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Gender Aspects of Digital Workplace Transformation



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ABSTRACT

COVID19 has accelerated the process of jobs' automation and digitalization in many sectors of the economy, which has increased the threat of decreasing employment for women and reducing their income. The article analyzes the gender structure of the employment and gender differences in wages of a service company based in the oil and gas industry. Two key areas of the company's personnel readiness for digital transformation have been identified: personnel restructuring area and personnel development area. It was revealed that most of the personnel of the oilfield service company under study is in the area of personnel restructuring, whose jobs will be subject to the greatest automation and will be eliminated. At the same time, some categories of women employees can be completely reduced (for example Accounting group, Bookkeeping and Payroll Clerks). In addition, in the personnel development zone, which will be less affected by automation, the wages of women are 3.4 times less than the wages of men. It is concluded that it is necessary to develop special corporate programs for professional training and retraining of women and special programs for personnel development, taking into account gender issues.

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Introduction

Achieving gender equality and empowering all women and girls is one of the 17 UN Sustainable Development Goals (The Sustainable Development Goals, 2021).

The World Economic Forum's Global Gender Gap Report 2020 showed that gender equality will not be achieved within 99.5 years. The Global Gender Gap Report assesses 153 countries' progress towards gender parity on four dimensions: economic participation and opportunity, access to education, health care and political participation. According to Global Gender Gap Report 2020, the top three ranking countries were Iceland (leader for 11 years in a row), Norway and Finland (World Economic Forum, Global Gender Gap Report 2020).

The WEF assessment showed that it takes the world 257 years to achieve gender parity in economic participation (compared to 202 in the 2019 Report). The Report identifies three main reasons for this state of affairs: women are more widely represented in automated workplaces; an insufficient number of women enter the professions in which the increase in wages is most noticeable; women face inadequate access to care infrastructure and access to capital. The report shows that the underrepresentation of women in new positions hinders the reduction of the gender gap. So, in cloud computing women make up only 12% of professionals, in engineering - 15%, Data and AI - 26% (World Economic Forum, 2020).

As a result of the COVID19 pandemic, gender inequality in automated workplaces is further exacerbated, and the proportion of women working in occupations where wage increases are most noticeable is decreasing compared to men. Harari has noted that in all societies known to us special importance is attached to gender hierarchy and literally everywhere men enjoy noticeable advantages (Harari, 2014).

The report of the World Economic Forum identifies the problem of women's participation in economic life as the most important issue, considered through the level of labour force participation, wage equality, total income for men and women, ratio in leadership positions, ratio in professional positions. Structural modernization of the economy based on

the principles of automation and digitalization, carried out without taking into account gender issues and gender inequality, can lead to the loss of economic security of entire countries and regions (Mingaleva & Gataullina, 2012; Radović Marković, et.al.2021). The extreme urgency of the problem of gender inequality for Russia is evident from the clearly expressed female character of Russian poverty.

Literature Review

Scientific studies devoted to the analysis of the reasons for the existence of the gender gap and forecasts of its elimination show that the processes occurring under the influence of the Fourth Industrial Revolution are superimposed on the modern gender gap. Both men and women can face special challenges in working life, which is likely to lead to their dismissal (Shoss, 2017). Kohlrausch and Weber have identified the main *“digitalization processes capable of overcoming or changing gendered work patterns. These include automation, the platform economy and the interactive processes by which a value is assigned to work”* (Kohlrausch & Weber, 2020, p.13).

Researchers note the growing fears that automation and new technologies will destroy large numbers of jobs for the middle class (Akst, 2013; Autor, 2015; Brynjolfsson & McAfee, 2014). Moreover, the results of modern research show that *“Technological change is perceived as most threatening in female-dominated occupations, particularly for women”* (Golsch & Seegers, 2021, p. 53).

The biggest challenges are seen in changing of demands for qualifications and increasing of work performance (Golsch & Seegers, 2021, p. 52), which will increase inequality in the workplace.

Erik Brynjolfsson and Andrew McAfee have defined the impact of automation on employment such as: *«...as computers get more powerful, companies have less need for some kinds of workers. Technological progress is going to leave behind some people..... there's never been a better time to be a worker with special skills or the right education, because these people can use technology to create and capture value. However, there's never been a worse time to be a worker with only 'ordinary' skills and abilities to offer, because computer, robots, and other digital technologies are acquiring these skills and abilities at an extraordinary rate»* (Brynjolfsson & McAfee, 2014, p.11)

David Autor notes that changes in technology are changing the types of jobs available and their pay (Autor, 2015). Over the past few decades, the “polarization” of the labour market has been notable, with wage growth disproportionately attributable to those at the top and bottom of the distribution of income and skills, rather than those in the middle. Researchers also argue that computers will replace workers in routine, codified tasks, but at the same time increase the comparative advantage of workers in solving adaptive problems, problems, required creative solutions (Autor, 2015; Pfeiffer, 2018). At the same time, “the scope of routine and non-routine tasks depends to a large extent on the framework conditions of work organisation and may differ significantly within occupations” (Dengler & Tisch, 2020, p.449).

The gap between automating worker roles and replacing workers when solving tasks that require flexibility, judgment, and common sense is huge and has a gender difference. This is confirmed in a study by Piasna and Drahokoupil, which reveals the impact of digitalization on the structure of employment through an analysis of the change of the occupational change and the task content of jobs (Piasna & Drahokoupil, 2017). Piasna and Drahokoupil showed that if the researchers take the task content into account (repetitive vs. complex tasks) and not the occupation field, they see that women ‘exhibit a faster growth in share of non-routine, analytic and interpersonal tasks’ (Piasna & Drahokoupil, 2017, p. 320).

According to Golsch and Seegers, the extent of men’s and women’s perceptions of technological changes in their workplace differ (the difference between men and women’s perceptions of technological changes in the workplace). Golsch and Seegers conducted a socio-economic panel study in Germany, during which they compared the perception of digitalization by men and women in gender-typical and gender-atypical professions (Golsch & Seegers, 2021). The conditions that increase or decrease the perceived risks of technological change in the world of work, especially for women, were identified based on three surveys (SOEP, 2015–2017).

Answering the question ‘whether social inequality between men and women may increase in the course of digital transformation’, Dengler and Tisch conducted a study the “Relationship Between Digital Transformation and Work Quality: Substitution Potential and Work Exposure in Gender-Specific Occupations” (Dengler & Tisch, 2020). They analyzed the impact of digital transformation on work exposure for male- and female-dominated

occupations. Large-scale administrative data and survey data from Germany were used for the analysis (Dengler & Tisch, 2020, p.427).

The results of numerous studies are in line with our findings from previous researches (Mingaleva et al., 2021; Mingaleva, Zinnurova & Shironina, 2021). In particular, we showed how the structure of personnel and their functional responsibilities affect the speed of digital technologies' implementation. Also, it was shown how digitalization affects the professional and staffing structure of personnel, including from the position of liquidation of redundant positions and professions (Mingaleva, Zinnurova & Shironina, 2021). In the process of various studies, it was concluded that the dismissal of some workers is inevitable due to the automation of some functions and the elimination of some positions (Mingaleva, Zinnurova & Shironina, 2021, p.394; By, 2020, p.15). Our DTS Model allows to develop a set of organizational and management measures for the successful implementation of the digital transformation of an organization.

The need for a more detailed study of the impact of automation and digitalization on the development of gender contradictions in the field of labour and employment is increasingly discussed in the scientific literature (Alemann et al., 2020; England, Levine & Mishel, 2020; Ha, 2020; Croft et al., 2021). As for the forecast of the size of workers' dismissals because of digitalization, various international organizations, analytical and consulting agencies provide the following figures. The WEF predicts the layoff of 6% of employees by 2025 (The Future of Jobs Report, 2020). Research by the Future of Jobs Survey showed "that by 2025, 85 million jobs may be displaced by a shift in the division of labour between humans and machines" (The Future of Jobs Report 2020, p.5). Bain & Company predicts that 20% to 25% of existing jobs will be eliminated due to automation by the end of this decade (Bain & Company, 2020). Who will suffer the most? In the process of answering this question, we have formulated the following hypotheses.

H1. As a result of automation and digitalization, the gender gap will widen, as women occupy the largest number professional positions, which are primarily on the list of liquidated.

H2. The ratio of women and men in leadership positions is characterized by strong segregation towards women in those industries where wages are traditionally higher.

H3. In Russia, there is a significant gap in the wages of men and women.

Research Method

Method

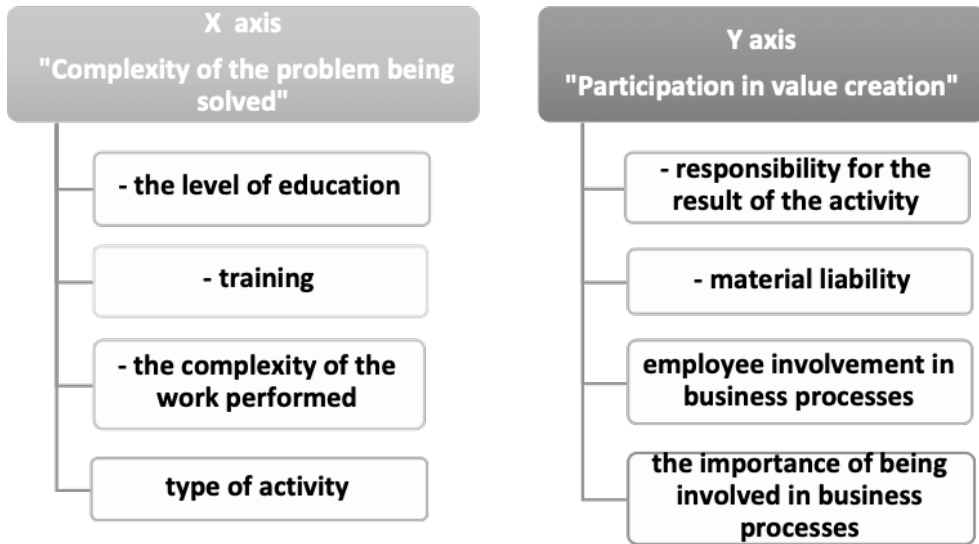
An analysis of the gender structure of the administrative staff of oil and gas companies was carried out to test these hypotheses. The professional positions of the administrative staff in which both women and men were taken for the study. The workers of the oil and gas production sites themselves are traditionally men.

The conceptual basis of the study was provided by modern approaches to strategic personnel management, innovative management, and digital modernization of the economy. The main focus was on strategic personnel management within innovational development of companies (Danilina, Mingaleva & Malikova, 2016). As a source of methodological provisions, we used the results of research by Piasna and Drahekoupil (on the complexity of the problems to be solved), Dengler and Tisch (on the relationship between digital transformation and work quality), Golsch and Seegers (on the extent of men's and women's perceptions of technological changes in their workplace).

In this study, we used the method developed and applied by us earlier to build the Digital Transformation Snake model (DTS model) (Mingaleva, Kostyreva, Shironina & Dvinskikh, 2021). This is a method of differentiating personnel depending on the problems being solved.

The method includes differentiation of personnel according to two key parameters of assessment: the complexity of the problems to be solved and participation in the value creation. Each parameter includes 4 main components. The structure of parameters and components is shown in Figure 1.

Figure 1: Main components of key measurement parameters



Source: compiled by the authors

The second element of the research method is the classification of job roles in increasing and decreasing demand across industries for the construction of which the structure of the professional information network (O*NET) was used (The Future of Jobs Report 2020, p.151). The professional information network structure for job, skill and task analysis categories was developed by the United States Department of the Labour in collaboration with the Bureau of the Labour Statistics' Standard Classification of Occupations. This classification is the most extensive and respected classification among other approaches and has been used by the World Economic Forum in its regular reports since 2016.

For the analysis, we used the classification of working roles in increasing and decreasing demand for Professional Services (The Future of Jobs Report 2020, p.146). An additional comparative analysis of the selected classification was also carried out with the classification of working roles in increasing and decreasing demand for the national characteristics of Russia (The Future of Jobs Report 2020, p.99). The selection results are shown in table 2.

Table 2: The increasing and decreasing job demand in the analyzed enterprise

Emerging	Redundant
1. Digital Marketing and Strategy Specialists	1. Administrative and Executive Secretaries
2. AI and Machine Learning Specialists	2. Accounting, Bookkeeping and Payroll Clerks
3. Data Analysts and Scientists	3. Data Entry Clerks
4. Business Development Professionals	4. Relationship Managers
5. Internet of Things Specialists	5. Legal Secretaries
6. Business Services and Administration Managers	6. Management and Organisation Analysts
7. Project Managers	7. General and Operations Managers
8. Process Automation Specialists	8. Electronics and Telecommunications Installers and Repairers
9. Lawyers	9. Client Information and Customer Service Workers
10. Financial Analysts	10. Business Services and Administration Managers

Source: The Future of Jobs Report 2020, p.146

The third element of our research method is the method and model of the organizational potential of digital transformation (Mingaleva et al., 2021). The model identifies 2 areas of impact on the company's personnel in terms of the company's readiness for digital transformation: personnel restructuring zone and personnel development zone. The organizational arrangements for creating the conditions for a successful digital transformation differ in these zones (Mingaleva et al., 2021, p.75).

Data

The analysis is based on actual data on wages, gender composition, qualifications of the administrative personnel of the oilfield services company (n = 58) and personnel in general for 2020.

A survey of all employees was also carried out. As a result, answers were received to the questions about the satisfaction of employees with their job duties, the level of wages, the possibility of moving up the career ladder and the readiness for training and retraining in the course of special development programs in accordance with the requirements of digitalization and business automation.

Research Results

In the course of the study, groups of personnel were aggregated according to the World Economic Forum classification. When aggregating, 8 groups of personnel were obtained. We have focused on job descriptions, as well as on the results of interviews while defining personnel groups. The aggregation results are shown in Table 3.

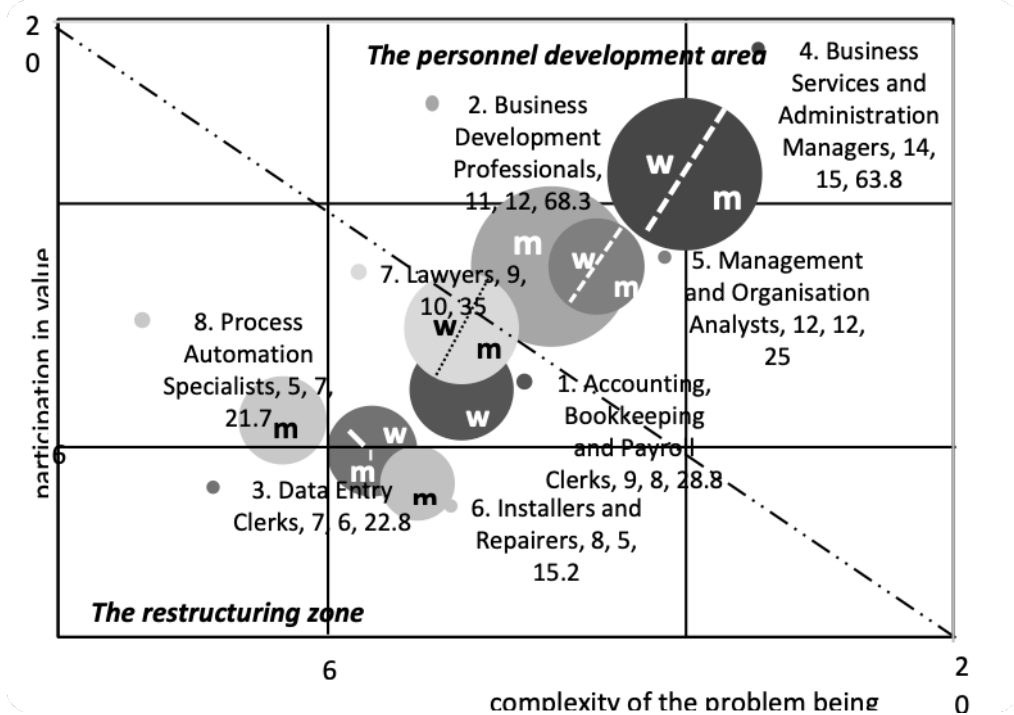
Table 3: Aggregation of personnel groups of a Russian enterprise in accordance with the UN classification

Group according to UN classification	Positions in the surveyed enterprise	Group number
Accounting, Bookkeeping and Payroll Clerks	chief accountant, accountant, payroll accountant	1
Business Development Professionals	director, deputy director, deputy director for development	2
Business Services and Administration Managers	technical director, commercial director, head of the commercial department, deputy director for ecology	3
Data Entry Clerks	clerk, HR specialist, economic planning department specialist, MTS specialist, labour protection engineer, ecologist	4
Management and Organisation Analysts	supervisor, head of process management department, head of ecology department, estimate engineer	5
Installers and Repairers	vehicle repair mechanic, equipment repair mechanic, welding production technician, excavator driver, cleaners, foreman, construction and installation specialist, leading construction and installation specialist, production and technical control engineer, driver	6
Lawyers	lawyer, leading lawyer	7
Process Automation Specialists	specialist in process regulation, specialist in process management, head of the construction and installation work department	8

Source: compiled by the authors

Further, an assessment was carried out for each of the identified groups of personnel by gender and salary level. The evaluation results are expressed as circles of different diameters. The diameter of the circle depends on the size of the average wage in the group. The results of assessments in the form of circles of different diameters were placed on the organizational capacity assessment matrix of the company to determine the possibilities for digital transformation and automation of different groups of personnel (see Figure 2).

Figure 2: Scoring results for groups of personnel



Source: compiled by the authors

In Figure 2, “w” and “m” represent the gender structure of each group (women and men).

As can be seen in Figure 2, several groups are composed exclusively of men. These are groups: Business Development Professionals; Installers and Repairers; Process Automation Specialists. One group (Accounting, Bookkeeping & Payroll Clerks) is 100% women, the second group consists of 60% of women 60% women (Data Entry Clerks). In the rest of the

groups, the gender distribution is approximately 50/50 (Lawyers; Management and Organization Analysts; Business Services and Administration Managers). In general, there are 3 times more men in the company than women. This creates certain difficulties in the automation and digitization of workplaces and changes in the company's staffing within the framework of the gender issue.

The second important result of the study relates to the development of individual training and retraining programs for personnel in accordance with the requirements of strategic personnel management. As stated earlier, training and retraining programs for company personnel should be drawn up taking into account which part of the matrix for assessing the organizational potential of the company to determine the possibilities of digital transformation they relate to (Mingaleva, Kostyreva, Shironina & Dvinskikh, 2021).

The distribution of personnel groups according to development zones, obtained on the basis of actual data, is generally in line with global trends in changes in the demand for professions and qualifications.

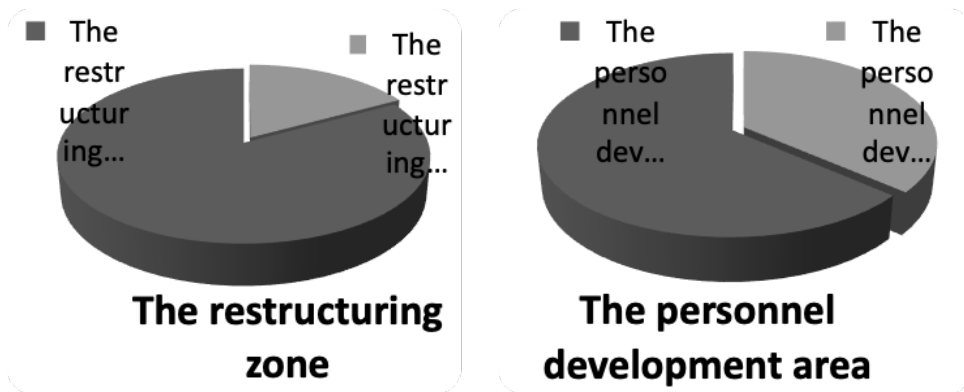
The restructuring zone (base: Automation) includes such groups as:

- data entry specialists;
- installers and repairers;
- process automation specialists;
- legal secretaries;
- accountants and payroll officers.

The personnel development area (basis: Digitalization) includes:

- business development specialists;
- business service managers;
- management and analysts of the organization.

The largest number of personnel in the oilfield services company under study is in the personnel restructuring area (see Figure 3). It is these jobs that will undergo the greatest automation.

Figure 3: Scoring results for groups of personnel

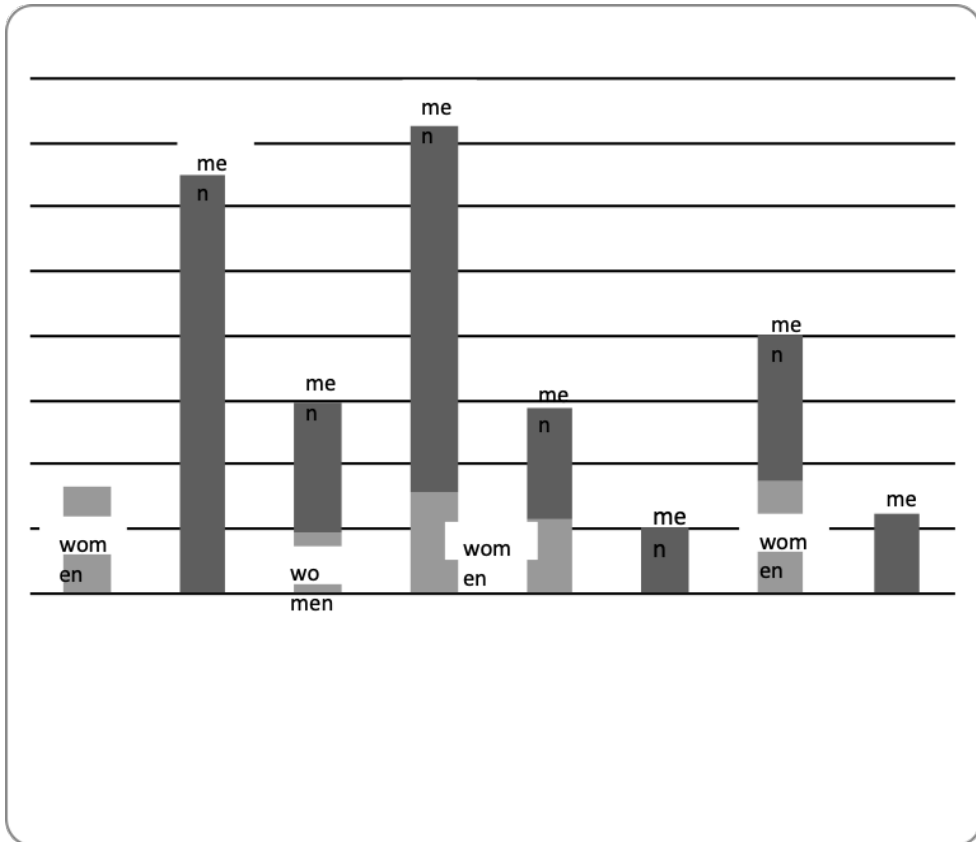
Source: compiled by the authors

This ratio of the number of personnel by zones of restructuring and personnel development is determined by the specifics of the company's activities. The main activity of employees is associated with hard physical work. Therefore, men make up 83% of employees in the restructuring area. Of these, 89.7% of men do hard physical work: construction of a well pad, installation of a drilling rig, drilling and casing of a wellbore, subsequent development, as well as routine and major well workovers. These worker roles cannot be fully automated. Only 10.3% of men are engaged in non-physical labour in the restructuring zone, whose work roles can be automated and performed by computers.

However, the work roles performed by women in a given company and also related to the restructuring area (accounting services, legal services, data entry, and others) can be fully automated. This situation illustrates well one of the global trends in the transformation of labour structure and gender structure in employment, contained in the WEF Report: women are more widely represented in automated workplaces. In the future this implies massive layoffs of women in the company.

Regarding the situation in the field of wages, the results of the study have showed that the wages of men in the company are 1.4 times higher than the average wages of women. Figure 4 shows the ratio of salaries for men and women in different groups of personnel.

Figure 4: The ratio of salaries of men and women in different groups



Source: compiled by the authors

Finally, it should be noted that there is a huge pay gap between women and men in the most paid groups of personnel included in the personnel development zone, from the personnel groups included in the restructuring zone. This gap is simply huge and amounts to 350% in the groups of personnel included in the personnel development zone (see Figure 5).

As can be seen from Figure 5 female workers in the field of personnel development have 3.4 times less wages than male workers. With digitalization this gap may widen further.

Figure 5: The ratio of salaries of men and women in different groups

Source: compiled by the authors

The results of this analysis confirm the conclusion in the WEF Report that insufficient numbers of women who are entering the professions where wage increases are most noticeable.

Conclusion

The study has showed that Russian companies have significant gender contradictions in the structure of employment and the level of wages. These problems have intensified as a result of COVID19.

In particular, COVID19 has accelerated the automation and digitization of workplaces in many enterprises, which has created an additional threat to women's employment and their income. This problem is very acute for Russian enterprises and organizations.

A real danger of increasing the gender gap in those specialties and fields of employment that are promising in terms of increasing jobs in them was identified based on the analysis of the prospects for changing the structure of employment under the influence of automation and digital transformation. It is to these industries that the labour force will move from industries and companies where jobs will be cut as a result of mass automation. In particular, it was found that in the analyzed company the professional group "Accounting, Bookkeeping and Payroll Clerks" which is 100% women will be reduced completely.

The analysis has once again confirmed the earlier conclusions about the need to develop special corporate programs for vocational training and retraining of women and special programs for personnel development, taking into account gender issues.

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