

The Effect of Remote Work on the Successful Development of Engineering Companies

Anna Evgenievna Gorokhova¹; Elman Said-Mokhmadovich Akhyadov²;
Andrey Nikolaevich Shishkin³

¹Moscow Polytechnic University, Moscow, Russia.

²Chechen State University, Grozny, Russia.

³Tula State Lev Tolstoy Pedagogical University, Tula, Russia.

Abstract

The purpose of the present study is to identify the main advantages and problems of remote work for both employers and employees, and possible ways to solve them.

The article shows a significant number of studies dealt with non-standard forms of labor organization, clarifies the essence of remote work, and examines the main aspects for its effective organization. The main advantages and problems of remote work for employers and employees, as well as possible ways to solve them, are identified based on an expert survey involving 36 experts.

According to the conducted study, it can be concluded that the acceleration of scientific and technological progress and adverse epidemiological conditions contribute to the spread of remote work worldwide. This phenomenon has two aspects. On the one hand, remote work, firstly, reduces the unemployment rate and improves the image of the company; secondly, offers flexible working hours; thirdly, protects/retains customers and saves time/transport costs. On the other hand, remote work is associated with the difficulty in maintaining efficiency and teamwork at a high level; secondly, it restricts communication, makes it impossible to perform certain tasks at home; and thirdly, remote work leads to insufficient physical activity, causes difficulties with integration into the corporate culture, etc.

Key-words: COVID-19 Pandemic, Remote Employment, Remote Work, Employer, Employee.

1. Introduction

The socio-economic problems caused by the COVID-19 coronavirus pandemic actualize the need to find new forms of organizing the work of personnel. Humanity is forced to transform its life, adapt to new requirements, and learn to quickly adapt to atypical realities. Mitigating the negative manifestations of this problem could be achieved through the wider implementation of remote work.

This increases the relevance of studying the remote form of work, and its impact on the macro- and micro-economic indicators of enterprises and organizations; as well as prevention and elimination of possible negative aspects.

The urgency of this problem is noted in numerous studies, according to which approximately 68% of the global workforce, including 81% of employers, live in those countries where recommendations or requirements for closing enterprises currently apply (Davies, 2021).

It should be noted that remote work has become more common in the last decade. By the time of the COVID-19 pandemic, researchers estimate that only 8% of the world's workforce, or roughly 260 million people, were permanently working at home. For EU countries, the proportion of remote workers aged 15-64 was only slightly more than 5% in 2019 and has remained so for the past decade. At that, in the USA, the number of employees working home-based has grown by 115% and reached 2.8% of all employed Americans (3.9 million people) over the past 10 years (Delanoetje, Verbruggen and Germeys, 2019).

2. Literature Review

A fairly large number of scientific studies directly or indirectly analyze certain socio-economic aspects of non-standard forms of labor organization (Fonner and Roloff, 2010; Felstead and Henseke, 2017; Goncharov *et al.*, 2020). The majority of publications concern the socio-economic consequences of various forms of labor organization such as remote work, flexible working hours, etc. (Martin and MacDonnell, 2012; Vasilyeva and Shuraleva, 2015; Dudin *et al.*, 2019; Poddubnaya *et al.*, 2021). It is also worth noting that there are different opinions on the definition of concepts such as remote work (Table 1).

Table 1 - Definition of the Concept of Remote Work

Source	Definition
Prokushev and Prokusheva, 2014	Remote work is a non-standard form of employment, based on flexible social and labor relations between the employee and the employer, which takes place in a virtual environment using information and communication technologies
Zakalyuzhnaya, 2015	Remote work is the work of an organization's employee outside the office using electronic communication means
Greer and Payne, 2014	The nature of remote work is that using information and communication technologies the work is moved away from the premises of the employer (this concerns at least 20% of the working time)
Tremblay and Thomsin, 2012	Remote work is based on the removal of the employee from the traditional workplace, flexible working hours, the use of information and telecommunication technologies as the basis of institutional relations
Kelliher and Anderson, 2010	Remote work is flexible ability to work in an area located outside the usual workplace
Wheatley, 2012	Remote work a kind of labor activity that is carried out in a location remote from the central office, which excludes the face-to-face communication of the employee with management and colleagues

To one degree or another, the issue of remote work has been raised in the works of scientists in various fields of knowledge. In particular, E.V. Chichina (2004) considered methodological and practical problems of the development of non-standard flexible forms of employment, determined the specifics of the manifestation of non-standard forms of employment resulted from the spread of the latest information and communication technologies, and justified institutional approaches to the regulation of non-standard flexible types of employment in the national labor market. T. Hartig, C. Kylin and G. Johansson (2007) identified the current trends in the emergence of new forms of employment that occur under the impact of innovative and globalizing processes, and transformational processes in the field of employment that affect the social and labor sphere, change the structure and content of social and labor relations.

Studies (Ushakov, Vinichenko and Frolova, 2018; Golden and Gajendran, 2019; Belzunegui-Eraso and Erro-Garces, 2020; Dudin *et al.*, 2020) indicate that during the pandemic, many office-based workers switched to remote work. At that, many of the employees (Delanoeyje and Verbruggen, 2020; Wang *et al.*, 2021) and employers are ready to continue working remotely or in a mixed-mode (Reuschke and Felstead, 2020). Researchers have identified both the main advantages of remote work (the ability to work from anywhere (Gallacher and Hossain, 2020), flexible working hours (Carnevale and Hatak, 2020), saving transport costs (Dubey and Tripathi, 2020)) and disadvantages (unauthorized access to corporate information, and data leakage (Kazekami, 2020)).

Despite numerous studies and useful suggestions, the need to re-examine the phenomenon of remote work and consider in more detail its advantages and problems still is an urgent issue, as well as the relevance of remote work in the context of the pandemic still ongoing in many countries.

The research hypothesis: the spread of remote work worldwide is characterized by two opposite aspects, creating both advantages and problems for employers and employees.

Research objectives: 1. To determine the main advantages of remote work during quarantine measures; 2. To identify the main problems of remote work and possible ways to solve them.

The article consists of an introduction, a literature review, research methods, research results, discussion, and conclusion.

3. Methods

Research Design

To solve the tasks set in the study, a qualitative analysis of modern trends in the remote work organization was carried out, and the following set of theoretical and empirical research methods was determined:

- Analysis, synthesis, comparison, and generalization methods, used in the study of scientific literature, sociological research on the state of the problem under study;
- The expert survey method, employed to determine the advantages and problems of remote work with their subsequent characteristics.

The experts were asked to respond voluntarily to the questions of the semi-formalized questionnaire. Based on the expert survey method, the main advantages and problems of remote work for both employers and employees are identified, as well as possible ways to solve them.

Research Tools and Procedure

The survey involved 36 experts from managers and employees of engineering and commercial companies whose personnel were forced to switch to remote work during the period of quarantine measures.

All participants were warned about the purpose of the survey and the planned publication of the results of the study in a generalized form.

Statistical Analysis

In the course of mathematical processing of the research results, the percentage of expert mentions of the advantages and problems of remote work was determined for their subsequent ranking, as well as the ways of their possible solutions.

The ranking of the entire set of remote work advantages/problems mentioned by experts was based on their ordering by each of the experts according to their decreasing preference. At that, each of the advantages/problems were assessed by the rank (number) under which they were listed in the sequence. The final rank of advantage/problem was the arithmetic mean of all the expert ranks in the expert sample.

With an acceptable probability of expert evaluation error (5%), the required number of experts ($N = 0.5 \cdot (3/b + 5)$, where b is the acceptable probability of expert evaluation error as a percentage/100) was 33 people.

4. Results

During the survey, it turned out that the shift of company employees to remote work, especially during quarantine measures, has its advantages both for the organization the employees (Table 2).

Table 2 - The Main Advantages of Remote Work during Quarantine Measures

Advantages	%*	Rank
For the employer and the organization:		
1. Switching to remote employment, instead of, for example, providing leave without pay or even dismissing part of employees, significantly improves the image of the company and the loyal attitude of employees	83.3	1
2. Protecting and retaining customers	80.6	2
3. Taking care of the employees' health and, as a result, reducing cases of illness, increasing the capacity for labor, and, consequently, the efficiency of personnel	77.8	3
4. Remote teams can be created in different compositions and sizes	69.4	4
5. Reducing the number of labor misconduct (unauthorized leave, etc.);	66.7	5
7. Remote work saves the costs of maintaining the office and the employee's workplace (in particular, utilities, computer equipment maintenance costs), and the like	61.1	6
For the employee:		
1. Ability to organize a flexible work schedule	86.1	1
2. Saving time and transport costs for home-to-office trips	80.6	2
3. Opportunity to combine the performance of professional and domestic duties	72.2	3
4. Ability not to comply with some corporate requirements (for example, dress code), etc.	69.4	4
5. Significantly reducing conflicts with the team and management	52.8	5

Note: compiled based on an expert survey; * – the percentage of expert mentions

At the first glance, when switching to remote work, there should be no problems in the teamwork, since teams are already formed, and regardless of where they work, they should continue to work well. However, as experts note, in practice remote working intercommunications can differ significantly from those in the office, causing certain problems (Table 3).

Table 3 - The Main Problems Associated with Remote Work and Possible Ways to Solve them

Problem	%*	Rank	A possible solution to the problem
For employer and organization:			
1. Supporting high-level performance and teamworking	86.1	1	Creating common goals, interest in working together
			Promoting transparency of actions at all levels and demonstrating benefits for employees
			Training both managers and employees in communication and coordination methods in the virtual environment
			Promoting trust among all employees
2. Remote monitoring of work, managing the work-life balance, integrating these two aspects	75.0	2	Creating a centralized communication system
			Using special platforms to organize and ordering the work of the team; structuring the information and discussions of the team using thematic channels (for example, Trello, Asana, Twist, etc.)
			Checking and providing systematic recommendations on all issues of the team (the frequency depends on the specific situation, but preferably it should be done daily).
			Setting corporate standards for working from home and providing assistance to remote employees in balancing their professional and personal life
For employee:			
1. Overwork (continuous working hours, holding too many online meetings)	83.3	1	Setting the correct working schedule
			Organizing workspace
			Avoiding multitasking: setting a particular goal for a certain period and focusing on achieving it
			Avoiding any distractions
2. Insufficient physical activity (immobility during work)	72.2	2	Allocating special time in working schedule for systematic physical training
			Performing special exercises during work that do not require immobility and increased attention; trying to stand when possible, rather than sit
3. Certain social isolation (feeling isolated, insufficient group communication with colleagues)	69.4	3	Getting acquainted with all the team members
			Participating in group meetings to create a social connection between employees
			Be a reliable and responsive team member
			Using a convenient communication platform for remote teams to communicate
4. Time problems due to working in different time zones	66.7	4	Using an integrated calendar where all team members can set their own specific availability time
			If possible, using special programs for asynchronous communication (for example, Doist), which allow compensating for the rejection of real-time conversations
5. Difficulties with integration into the corporate culture and being "visible" to management	61.1	5	Participating in shaping the corporate culture
			Participating in important team meetings and events to feel like a part of the team
			Using various technologies (for example, video conferencing) to communicate with colleagues
			Performing set tasks on time
6. Unexpected (specific) problems (lack of Internet access, etc.)	58.3	6	Considering emergency options and channels for transmitting and storing information

Note: compiled based on an expert survey; *percentage of expert mentions

5. Discussion

Available sociological studies (Golden and Gajendran, 2019) indicate that during the COVID-19 pandemic, more than 35% of workers shifted to work from home. The pandemic has triggered a long-overdue stage of technological and social experiments that significantly affect the future fate of office workers.

Therefore, today, employers and governments around the world are trying to determine how relevant remote work will be after the end of the pandemic. At that, the opinions of employees and business owners somewhat differ.

It should be noted that studies (Belzunegui-Eraso and Erro-Garces, 2020; Delanoeijs and Verbruggen, 2020; Wang *et al.*, 2021) prove that the majority of the surveyed employees and some employers are ready to continue working remotely or in a mixed-mode (several days working in the office, and several days – home-based). Although most of them admit that at first, they had to get used to remote work. Thus, according to the study (Belzunegui-Eraso and Erro-Garces, 2020), 82% of the surveyed office employees in 25 countries of the world expressed a desire to continue working from home one or two days a week after the complete abolition of quarantine measures. Another study came to similar conclusions, according to which six out of ten French people who have worked remotely want to continue working from home - regularly or in individual cases (Delanoeijs and Verbruggen, 2020). The results of a study conducted by representatives of the Japanese Labor Productivity Center have shown that more than 60% of employees surveyed would like to continue working remotely after the end of the pandemic (Wang *et al.*, 2021).

Part employers around the world have also evaluated the remote form of work, and plan to use it after the end of the pandemic. For example, according to the results of the study (Reuschke and Felstead, 2020), 54% of German companies that took part in the survey plan to use remote work more often after the end of the pandemic than before. At that, 75% of the survey participants noted that in recent months they have recommended their employees to work from home.

The results of sociological studies (Carnevale and Hatak, 2020; Gallacher and Hossain, 2020) also allowed determining the main advantages and disadvantages of remote employment. Thus, those who liked the home-based office, among the advantages, in addition to not having to spend time and money on transport, mention the ability to work from anywhere, to spend more time with the family, inclusiveness (more opportunities for people with special needs), flexibility in terms of working schedule, i.e. the ability to choose when to work during the day, as well as increased autonomy, motivation, and work performance, more comfortable working conditions, and reduced stress.

According to the results of an American study (Dubey and Tripathi, 2020), during the coronavirus pandemic, Americans saved \$ 91 billion. Thus, everyone who used to spend money on the way to the office and back saved an average of \$ 2 thousand on transport since mid-March. In addition, Americans save about \$ 183 million a day by reducing the number of trips to the gas station or the car-care center. As for business owners, they consider a reduction in the cost of renting an office and its maintenance the biggest advantage in remote work, as well as the ability to hire employees from other cities to work remotely, and greater work efficiency outside the usual format.

According to the interviewed experts, positive achievements should be used in the future, however without rejecting the negative aspects peculiar to remote work. Indeed, remote work has its drawbacks and can be a source of discomfort. For example, some employees feel more isolated, take fewer breaks, and complain that they have to work more, disrupt a work-life balance.

Among the negative aspects, experts named certain restrictions in the organization's activities, in particular, problems with documents, and the lack of the ability to visually track the work of employees. In addition, according to experts, the transition to remote work increases technological risks – from the leakage of confidential information to the loss of data and the availability of systems, since not all companies can provide employees with proper equipment, and employees are forced to work with home computers.

Thus, almost 40 Japanese companies that transferred some employees to remote work came across with unauthorized access to their servers, which led to a data leak. Among other things, the attackers gained access to the passwords of employees required for remote work. Among the suffered companies are those belonging to the pharmaceutical, energy, and automotive industries (Hitachi Chemical, Sumitomo Forestry, and others). Representatives of the government Cyber Security Center believe that over time, these companies may face not only the subsequent loss of confidential data but also the risk of infection of corporate servers with viruses (Kazekami, 2020).

However, the administrations of many Japanese corporations that have implemented a remote work format for their employees to ensure business continuity while maintaining people's health, have also concluded that even after the complete victory over the pandemic, remote work should not be abandoned. This will become one of the elements of the restructuring aimed at improving personnel management efficiency. Thus, the management of the Hitachi corporation reported that despite the lifting of the quarantine its employees will visit the office only once or twice a week. In addition, the company provides for payments to each employee of three thousand yen per month to compensate for the costs associated with home-based work. The Japanese company Fujitsu also

decided to permanently reduce the area of leased office space by 50% over the next three years, and transfer 80 thousand employees to remote operation. At the same time, the company's employees are provided with a payment of five thousand yen (about \$ 46) per month. It is expected that such encouragement will allow employees to organize the home workplace in the best possible way and quickly get used to the new format of performance of official duties (Kazekami, 2020).

Although experts predict an increase in the number of remote workers after the quarantine, they are confident that this practice will not become widespread. At the same time, the global companies that consider remote work as the most promising option for the development of labor relations in the context of the COVID-19 pandemic and other possible threats to the life and health of their employees, include leading technology giants such as Google, Microsoft, Apple, Samsung, etc. For example, Facebook is going to become a promising company in the field of organizing remote work. Facebook is considering remote work as part of its long-term strategy and plans to move up to 50% of its employees to remote work. The implementation of these plans will take from five to ten years. The social network is already looking for a director of remote work, who should develop a long-term remote work plan and lead the team during this period. Today, the social network employs 48 thousand people worldwide. The American company Twitter also allowed its employees to work at home after completion of the quarantine (globally almost five thousand people work currently remotely). At that, the company's management increased the allowance for working from home to \$ one thousand for all employees (Dingel and Neiman, 2020).

At that, some experts – company executives believe that a completely remote mode of operation is doomed to failure. They believe that after the pandemic, many companies will switch to a hybrid operation mode, namely, working in the office one or two weeks a month, or several days a week, because making important decisions or creative work requires personal presence. Only those who need to take care of young children will be able to work fully from home.

The interviewed experts are convinced that we are not talking about mass transfer to remote work in the near future. As one of the interviewed experts notes, "employers mostly want to see a person in the workplace, therefore the absolute majority plans to return to the standard mode of work". A similar opinion was expressed by another expert, noting that "the remote work format will only be expanding in the future, while the ideal work option will be a mixed version, or for example, remote work can become an incentive for those with better performance characteristics".

6. Conclusion

In the current context, the development of distance employment becomes possible for many reasons. First, at the present stage of high-tech development, the cost of computers and telecommunications is decreasing, while their power is increasing. Secondly, the latest technical means and services of open electronic networks, including the Internet, are spreading quite quickly. Third, the motivation of employers and employees to explore new opportunities to achieve success in a business or an individual project is gradually increasing.

The reality is that the interest in remote work among organizations and employees is growing, especially with the rapidly growing changes in remote communication technologies. The processes of digitalization, contemporary information technologies, and the computer experience of employees provide them with the opportunity to solve work tasks remotely. Consequently, one can expect an increase in the number of remote jobs in various organizations. At the same time, there are several problems in the management of personnel working in remote access mode. To make effective use of their capabilities and potential, more time should be devoted to the development of such employees.

Further scientific research can be associated primarily with improving the organizational support of remote work to minimize risks and threats to various aspects of social and labor relations.

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