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Transformations in the qualification aspect of labour quality in an information society

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Subject. Trends determining the employment dynamics both globally and in particular countries are of growing importance for the modern economy. Transformations of the global labour market caused by the transition to an information society based on the advances of the current scientific and technical resolution, have a significant impact on this market and induce social instability. To understand the processes occurring in the modern economy, predict the development of labour relations, and mitigate the negative effects, it is vital to determine the changes in the nature of labour related to the composition of various qualification groups.

Purpose. To determine the main professional and qualification transformations of the nature of labour in Russia and the factors affecting these transformations.

Methods. In our study, we used a historical-genetic method, an interdisciplinary approach to the analysis of the causes and consequences of the changes in the labour market, and empirical observation based on the analysis of statistical data.

Results. As a result of the study, we determined the trends concerning the occupational structure of major fields and qualification levels in Russia in 2008–2012. We analysed the changes for various types of economic activities and qualification levels of employees, which helped us to confirm our assumptions about the causes of such changes. We also compared the obtained results to the global trends and determined features specific for the Russian Federation.

Discussion. The obtained results were compared to the conclusions of the World Bank and international experts regarding the modern global trends on the labour market and the factors affecting it.

Conclusions. As a result of the analysis, we came to the conclusion that there are types of economic activities on the labour market in Russia which are predominantly affected by the transformations associated with the transition to an information society. On the other hand, professional transformations are a multi-factor process. The specifics of this process in the economy of Russia is described in the article.

Keywords: labour market, professional aspects of the transformation of the labour market, information society.

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Introduction

The importance of our study is connected with the need to predict the state of the labour market, whose development is affected by a number of factors. These factors include significant changes in the nature of labour caused by globalisation, the digitalisation of the society, and the resulting transformation of human resources. Awareness of the global trends and national specifics (regarding both industrial and professional aspects) of the changes in the labour demand caused by the changes in the requirements to the quality of labour, makes it possible to predict further transformations and enable those employees who belong to risk groups to adapt to the changes and acquire new professional skills.

Being of great predictive significance, this problem has become the focus of a large number of studies. Thus, Enderwick considers the connection between globalisation and the transformation of the labour market [10]. In his study, he uses traditional analysis methods, which involve determining the connections “skilled labour – unskilled labour” and “traditional industries – new industries”. However, he does not focus on the dramatic changes in the nature and quality of labour caused by the current technological revolution.

It is a study conducted under the aegis of the World Bank that focuses on the changes of the nature of labour linked to the modern technological transformations [2]. The study reviews the results of empirical observations conducted in a number of both developed and developing economies and determines new global trends in the development of the quality of labour resulting from the Fourth Industrial Revolution. According to the study, the transformations tend to be more active with regard to the specific features of labour activities (routine and creative) rather than to qualifications and industry. It demonstrates that, under such conditions, to ensure sustainable development of the labour market, it is necessary

for everyone, from individuals to companies, and to governments, to pay more attention to the development of human resources and development of adaptive, creative, and cognitive skills in modern employees. The study concludes that these changes in the quality of labour have global nature and are of utmost importance for the development of human resources and the competitive ability of individuals and economic systems.

Veselovsky considers the influence of new technologies on the labour market. He stresses that this influence is very significant and appears to be a lot stronger than the effect of globalisation [1, p. 106]. Nambisan et al. [15] and Eiteneyer et al. [9] consider this problem in the context of general social and economic processes. A study by researchers from Voronezh State University presents general theoretical and methodological approaches to the problem of quantitative estimates of such dependences [5].

Boudreau & Jesuthasan [12], international experts specialising in the future of labour, point out that new technologies do not directly correlate with the number of jobs and employment rates. They believe that this dependence is affected by a large number of factors and there is no linear relation between automation of work and the labour market. Therefore, it is extremely difficult to predict the effect of automation both on the labour market and on specific fields of occupation.

Fossen & Sorgner analysed the effect (transformative and destructive) of technological transformations and automation of the production process on certain jobs and the level of qualification [11]. In their study, they divided jobs in four groups based on the likelihood of their automation and the degree of transformative and destructive effects. The distribution between groups also depends on the level of qualification, income, and social inequality. However, the researchers do not differentiate between primary and secondary factors.

Similar dependences are considered by Désiré, Kocou & Charlemagne [6] based on a case study of West Africa. They focus on the effects that the number of jobs and the adoption of information and communication technologies (ICTs) have on high- and low-skilled employees. Balsmeier & Woerter [7] come to similar conclusions analysing the situation in Switzerland. Liu & Wang [8] present a case study of low-income households in China. They point out that there is not enough statistical data to analyse the effect of ICTs on the labour market.

A large number of studies today are also dedicated to the social impact of the dependence between the labour market and modern technological transformations. Thus, Ngoa & Song [16] analyse the gender aspects of the phenomenon in Africa, and Lyu & Liu [13] consider the changes in the payment rates in the energy sector in order to determine overall trends.

Although there are a large number of studies aimed at determining the factors affecting the dynamics of the modern labour market, there is little research on the specific features of the transformation of the labour market in Russia and its connection with global trends. Therefore, the purpose of our study was to determine the main transformations of the nature of labour in Russia related to the professional qualification aspect, determine the factors affecting these transformations, and compare the results with the global trends. Our study included the following stages. First, to determine the nature of changes occurring on the labour market in 2008-2020, we analysed the data on the occupational structure in major industries depending on the qualification level of employees. Based on the results of this analysis, we determined the current trends in Russia. Then, we analysed the changes based on the type of economic activities, which allowed us to determine the areas where the demand for labour increased or decreased and make assumptions regarding the causes of such changes. Next, we analysed

the changes based on the type of activity and qualification characteristics, which allowed us to confirm our assumptions regarding the transformations in the labour quality. The article provides a comparative analysis of employment in the processing industry and healthcare and social services. We then compared the revealed trends in the development of the labour market in Russia and the factors affecting it with the global trends.

Methods and data sources

Our study was based on the following theoretical and methodological approaches.

– A historical-genetic method, which presumes that each stage of development of human society is characterised by certain features of labour quality transforming its essence. Such transformations are based on the changes in the productive forces resulting in the changes in the demand for labour as the main economic resource of the modern technological society. Besides the historic period, the features of the labour quality are determined by the specific conditions in the country where the said transformations are observed.

– An interdisciplinary approach, which allowed us to appeal to theoretical assumptions and conclusions presented in various fields of study to form a systematic view of the causes, role, and consequences of the changes occurring in the labour quality. In particular, we employed the concept of human development, the idea of continuous education, the social learning theory, the theory of cognitive development, the theory of post-industrial society, and the theory of economic globalisation. Based on the above listed theories and methods we could determine global trends in the analysed processes connected with the labour quality and compare them to a specific situation in a particular geographical, cultural, and historical setting.

To determine the global trends, we analysed the results of research conducted by international

organisations – the International Labour Organization, the World Bank, and the World Economic Forum. Based on the long history of studies conducted worldwide, we could determine the trends which helped us to set the purpose and tasks of our study.

To determine the trends of the transformation of the labour quality in Russia we used empirical observation based on the statistical information about the labour market. The data source was the statistics published by Rosstat in 2008-2020. The observation period was selected based on the fact that, in 2008 the transition to the market economy in Russia was complete, the economy was at its peak, and the power of the market extended to the labour market. The processes occurring in the following years were influenced by globalisation. However, there was also a significant impact of foreign policy, which we took into account in our final conclusions.

To determine the changes in the labour market, we analysed the employment data based on the types of economic activities according to OKVED (Russian National Classifier of Types of Economic Activity). However, we had to introduce certain amendments to compare the data over the said period (we merged the data on the “professional, scientific, and technical activities” and “administrative activities and related services” and excluded “activities of households as employers” and “activities of extraterritorial organisations and agencies”). We also analysed the data on the groups of employees determined by Rosstat based on the Russian National Classification of Occupations of Employees, Positions of Civil Servants and Wage Category.

Results

To determine the changes in the nature of labour in 2008-2020, we analysed the data on the occupational structure in major industries depending on the qualification level of employees. Based on the results of this

analysis, we determined the current trends in Russia. Then, we analysed the changes based on the type of economic activities, which allowed us to determine the areas where the demand for labour increased or decreased and make assumptions regarding the causes of such changes. Next, we analysed the changes based on the type of activity and qualification characteristics, which allowed us to confirm our assumptions regarding the transformations in the labour quality. The article provides a comparative analysis of employment in processing industry and healthcare and social services.

Table 1 presents the quantitative changes in human resources over the studied period.

– There was a significant reduction in the number of skilled workers occupied in agriculture (40 %; 1136 thousand people) and unskilled workers (33 %; 2600 thousand people), as well as managers (18 %, 896 thousand people), and skilled workers occupied in manufacturing industry, construction industry, and transportation system (12 %, or 1293 thousand people).

– The largest increase in the number of workers is observed among high-skilled workers (by 40 %, 18744 thousand people) and workers responsible for documents, accounting, and service (38 %, 540 thousand people). There was an insignificant growth in the number of service and trade workers (2 %) and equipment operators (4 %).

The total number of the employed reduced by 542 thousand people (1 %).

The variety of changes in the occupational structure may indicate the changes in the labour quality and human resources. An increase in the number of high-skilled workers and a decline in the number of medium- and low-skilled workers may indicate the changes in the labour demand and the resulting changes in the labour quality. However, these changes may have other causes. Thus, the employment dynamics in 2008-2020 (Fig. 1) demonstrates that the largest

Table 1

*Dynamics of human resources in Russia for different groups of workers 2008–2020**

Staff category	2008, thousand people	2020, thousand people	Absolute difference, thousand people	Relative difference, %
Managers	4986	4090	–896	–18
High-skilled workers	13230	18558	+5328	+40
Medium-skilled workers	10818	9697	–1121	–10
Workers responsible for preparing documents, accounting, and service	1404	1944	+540	+38
Service and trade workers, security workers	10457	10716	+259	+2
Skilled workers occupied in agriculture, forestry, fish farming, and fishing	2855	1719	–1136	–40
Skilled workers occupied in manufacturing industry, construction industry, transportation, and related industries	10504	9212	–1293	–12
Equipment operators, assemblers, and drivers	8818	9194	+376	+4
Unskilled workers	7931	5331	–2600	–33
Total	71003	70461	–542	–1

* Labour and occupation in Russia. URL: https://rosstat.gov.ru/folder/210/document/13210_2009-2021

reduction was observed in the years of crisis – 2009 (a recession) and 2019-2020 (Covid-19 pandemic), which caused structural changes in the labour demand. Matersheva & Gridasova provide similar data [3].

To specify the nature of the changes occurring in Russia, we should analyse the employment dynamics for specific types of economic activities. It shows that these changes

are different for different types of economic activities. The effect of digitalisation of the economy on the labour market is traditionally explained by the fact that new technologies result in the automation of production processes and increased productivity, which, in turn, leads to jobs reduction and growth of unemployment, when employees whose jobs involve routine activities and do not require

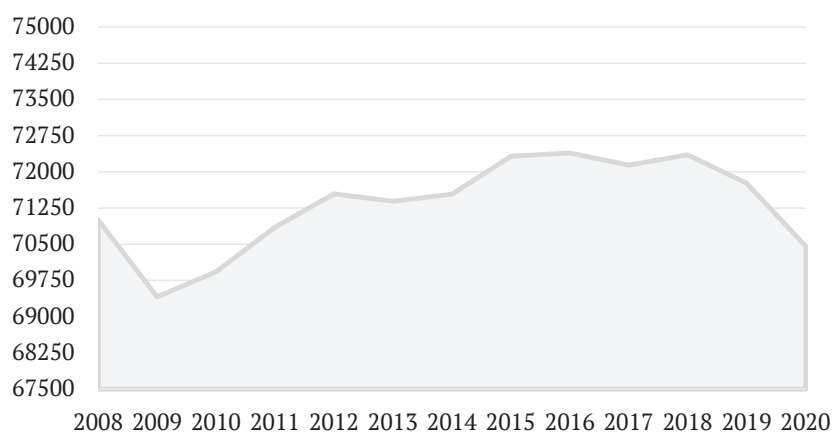


Figure 1. Employment dynamics in Russia in 2008-2020 (Labour and occupation in Russia. URL: https://rosstat.gov.ru/folder/210/document/13210_2009-2021)

qualifications are at risk to be made redundant [2, c. 26]. The changes in the labour market in Russia are presented in Table 2.

The most significant reduction in the number of employed in 2008-2020 was observed in agriculture, the processing industry, and the construction industry. There was also a decline in public administration and real estate activities. All these types of economic activities include a large number of routine jobs. At the same time, these spheres observed significant changes in the technological processes caused by the introduction of new equipment and digitalisation, which, in our opinion, is the main cause of the negative dynamics.

Other types of economic activities demonstrated the growth of employment.

However, such growth may have various reasons. Within the scope of our study, we divided them into the following groups.

– Types of economic activities where the employment growth is largely connected with an increase in the demand for their products on the global market: mineral extraction; transportation and storage.

– Types of economic activities where the employment growth is largely connected with an increase in the demand for their products on the internal market: energy supply; water supply, sewage systems; wholesale and retail trade; accommodation and food service activities; information and communication.

– Types of economic activities where the employment growth is primarily caused by new

Table 2

*Employment dynamics for various types of economic activities in Russia 2008-2020**

Type of economic activity	Changes in the number of employed, thousand people
Agriculture, forestry, fish farming, and fishing	-1807.6
Mineral extraction	+271.5
Processing industry	-1355.1
Energy, gas, and vapour supply, air conditioning	+127.4
Water supply, sewage system, waste disposal, elimination of pollution	+66.7
Construction industry	-745.8
Wholesale and retail trade; car and motorbike repair	+200.5
Transportation and storage	+378.3
Accommodation and food service activities	+199.9
Information and communication	+60.7
Financial and insurance activities	+201.1
Real estate activities	-151.8
Professional, scientific and technical activities; administrative and related activities	+1032.5
Public administration and defence; social services	-393.5
Education	+232.5
Healthcare and social services	+383.7
Arts, entertainment and recreation	+273.2
Other services	+412.5
Total number of employed	-542.3

* Human resources, and employment rate. URL: https://rosstat.gov.ru/labour_force

requirements to the characteristics of human resources: education; healthcare and social services; arts, entertainment, and recreation.

– A separate group comprises such types of economic activities as information and communication; professional, scientific and technical activities; administrative and support service activities. These types of activities are sources of technological, innovative, and digital transformations. The employment growth in these areas can indicate the growing importance of these groups of economic activities for the society.

To confirm our assumptions regarding the causes of the observed dynamics for particular types of economic activities, we analysed two of these types – processing industry (negative dynamics) and healthcare (positive dynamics) in more detail (Table 3).

The statistical data presented in Table 3 demonstrate economic growth for both types of activities coupled with a decline in employment in the processing industry, and an employment growth in healthcare and social services. Comparing these two types of activities, we can see that the growth rate of production and the gross added value in the processing industry is much greater. At the same time, fixed capital investments here are compatible with those observed in healthcare and social services (280 % of the 2008 level). We believe that this proves the following assumptions.

– The processing industry has undergone significant changes in technological processes

resulting from the introduction of new technologies and digitalisation. According to Akindinova et. al. [4], the fixed capital investments were aimed at these changes. This was followed by a reduction in the number of workers who had been doing routine jobs.

The main cause of the employment growth in healthcare and social services is the introduction of new requirements to the characteristics of human resources, and the resulting demand for such services, namely the implementation of a national project “Healthcare”.

These conclusions are confirmed by a comparative analysis of the changes in professional and qualification characteristics of the workers occupied in these fields over the studied period (Figure 2-3).

Figure 2 demonstrates that the processing industry showed both a decline and a growth of employment depending on the jobs and qualification levels of employees. The reduction in the employment rate was observed with regard to low-skilled and unskilled workers: their portion in the total number of workers reduced by 6.6 % and 2.6 % respectively; the total number of unskilled workers reduced by 36 % (1287 thousand people), and the total number of low-skilled workers reduced by 25 % (387 thousand people). The number of managers also reduced (by 23 %, or 280 thousand people). At the same time, the number of medium- and high-skilled workers increased by 34 % and 29 % (156 and 363 thousand people respectively).

Table 3

*Comparison of the key economic development indicators for the processing industry and healthcare and social services, billion roubles, (2008-2020)**

Type of activity	Production		Gross added value		Fixed capital investments	
	2008	2020	2008	2020	2008	2020
Processing industry	3100.5 100	50660.8 1634	1696.3 100	14179.4 8359	1372.1 100	2944.5 214
Healthcare and social services	1841.8 100	6134.6 333	1135.3 100	3791.8 334	206.9 100	580.1 280

* Russian annual book of statistics URL: <https://rosstat.gov.ru/folder/210/document/12994>.



Figure 2. Dynamics of the occupational structure for the processing industry in 2008–2020 (Results of the sampling survey of human resources in 2009–2021. URL: <https://rosstat.gov.ru/folder/11110/document/13265>)

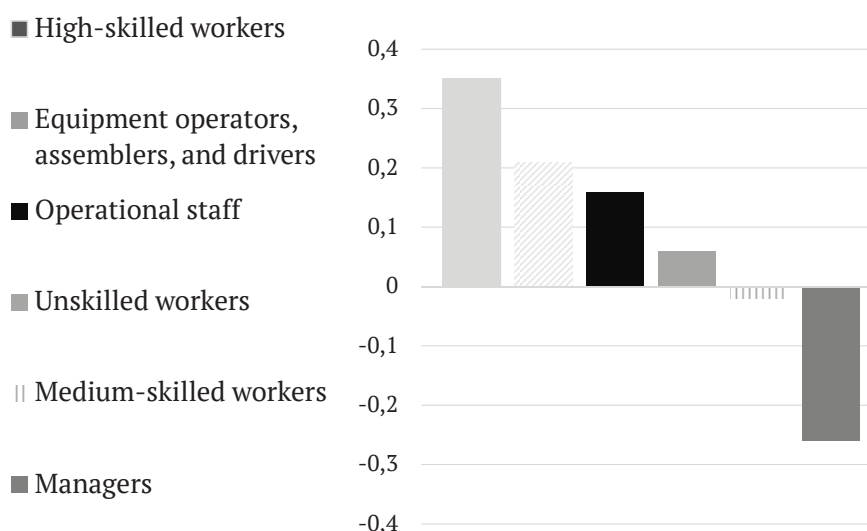


Figure 3. Dynamics of the occupational structure for healthcare and social services 2008–2020 (Источник данных: Итоги выборочного обследования рабочей силы 2009–2021. URL: <https://rosstat.gov.ru/folder/11110/document/13265>)

The number of equipment operators also grew (80 thousand people, 4 %). These changes in the occupational structure for this type of economic activity confirm the assumption that automation of industrial production processes results in low-skilled and unskilled workers being substituted by machines. At the same time, the number of skilled workers and machine operators grows, since they can help with

automation processes. The same reason may cause the reduction in the number of managers. Fewer worker and automation of the production processes require less control. Hence, there is a lower demand for managers. This is also proved by the data regarding the aims of the fixed capital investments. Thus, in 2018, the portion of industrial enterprises investing in automation of the production process was 46 % (55 % in

2016), while only 22 % invested in job creation¹.

The number of people employed in healthcare and social services increased by 384 thousand (8 %) over the studied 12 years. The changes in the occupational structure in this field (Figure 3) are different from those observed in the processing industry.

The greatest reduction is observed in the number of managers. It fell by 25 % (75 thousand people) over the studied period. There was also a small reduction in the number of medium-skilled workers (2 %, 50 thousand people). The number of workers of other groups increased. The largest growth was demonstrated by high-skilled workers – 34 %. A growth in the number of equipment operators indicates the introduction of new technological processes, which require new specialists. These changes demonstrate the extensive growth of the healthcare and social services industries.

The overall employment dynamics for the analysed types of economic activities shows that the processing industries predominantly demonstrate intensive growth based on the introduction of new technological processes, while healthcare and social services extend by attracting new employees.

We also analysed industries connected with other types of economic activities. The results of the analysis confirmed the assumptions regarding the factors causing the changes in the occupational structure.

Discussion

The results of our study allowed us to determine common features that are true for the labour market in Russia and for the global trends determined by the World Bank and associated with the transformation of the labour quality caused by the Fourth Industrial Revolution.

One of the trends identified by the World Bank [2, p. 36-39] and associated with the

occupational structure and unemployment is the following: modern technologies aim at the automation and robotisation of production processes, which leads to a reduction in the number of employees performing routine tasks. This may occur in both low-skilled and high-skilled segments of the labour market (the latter concerns certain jobs done by lawyers, accountants, and bank employees). At the same time, there are a number of low-skilled jobs that cannot be automatised (nurses, medical attendants, etc.). Therefore, changes in the demand for labour of certain quality are not characteristic for any particular qualification group and do not directly correlate with the level of economic development of the country. The data presented by the World Bank contradict the common view that technological changes in the economy result in a reduction of the demand for low-skilled and unskilled labour and a growth in the demand for high-skilled labour, as well as to the reduction in the number of employees in traditional economic fields and increased number of employees in knowledge-intensive sectors of the economy. This is a conclusion made by the scholars who analysed the impact of information and communication technologies on the number of jobs in West Africa. They demonstrated that, although there was both a reduction in the number of low-skilled jobs and a growth in the number of high-skilled jobs, the overall dynamics is positive – the number of jobs grew [6]. Balsmeier & Woerter [7] analysing the situation in Switzerland demonstrated that this is true for the developed countries as well as for the developing ones.

The results obtained for the processing industry demonstrated that this trend determines the transformation of the labour quality in this sector of economy. We agree with Nagaraj [14] that this is very important for determining the vector of requirements to the education and the level of qualification in such industries. The importance of this problem was acknowledged

¹ Investments in Russia 2019. URL: https://rosstat.gov.ru/storage/mediabank/Invest_2019.pdf

by a number of researchers focusing on the development of engineering education at the 9th World Engineering Education Forum (WEEF 2019) [18].

This trend, however, does not apply to other types of economic activities. They can be affected by the growth of the demand for their products on the internal market, the growth of the demand on the global market, and new requirements to the characteristics of human resources. In this case, we agree with Boudreau & Jesuthasan [12] that labour markets and their current transformation are affected by a large number of factors. Further research is needed to specify the development trends of the labour market in these fields.

The obtained results, when compared to other studies, demonstrate that in order to predict future professional and qualification transformations of the labour market in Russia, it is important to consider the specifics of the country and particular sectors of economy together with global trends [17].

Conclusions

Our study led us to the following conclusions.

– While there is a general trend towards a reduction in the employment rate in Russia (by 542 thousand people) in 2008-2020, major professional groups demonstrated both reduction and growth of employment. This indicates the transformation of the occupational structure and can be a sign of the changes in the nature of labour and human

resources as a result of a transition to an information society.

– The employment dynamics for specific types of economic activities with regard to professional groups demonstrated a reduction in the number of people employed in agriculture, processing industries, construction industry, public administration, and real estate activities. This is primarily associated with a large number of jobs which involve routine tasks. These jobs were automated following the introduction of new technologies and digitalisation, which we believe to be the key (but not the only) factor causing the negative dynamics. These processes correlate well with the global trends.

Other types of economic activities demonstrated a growth in the number of employees, which can be caused by a number of factors including the COVID-19 induced recession, increased demand on the global market, increased demand on the internal market, and new requirements to the reproduction of human resources in the country.

This demonstrates that professional transformation of the labour market is a multi-factor process which, besides the modern changes in the labour quality, can also be affected by social, economic, and even political factors.

Conflict of interest

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

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Профессионально-квалификационные трансформации качества труда в информационном обществе

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Предмет. Тенденции, определяющие динамику занятости и безработицы как в мире, так и на уровне отдельной страны становятся все более значимой проблемой для современной экономики. Трансформации, происходящие на мировом рынке труда, связанные с переходом к информационному обществу, основанному на достижениях современной научно-технической революции, оказывают значительное влияние на состояние данного рынка и создают предпосылки для усиления социальной нестабильности. Выявление профессионально-квалификационных изменений характера труда в современной экономике является необходимым условием для понимания происходящих процессов, прогнозирования развития трудовых отношений и разработки мер противодействия возможным негативным последствиям данных изменений.

Цель. Определение тенденций профессионально-квалификационных трансформаций характера труда, происходящих в Российской Федерации, и выявление факторов, на них влияющих.

Методология. В процессе достижения поставленной цели использовались историко-генетический метод, междисциплинарный подход к анализу причин и последствий происходящих изменений на рынке труда, метод эмпирического наблюдения на основе сбора и анализа статистической информации.

Результаты. Выделены общероссийские тенденции изменения структуры занятости по укрупненным группам занятий и уровней квалификации за период 2008–2022 гг., проанализированы изменения занятости по видам деятельности, профессионально-квалификационным характеристикам, что позволило обосновать предположения о причинах, их вызывающих, сравнить полученные результаты с общемировыми тенденциями и выделить российскую специфику.

Обсуждение результатов. Полученные в ходе исследования результаты сопоставлены с выводами Всемирного банка и международных экспертов о современных международных тенденциях развития рынка труда и факторах, на него влияющих.

Выводы. Проведенный анализ позволил сделать вывод о наличии на российском рынке труда видов деятельности, которые в качестве основного фактора изменения характера труда имеют трансформации, происходящие под влиянием перехода к информационному обществу. В то же время сделан вывод о том, что профессионально-квалификационные трансформации – это многофакторный процесс, российская специфика которого представлена в исследовании.

Ключевые слова: рынок труда, профессионально-квалификационные трансформации рынка труда, информационное общество.

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Конфликт интересов

Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

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