scalability (ability of software to manage lots of data)

- Usability (quality of interface)
- Maintenance
- Security
- Flexibility
- Interoperability (the product functions properly together with others)

21) Have you ever used an Open-Source Software?

In case you are not familiar with the term, according to Wiki, "Open-source software (OSS) is computer software that is released under a license in which the copyright holder grants users the rights to use, study, change, and distribute the software and its source code to anyone and for any purpose. Open-source software may be developed in a collaborative public manner. Open-source software is a prominent example of open collaboration, meaning any capable user is able to participate online in development, making the number of possible contributors' indefinite. The ability to examine the code facilitates public trust in the software". Examples of OSS tools: Signal, Open Office, etc.

- Yes (Skip to question 24)
- No (Skip to question 22)

22) According to the previous short description of OSS, how possible is for you to use an OSS in the future?

- Likert Scale 1 to 10 (Very Unlikely to Very Likely)

23) How much important would be the following factors to decide whether or not you work with an OSS software? (Not important at all, Less important, Neutral, Important, Very important) (Skip to question 26)

- Functionality
- Cost
- Support
- Reliability
- Performance
- Scalability (ability of software to manage lots of data)

- Usability (quality of interface)
- Maintenance
- Security
- Flexibility
- Interoperability (the product functions properly together with others)

24) Which of the following OSS did you use while you were working remotely?

- Mozilla Thunderbird
- Element (formerly Riot)
- Jitsi Meet
- Apache OpenMeetings
- Rocket.Chat
- Signal
- Open Office
- SumatraPDF
- SugarCRM
- CiviCRM

25) Rate the chosen OSS tool in terms of the following attributes. (Very low, Low, Neutral, High, Very high)

- Functionality
- Cost
- Support
- Reliability
- Performance
- Scalability (ability of software to manage lots of data)
- Usability (quality of interface)
- Maintenance
- Security
- Flexibility
- Interoperability (the product functions properly together with others)

26) How was your overall experience with digital software tools?

- Positive
- Neutral
- Negative

Appendix B. Statistical Analysis

			Correlations					
			YOUR productivity	YOUR trust to the team	YOUR communi- cation	COLLEAGUES' productivity	COLLEAGUES' trust to the team	COLLEAGUES' communi- cation
Spearman's rho	YOUR productivity	Correlation Coefficient	1.000	.205	.316**	.493**	.298*	.164
		Sig. (2-tailed)	.	.099	.010	<.001	.015	.189
		N	66	66	66	66	66	66
	YOUR trust to the team	Correlation Coefficient	.205	1.000	.453**	.392**	.697**	.460**
		Sig. (2-tailed)	.099	.	<.001	.001	<.001	<.001
		N	66	66	66	66	66	66
	YOUR communication	Correlation Coefficient	.316**	.453**	1.000	.153	.414**	.649**
		Sig. (2-tailed)	.010	<.001	.	.219	<.001	<.001
		N	66	66	66	66	66	66
	COLLEAGUES' productivity	Correlation Coefficient	.493**	.392**	.153	1.000	.413**	.333**
		Sig. (2-tailed)	<.001	.001	.219	.	<.001	.006
		N	66	66	66	66	66	66
	COLLEAGUES' trust to the team	Correlation Coefficient	.298*	.697**	.414**	.413**	1.000	.489**
		Sig. (2-tailed)	.015	<.001	<.001	<.001	.	<.001
		N	66	66	66	66	66	66
	COLLEAGUES' communication	Correlation Coefficient	.164	.460**	.649**	.333**	.489**	1.000
		Sig. (2-tailed)	.189	<.001	<.001	.006	<.001	.
		N	66	66	66	66	66	66

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Correlations

			Professional _experience	your_produc tivity	your_commu nication
Spearman's rho	Professional_exp erience	Correlation Coefficient	1.000	.313*	.256*
		Sig. (2-tailed)	.	.011	.038
		N	70	66	66
	your_productivity	Correlation Coefficient	.313*	1.000	.316**
		Sig. (2-tailed)	.011	.	.010
		N	66	66	66
	your_communicat ion	Correlation Coefficient	.256*	.316**	1.000
		Sig. (2-tailed)	.038	.010	.
		N	66	66	66

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

			your_tru st	colleagues_t rust	Vendor_Usa bility
Spearman's rho	your_trust	Correlation Coefficient	1.000	.697**	.244*
		Sig. (2-tailed)	.	<.001	.048
		N	66	66	66
	colleagues_tr ust	Correlation Coefficient	.697**	1.000	.273*
		Sig. (2-tailed)	<.001	.	.027
		N	66	66	66
	Vendor_Usabi lity	Correlation Coefficient	.244*	.273*	1.000
		Sig. (2-tailed)	.048	.027	.
		N	66	66	70

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

			Remote_ experienc e	Remote_fre quency	Distance_wo rk_overall_e xperience
Spearman's rho	Remote_ experience	Correlation Coefficient	1.000	.243*	.269*
		Sig. (2-tailed)	.	.050	.029
		N	66	66	66
	Remote_frequen cy	Correlation Coefficient	.243*	1.000	.362**
		Sig. (2-tailed)	.050	.	.003
		N	66	66	66
	Distance_work_ overall_experien ce	Correlation Coefficient	.269*	.362**	1.000
		Sig. (2-tailed)	.029	.003	.
		N	66	66	66

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

			OSS_Secur ity	your_tru st	your_commu nication	colleagues_ ommunicati on
Spearman's rho	OSS_Security	Correlation Coefficient	1.000	.471*	.517**	.43
		Sig. (2-tailed)	.	.020	.010	.03
		N	25	24	24	2
	your_trust	Correlation Coefficient	.471*	1.000	.453**	.460**
		Sig. (2-tailed)	.020	.	<.001	<.001
		N	24	66	66	6
	your_communication	Correlation Coefficient	.517**	.453**	1.000	.649**
		Sig. (2-tailed)	.010	<.001	.	<.001
		N	24	66	66	6
	colleagues_communication	Correlation Coefficient	.437*	.460**	.649**	1.000
		Sig. (2-tailed)	.033	<.001	<.001	.
		N	24	66	66	6

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

			your_tru st	your_comm unication	colleagues_ trust	colleagues_ communicat ion	Vendor Performance
Spearman's rho	your_trust	Correlation Coefficient	1.000	.453**	.697**	.460**	
		Sig. (2-tailed)	.	<.001	<.001	<.001	
		N	66	66	66	66	
	your_communication	Correlation Coefficient	.453**	1.000	.414**	.649**	
		Sig. (2-tailed)	<.001	.	<.001	<.001	
		N	66	66	66	66	
	colleagues_trust	Correlation Coefficient	.697**	.414**	1.000	.489**	
		Sig. (2-tailed)	<.001	<.001	.	<.001	
		N	66	66	66	66	
	colleagues_communication	Correlation Coefficient	.460**	.649**	.489**	1.000	
		Sig. (2-tailed)	<.001	<.001	<.001	.	
		N	66	66	66	66	
Vendor_Performance	Correlation Coefficient	.256*	.357**	.255*	.283*		
	Sig. (2-tailed)	.038	.003	.039	.022		
	N	66	66	66	66		

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

			Distance_ work_over all_experie nce	your_prod uctivity	your_com munication	colleagues _productivi ty	colleagues _communi cation
Spearman's rho	Distance_work_overall_experience	Correlation Coefficient	1.000	.392**	.248*	.319**	.334**
		Sig. (2-tailed)	.	.001	.045	.009	.006
		N	66	66	66	66	66
	your_productivity	Correlation Coefficient	.392**	1.000	.316**	.493**	.164
		Sig. (2-tailed)	.001	.	.010	<.001	.189
		N	66	66	66	66	66
	your_communication	Correlation Coefficient	.248*	.316**	1.000	.153	.649**
		Sig. (2-tailed)	.045	.010	.	.219	<.001
		N	66	66	66	66	66
	colleagues_productivity	Correlation Coefficient	.319**	.493**	.153	1.000	.333**
		Sig. (2-tailed)	.009	<.001	.219	.	.006
		N	66	66	66	66	66
	colleagues_communication	Correlation Coefficient	.334**	.164	.649**	.333**	1.000
		Sig. (2-tailed)	.006	.189	<.001	.006	.
		N	66	66	66	66	66

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Correlations

			Professional_ xp	Vendor_Co st	Vendor_Secu rity	OSS_Co st	OSS
Spearman's rho	Professional_xp	Correlation Coefficient	1.000	.310**	.359**	.463*	
		Sig. (2-tailed)	.	.009	.002	.020	
		N	70	70	70	25	
	Vendor_Cost	Correlation Coefficient	.310**	1.000	.185	.054	
		Sig. (2-tailed)	.009	.	.126	.797	
		N	70	70	70	25	
	Vendor_Security	Correlation Coefficient	.359**	.185	1.000	.354	
		Sig. (2-tailed)	.002	.126	.	.082	
		N	70	70	70	25	
	OSS_Cost	Correlation Coefficient	.463*	.054	.354	1.000	
		Sig. (2-tailed)	.020	.797	.082	.	
		N	25	25	25	25	
	OSS_Security	Correlation Coefficient	.458*	.184	.323	.256	
		Sig. (2-tailed)	.021	.378	.115	.216	
		N	25	25	25	25	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Correlations

			Digital_tools_ experience	Industry	OSS_Perfor mance	OSS_Usabili ty
Spearman's rho	Digital_tools_experie nce	Correlation Coefficient	1.000	.254*	.452*	.457*
		Sig. (2-tailed)	.	.034	.023	.022
		N	70	70	25	25
	Industry	Correlation Coefficient	.254*	1.000	.273	.081
		Sig. (2-tailed)	.034	.	.186	.701
		N	70	70	25	25
	OSS_Performance	Correlation Coefficient	.452*	.273	1.000	.748**
		Sig. (2-tailed)	.023	.186	.	<.001
		N	25	25	25	25
	OSS_Usability	Correlation Coefficient	.457*	-.081	.748**	1.000
		Sig. (2-tailed)	.022	.701	<.001	.
		N	25	25	25	25

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).