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Cluster analysis of the Russian labour market sectors

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Subject. In the face of significant change, with companies suspending or completely terminating their operations in the Russian Federation, there are supply and logistical challenges, and planning issues arise. It is still necessary to plan financial support for industries that are most likely to be affected by these changes. The changes affect not only the output, but also the employment and wages in the sectors. A comprehensive analysis of the developments is required to make the most effective decisions. In this study, we considered the relationship between sectors of the economy in terms of average wages, which is an important factor reflecting the development vector in the sector.
Objectives. The purpose of the study was to analyse the specific features of the Russian labour market, based on average wages by sector and to identify similar sectors.
Methodology. In the study, we used the classification of economic sectors based on the methodology developed by the Federal State Statistics Service. Throughout the study, the terms "economic sector" and "industry" are used as synonyms. The following scientific methods were used: measurement, description, and modelling. The research is based on reviewing topical scientific literature, both Russian and foreign.
Results. We grouped economic sectors based on characteristics such as chained rate of increase, average rate of increase, minimum and maximum value, standard deviation, and the range of the studied time series. The resulting clusters reflect the specific features of the industries included, which supports the results of the analysis.
Conclusions. The analysis revealed three clusters with industries sharing a common development dynamic. The first cluster includes industries that are part of the primary sector of the economy. The second cluster includes state-supported industries, while the third cluster represents industries that are part of the manufacturing sector.

Keywords: analysis, labour market trends, economic sector vector analysis, labour market.

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Introduction

The labour market is an important factor for the development of a country, which directly determines the well-being of the population, as pointed out in (Ko & Bae, 2020).

However, over the past few months there have been significant changes in the labour market. In the study (Voloshin, 2022), it was emphasised that due to the current situation, some international and Russian companies suspended or completely ceased their activities in the Russian Federation. Disruptions in the supply of components and logistical issues have certainly affected the structure of the Russian labour market.

Significant changes in the employment structure can also be expected. In particular, one can expect an increase in demand for IT specialists due to the emigration of specialists in the last 6 months, and job cuts in industries either heavily dependent on supplies from abroad (automotive industry, household appliances) or export-oriented as metallurgy and fertilizer production, as noted in (Voloshina et al., 2022).

All the changes described above will have a direct impact not only on the number of jobs in the labour market, but also on wage levels, which will reflect the change in companies' needs for labour.

In the article (Stiglitz, 2021), it was noted that the scale of the consequences will be determined by both the efficiency of companies' adaptation to market changes (changing supply chains, substitution of imported components, etc.) and the introduction of adequate government programmes to regulate the labour market (support for industries most exposed to changes, financing of professional skills development programmes, etc.).

These supporting instruments are critical for the development of the economy, as changes in the consumer market directly affect both supply by companies and demand by consumers, thereby shaping the amount of money that people are able to save and reinvest.

In the context of state support, it is necessary to understand the similarities between changes in different sectors of the economy in order to make the most effective decisions for economic recovery.

There are different approaches to considering the labour sector and assessing the current development vector. Such approaches include examining the gender pay gap, government programmes, the impact of external factors, and the demand for labour.

The study (Sloane et al., 2021) described the impact of the choice of specialisation at university and subsequent employment on the gender wage gap. It was shown that the above factors influence only 60 % of the gender wage gap.

In the article (Hagen, 2005), the three major active labour market policies (ALMP) were evaluated using different regional data sources for East Germany. They are job creation schemes (JCS), structural adjustment schemes (SAS), and public training (PT). The Beveridge curve approach does not indicate any long-term effects of active labour market policies on regional levels of job seekers. A dynamic assessment of labour demand showed that public training (PT) has no effect on employment, while job creation schemes (JCS) result in the substitution of permanent employment.

In (Li & Lin, 2022), the impact of external factors on the level of employment was highlighted. From 2013 to 2017, Clean Air Action policies were implemented in China in response to air pollution in the country. In order to assess the political impact of the environmental management on labour demand, the authors evaluated the policy by a quasi-natural experiment. Based on the changes in labour demand in different regions and industries from 2008 to 2017, the experimental results showed that the implementation of Clean Air Action had a significant negative impact on industrial employment. Dynamic shocks were concentrated at the final stage of policy implementation.

In the study (Sun, 2022), it was stressed that the innovation-driven technological change focused on highly skilled employees changed the labour market dramatically. The author noted that innovation is positively correlated with income inequality in two ways: labour demand and entrepreneurship. First, innovation can change the demand for high-skilled and low-skilled labour and thereby change the structure of skill premiums and wages, thus affecting income inequality. Second, entrepreneurship development allows entrepreneurs to accumulate more wealth through higher financial returns from innovation, as well as a higher motivation to save more money.

The analysis of wage levels is also one of relevant methods. In the article (Greenlaw & Taylor, 2016), this factor is one of the most significant in assessing the demand for skills and the public demand for meeting certain needs.

The dynamics of wage growth reflect many processes both in the labour market and in society in general. The greater the difference in wage growth dynamics between different social classes, the greater the social disintegration. This trend is especially noticeable if the wage gap does not reflect the social demands of the population, as emphasised in the article (Kurbatova & Permyakova, 2015).

This issue is particularly relevant nowadays, when there is a need to ensure the stability of the labour market, as noted in (Maslova et al., 2022). It is also critical to study the similarities in the dynamics of wage growth across the main economic sectors, in order to be able to identify correlations between trends that were not previously evident.

Issues related to the grouping of economic sectors were considered in (Anderson et al., 1987). The analysis was based on data collected for 1968–1980. The purpose of the study was to test the dual labour market theory. The theory suggests that industries can be divided into two groups, primary and secondary, based on certain characteristics. The theory was not confirmed in this paper, but a division of industries on the basis of occupations related to office or intellectual work and occupations related to physical work was suggested. The study took the division of industries beyond the above groupings, operating less obvious relations and separating the sectors using cluster analysis.

Moreover, clustering of industries is often linked to geographical location.

The study (Ershova, 2012) defines a cluster as a generalised grouping of communities, organisations, firms, enterprises, educational institutions, etc. into one conglomerate or association based on economic, social, geographical, and industrial indicators. It contributes to further development, competitiveness, and attractiveness, as well as design and further implementation of new technologies for the effective development of all sectors of the region.

The author also noted that in practice there are two models of cluster policy.

1. The first model is Anglo-Saxon (USA, Australia, and UK). In this model, the cluster is considered as a market body, and the state is an institution that helps to overcome barriers to the development of the industry or the country as a whole. A feature of this approach is that development programmes are designed and implemented by companies and regional authorities.

2. In the second model, which is widely used in European and some Asian countries, federal policy for cluster development and promotion plays an important role. It includes a number of measures featuring the prioritisation of clusters and project financing.

In the study (Garnov & Garnova, 2016), the importance of state support for the development of clusters was noted, especially at the point of implementation of innovative features. The study highlighted the objectives of the national cluster policy in Russia that would allow the state to participate most effectively in the development of industries:

1. Increasing the efficiency of using investment resources and managing investment projects.

2. Creating conditions for constructive dialogue within a cluster and strengthening interaction between actors within the cluster.

3. Formation of consumer preferences, the development of related sectors of economy.

4. Providing the population with the necessary skills for more effective development of the sector.

5. Removal of trade barriers, implementation of investment and infrastructure projects.

Research materials and methods

The analysis of the relationships between economic sectors was based on indicators obtained from Rosstat data on average wages by sector.

The time horizon of the study was 2010–2021. This period allowed us to make conclusions about recent sectoral trends in the labour market.

In the study, the time series K-means (TimeSeriesKMeans) method was used for cluster analysis, while the elbow method and silhouette coefficient were used for determining the number of clusters.

The elbow method was used to find the optimal number of clusters by trying out different partitioning of objects into clusters in order to minimise the sum of errors within each cluster (J), it was calculated using the formula (1)

$$J = \sum_{j=1}^{N}\sum_{i=1}^{K}\left(x_{ij} - c_j\right)^2, \quad (1)$$

where c_j is the centroid of the jth cluster, x_{ij} is the ith element in jth cluster

We also used the silhouette coefficient, which can be calculated using formula (2)

$$S = \frac{b-a}{\max\left(a,b\right)}, \quad (2)$$

where a is the average intra-cluster distance, b is the average distance to the nearest cluster

To determine the clustering quality, the Calinski – Harabasz index, calculated by formula (3), was used. The index is the ratio of the variance total between clusters and the variance for all clusters (where the variance is defined as the sum of the squares of the distances).

For a dataset E of size , which was grouped intok clusters, the Calinski – Harabasz estimate of s is defined as the ratio of the mean variance between clusters to the intra-cluster variance:

$$s = \frac{\mathrm{tr}\left(B_k\right)}{\mathrm{tr}\left(W_k\right)} \times \frac{n_E - k}{k-1}, \quad (3)$$

where tr(B_k) is the trace of the intergroup variance matrix, and tr(W_k) is the trace of the intra-cluster variance matrix, which are defined as follows:

$$W_k = \sum_{q=1}^{k}\sum_{x \in C_q}\left(x - c_q\right)\left(x - c_q\right)^T,$$

$$B_k = \sum_{q=1}^{k} n_q \left(c_q - c_E\right)\left(c_q - c_E\right)^T,$$

where cluster q has a number of points with C_q, C_q is the centre of cluster q, C_E is the centre of E, and n_q is the number of points in cluster q.

After determining the number of clusters, the time series K-means method was used. It is also a commonly used clustering method. Among others, the following methods were applied: affinity propagation, K-means, and hierarchical clustering (agglomerative clustering). The method is iterative and consists of trying different options for clustering objects, each time recalculating the standard deviation at the points of each cluster.

Results

In this work, we studied the current changes in the Russian labour market, conducted a correlation analysis, and formed clusters comprising the main economic sectors, identified based on data from Rosstat.

Chain coefficients of growth of wage levels for 28 sectors for 2010–2021 were included in the analysis (see Appendix 1). This approach allowed us to normalise the data and to neutralise the impact of scale on the results. Additional characteristics were also included for a more comprehensive analysis, namely average increase rate, maximum and minimum increase rates, standard deviation, and range.

The correlation analysis showed that, on average, an industry has a significant linear relationship (the Pearson correlation coefficient ≥0.65) with three other industries. For example, fishing and fish farming has a strong relationship with the manufacture of non-metallic mineral products, the electricity, gas, and water supply, and construction. For further consideration of the cluster analysis, we also used the results of correlation analysis. It was reflected in the characteristic division of industries into clusters (Appendices 1, 2).

A cluster analysis was conducted to study wage dynamics more closely. The elbow method and the silhouette coefficient were used to determine the number of clusters. The analysis allowed us to identify three clusters. Economic sectors were distributed among them (Figure).

In the study, the data were clustered using four different methods, namely: K-means, time series K-means, hierarchical clustering (agglomerative clustering), and affinity propagation. The best result was shown by time series K-means method based on such metrics as: silhouette coefficient and Calinski – Harabasz index (Table). It was used in the further analysis of the industries.

The cluster analysis divided sectors into three clusters, comprising nine, five, and fourteen sectors respectively (see Appendix 1).

Results and discussion

Based on the analysis, we can note that agriculture and hunting, fishing, wood processing, textile and clothing production are in the same cluster. It is worth emphasising that the above-mentioned industries belong to the primary sector of the economy, which, as disclosed in the article (Rastyannikova, 2016), has a common development vector.

The peak in wage growth for this cluster was evident in 2017, which may be related to government investment in the primary sector. In the article (Nikolaeva & Serdukova, 2018) it was noted that 143.9 billion roubles of subsidies

Table

Assessment of the quality of cluster analysis using different clustering methods

Parameters / Methods	Silhouette	Calinski–Harabasz
K-means	0,20	6,62
TimeSeriesKmeans	0,20	8,02
Agglomerative clustering	0,22	7,93
AffinityPropagation	0,11	6,23

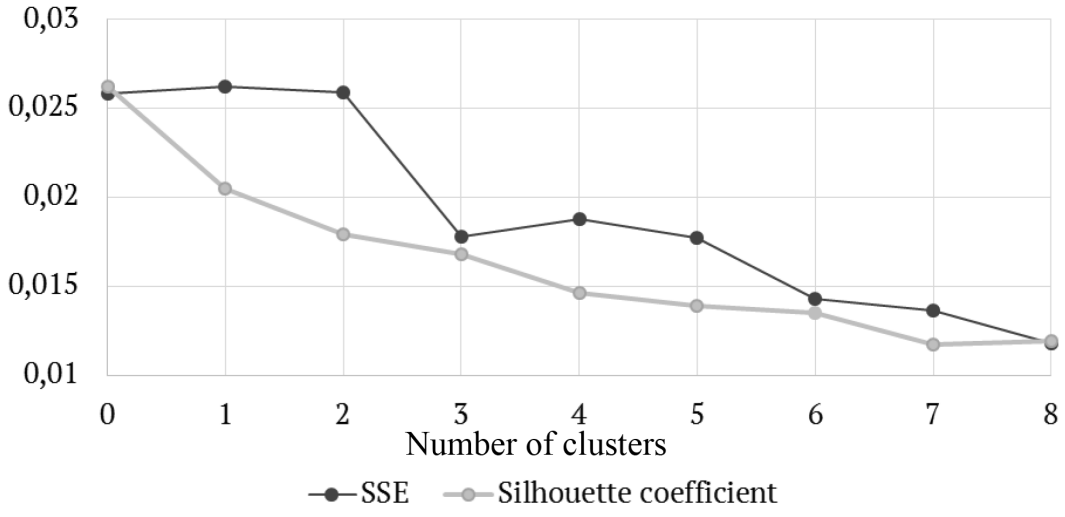

Fig. Visualisation of the elbow method (SSE) and the silhouette score used to identify the number of clusters [designed by the authors]

were allocated from the federal budget for the development of agriculture in 2017.

It is worth noting that the EU import and export restrictions remained in place in 2017, including those imposed on the public sector. The government issued a decree establishing a ban from 1 December 2017 to 1 December 2019 on using certain wood products manufactured outside the territory of the Russian Federation (with the exception of the EAEU states) in public procurement. It was aimed to protect the domestic market and support commodity producers. In the study (Tappaskhanova et al., 2018), it was noted that the decree significantly increased the demand for domestic products, which contributed to an increase in free funds in the woodworking sector.

The second cluster included such sectors as public administration, education, healthcare, as well as food production, including beverages and tobacco, as well as electricity, gas, and water supply. It should be emphasised that most of the industries included in the cluster are to a large extent financed and managed by the state. In the study of the education financing (Kookuyeva, 2013), it was noted that "federal, regional, and municipal budgets are the main sources of funding for education expenses. Extra-budgetary funds from entrepreneurship and sponsors, as well as voluntary donations and target contributions, play a minor role". On the other hand, in the healthcare sector, the main sources of funding are the federal budget, the budgets of the regions of the Russian Federation, local budgets, and compulsory medical insurance funds. The authors (Alekseeva & Shvetsova, 2016) noted that voluntary health insurance and paid services are among the sources, but their share is insignificant. The available funds that can be allocated for wages depend heavily on the state budget. This relationship may explain the similarity of changes in wage dynamics.

The third cluster is dominated by sectors related to the chemical industry and manufacturing (manufacture of electrical, electronic and optical equipment, manufacture of vehicles and equipment, manufacture of other non-metallic mineral products, chemical production, manufacture of leather, and pulp and paper production). In their study of unemployment in the pandemic of 2021 (Iskandaryan & Fadeeva, 2021), the authors noted that the widespread restrictions imposed due to the spread of COVID-19 had a negative impact on manufacturing industries, which was directly related to wage levels in those industries. In the study (Huynh et al., 2022), it was noted that pressure on the industrial sector increased in 2022 due to the conflict in Ukraine and the resulting anti-Russian sanctions and supply chain challenges. Both the number of export sales and the number of customers who continued to cooperate declined sharply. Lower capacity utilisation caused staff and wage reductions in much of the industrial sector. The negative effects on the sector are confirmed by Miller's report on industrial production dynamics (Kaukin & Miller, 2022): The trend component of the industrial production index showed a decline in the second quarter of 2022. It was mainly due to the sanctions imposed by several countries in response to Russia's special operation in Ukraine launched in February 2022.

Conclusions

In times of uncertainty, the most effective decisions need to be made, due to the scale of the potential consequences and their impact on the well-being of the population. It is worth noting that the introduced policies need to be designed taking into account the relationships in the market. This study expanded the scope of information on the economic sectors of the Russian labour market.

Our analysis allowed us to study the dynamics of the Russian labour market, the challenges faced by today's market, and their consequences, which will affect the structure of the labour market and the level of wages.

We conducted correlation and cluster analyses. The correlation analysis showed a significant

correlation between each of the considered sectors and the other three sectors included in the analysis. The cluster analysis identified three clusters, dividing the economic sectors on the basis of similarities in wage dynamics. The first cluster included, mostly, economic sectors belonging to the primary sector of the economy: agriculture, fisheries, and textile and clothing production. The second cluster consists of state-supported sectors: healthcare, public administration, and education. The last identified cluster includes the industrial sector: chemical production, pulp and paper production, manufacture of rubber and plastic products, etc. This analysis makes it possible to monitor changes in individual sectors and to forecast changes in similar sectors (belonging to the same cluster). This will allow improving labour market analysis and making the best possible decisions for the market.

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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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Appendixes

Appendix 1

Economic sectors according to the Rosstat classification

No	Economic sectors	Cluster number
1	Agriculture, hunting, and forestry	1
2	Fishing and fish farming	1
3	Mining of fuel minerals	3
4	Mining and quarrying, except of fuel minerals	3
5	Food production, including beverages and tobacco	2
6	Textile and clothing production	1
7	Manufacture of leather, leather goods, and footwear	3
8	Wood processing and manufacture of wood products	1
9	Pulp and paper production; publishing and printing	3
10	Chemical production	3
11	Manufacture of rubber and plastic products	3
12	Manufacture of other non-metallic mineral products	3
13	Metallurgy and manufacture of finished metal products	1
14	Manufacture of electrical, electronic, and optical equipment	3
15	Manufacture of vehicles and equipment	3
16	Other manufactures	3
17	Electricity, gas, and water supply	2
18	Construction	3
19	Wholesale and retail trade; repair of motor vehicles, motorbikes, and household and personal goods	3
20	Accommodation and food service	1
21	Transportation and communications	1
22	Finance	3
23	Real estate operations, rental, and service provision	3
24	Public administration and military security; social insurance	2
25	Education	2
26	Healthcare and social services	2
27	Provision of other utility, social, and personal services	1
28	Activities of extraterritorial organisations	1

Appendix 2

Correlation matrix of wages in different economic sectors

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	1,0	0,2	0,2	–0,1	–0,3	0,4	–0,1	0,1	0,5	0,1	0,3	0,3	0,5	0,2	0,2	0,1	–0,3	0,1	–0,2	0,6	0,7	–0,3	0,1	0,1	0,2	–0,2	0,3	0,2
2	0,2	1,0	–0,4	–0,5	–0,4	0,2	–0,4	0,0	–0,5	–0,4	–0,6	–0,7	0,1	–0,5	–0,6	–0,4	–0,7	–0,7	–0,5	0,1	0,0	–0,6	–0,3	–0,4	–0,3	–0,5	–0,1	0,1
3	0,2	–0,4	1,0	0,5	0,5	–0,5	0,7	–0,4	0,4	0,4	0,1	0,4	–0,3	0,6	0,5	0,4	0,6	0,6	0,4	0,0	0,3	0,1	0,4	0,4	0,3	0,6	–0,3	–0,2
4	–0,1	–0,5	0,5	1,0	0,8	–0,5	0,3	0,0	0,6	0,8	0,4	0,5	0,0	0,7	0,8	0,6	0,8	0,6	0,3	–0,3	0,0	0,5	0,1	0,4	0,1	0,4	–0,5	–0,2
5	–0,3	–0,4	0,5	0,8	1,0	–0,7	0,3	–0,3	0,2	0,6	0,1	0,2	–0,3	0,7	0,6	0,4	0,9	0,2	0,1	–0,5	–0,3	0,2	–0,3	0,4	0,2	0,6	–0,5	0,0
6	0,4	0,2	–0,5	–0,5	–0,7	1,0	–0,3	0,6	0,2	–0,2	0,4	0,0	0,8	–0,2	0,0	–0,3	–0,6	0,0	0,0	0,7	0,6	–0,1	–0,1	–0,3	–0,1	–0,7	0,4	0,3
7	–0,1	–0,4	0,7	0,3	0,3	–0,3	1,0	0,1	0,2	0,3	0,1	0,3	–0,4	0,5	0,4	0,6	0,6	0,6	0,7	0,1	0,2	0,4	0,2	0,0	0,1	0,3	–0,3	–0,2
8	0,1	0,0	–0,4	0,0	–0,3	0,6	0,1	1,0	0,2	0,4	0,3	0,2	0,7	0,2	0,4	0,2	–0,1	0,3	0,5	0,6	0,5	0,6	0,0	–0,2	–0,2	–0,7	0,0	0,3
9	0,5	–0,5	0,4	0,6	0,2	0,2	0,2	0,2	1,0	0,5	0,7	0,8	0,4	0,4	0,7	0,5	0,3	0,8	0,3	0,4	0,6	0,4	0,3	0,3	0,2	0,1	0,1	–0,1
10	0,1	–0,4	0,4	0,8	0,6	–0,2	0,3	0,4	0,5	1,0	0,3	0,6	0,2	0,8	0,9	0,6	0,7	0,4	0,4	0,1	0,3	0,5	0,0	0,4	0,4	0,2	–0,3	0,1
11	0,3	–0,6	0,1	0,4	0,1	0,4	0,1	0,3	0,7	0,3	1,0	0,5	0,5	0,4	0,5	0,2	0,2	0,5	0,3	0,3	0,3	0,4	0,0	0,2	0,0	–0,1	0,1	0,1
12	0,3	–0,7	0,4	0,5	0,2	0,0	0,3	0,2	0,8	0,6	0,5	1,0	0,2	0,5	0,6	0,7	0,5	0,8	0,5	0,4	0,5	0,4	0,5	0,6	0,5	0,3	0,3	0,2
13	0,5	0,1	–0,3	0,0	–0,3	0,8	–0,4	0,7	0,4	0,2	0,5	0,2	1,0	0,1	0,3	–0,1	–0,4	0,2	0,0	0,5	0,6	0,1	0,0	–0,2	–0,2	–0,7	0,2	0,3
14	0,2	–0,5	0,6	0,7	0,7	–0,2	0,5	0,2	0,4	0,8	0,4	0,5	0,1	1,0	0,9	0,6	0,8	0,5	0,4	0,1	0,3	0,3	–0,1	0,3	0,3	0,3	–0,3	0,2
15	0,2	–0,6	0,5	0,8	0,6	0,0	0,4	0,4	0,7	0,9	0,5	0,6	0,3	0,9	1,0	0,6	0,7	0,7	0,5	0,2	0,4	0,6	0,1	0,3	0,2	0,2	–0,3	0,0
16	0,1	–0,4	0,4	0,6	0,4	–0,3	0,6	0,2	0,5	0,6	0,2	0,7	–0,1	0,6	0,6	1,0	0,6	0,6	0,5	0,3	0,3	0,4	0,1	0,4	0,3	0,3	–0,1	0,3
17	–0,3	–0,7	0,6	0,8	0,9	–0,6	0,6	–0,1	0,3	0,7	0,2	0,5	–0,4	0,8	0,7	0,6	1,0	0,5	0,4	–0,3	–0,2	0,5	0,0	0,4	0,3	0,6	–0,4	–0,1
18	0,1	–0,7	0,6	0,6	0,2	0,0	0,6	0,3	0,8	0,4	0,5	0,8	0,2	0,5	0,7	0,6	0,5	1,0	0,8	0,3	0,6	0,7	0,7	0,2	0,1	0,1	–0,1	–0,2
19	–0,2	–0,5	0,4	0,3	0,1	0,0	0,7	0,5	0,3	0,4	0,3	0,5	0,0	0,4	0,5	0,5	0,4	0,8	1,0	0,4	0,3	0,8	0,4	0,1	–0,1	–0,1	–0,3	0,0
20	0,6	0,1	0,0	–0,3	–0,5	0,7	0,1	0,6	0,4	0,1	0,3	0,4	0,5	0,1	0,2	0,3	–0,3	0,3	0,4	1,0	0,8	0,1	0,1	0,1	0,2	–0,4	0,4	0,4
21	0,7	0,0	0,3	0,0	–0,3	0,6	0,2	0,5	0,6	0,3	0,3	0,5	0,6	0,3	0,4	0,3	–0,2	0,6	0,3	0,8	1,0	0,1	0,5	0,0	0,2	–0,3	0,2	0,1
22	–0,3	–0,6	0,1	0,5	0,2	–0,1	0,4	0,6	0,4	0,5	0,4	0,4	0,1	0,3	0,6	0,4	0,5	0,7	0,8	0,1	0,1	1,0	0,3	0,0	–0,3	–0,2	–0,4	–0,3
23	0,1	–0,3	0,4	0,1	–0,3	–0,1	0,2	0,0	0,3	0,0	0,0	0,5	0,0	–0,1	0,1	0,1	0,0	0,7	0,4	0,1	0,5	0,3	1,0	0,0	0,0	0,1	0,0	–0,5
24	0,1	–0,4	0,4	0,4	0,4	–0,3	0,0	–0,2	0,3	0,4	0,2	0,6	–0,2	0,3	0,3	0,4	0,4	0,2	0,1	0,1	0,0	0,0	0,0	1,0	0,8	0,7	0,4	0,3
25	0,2	–0,3	0,3	0,1	0,2	–0,1	0,1	–0,2	0,2	0,4	0,0	0,5	–0,2	0,3	0,2	0,3	0,3	0,1	–0,1	0,2	0,2	–0,3	0,0	0,8	1,0	0,7	0,6	0,3
26	–0,2	–0,5	0,6	0,4	0,6	–0,7	0,3	–0,7	0,1	0,2	–0,1	0,3	–0,7	0,3	0,2	0,3	0,6	0,1	–0,1	–0,4	–0,3	–0,2	0,1	0,7	0,7	1,0	0,1	–0,1
27	0,3	–0,1	–0,3	–0,5	–0,5	0,4	–0,3	0,0	0,1	–0,3	0,1	0,3	0,2	–0,3	–0,3	–0,1	–0,4	–0,1	–0,3	0,4	0,2	–0,4	0,0	0,4	0,6	0,1	1,0	0,4
28	0,2	0,1	–0,2	–0,2	0,0	0,3	–0,2	0,3	–0,1	0,1	0,1	0,2	0,3	0,2	0,0	0,3	–0,1	–0,2	0,0	0,4	0,1	–0,3	–0,5	0,3	0,3	–0,1	0,4	1,0

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Кластерный анализ отраслей российского рынка труда

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Предмет. В условиях значительных перемен, когда компании приостанавливают или полностью прекращают свою деятельность на территории РФ, возникают перебои с поставками комплектующих и логистические проблемы, встают вопросы планирования. Всё еще необходимо выстраивать планы по финансовой поддержке отраслей, которые в большей мере могут пострадать от происходящих изменений. Данные перемены влияют не только на объемы производства, но и на занятость и оплату труда работников секторов. Для принятия наиболее эффективных решений необходим комплексный анализ динамики развития. В статье рассмотрены взаимосвязи между отраслями экономики на основе среднего уровня заработных плат, что является важным фактором, отражающим вектор развития сектора.
Цели. Исследование специфики российского рынка труда на основе среднего уровня заработных плат по отраслям. Определение схожих секторов экономики.
Методология. В процессе изучения использовалась классификация экономических отраслей, основанная на методологии, разработанной Федеральной службой государственной статистики. В работе термины «сектор экономики» и «отрасль экономики» используются как синонимы. Применялись следующие методы научного познания: измерение, описание, моделирование. Исследование построено на изучении актуальной научной литературы – как отечественной, так и зарубежной.
Результаты. Показана группировка экономических отраслей на основе таких характеристик, как цепной темп прироста, средний прирост, минимальное и максимальное значение, стандартное отклонение и размах изучаемого временного ряда. Сформированные кластеры, в свою очередь, отражают специфику включенных в них отраслей, что подкрепляет результаты проведенного анализа.
Выводы. В ходе анализа было выявлено три кластера, отрасли которых разделяют общую динамику развития. Первый кластер включает в себя экономические отрасли, входящие в первичный сектор экономики. Во втором кластере можно выделить отрасли, поддерживаемые государством, а третий отражает отрасли, входящие в промышленный сектор.

Ключевые слова: анализ, направления развития рынка труда, анализ вектора развития экономического сектора, рынок труда.

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