Labour Resources use in the National Economy: G7 and Russia Comparative Analysis

Svetlana Pshenichnikova, Elena Kolesnik, and Vladimir Plotnikov

Introduction

In the past two years, the global economy and national economies have been developing under the powerful influence of the Covid-19 pandemic (Borio, 2020; Nadezhina et al., 2021; Pirogova et al., 2021; Vertakova & Feoktistova, 2020; Zhang et al., 2020). This led, in most cases, to a slowdown in economic growth or even to its termination. Prospects for further development are closely linked to the success in the fight against the pandemic. At the same time, economic dynamics is governed not only by random factors (for example, a pandemic), but also by fundamental factors. The main fundamental factor of economic growth is the number of resources involved in the economic turnover (extensive factor) (Senhadji, 2000; Shabbir et al., 2020), as well as their quality (intensive factor) (Pogodaeva & Senchenko, 2017; Saleem et al., 2019).

It is the resources that determine the long-term socio-economic dynamics (Akaev & Hirooka, 2009; Pradhan et al., 2019). Therefore, their analysis and assessment of their impact on economic growth should be priority issues for study. Within the framework of this article, an analysis was made of the use of one of the types of resources—labour resources. The research was carried out on empirical materials from the G7 countries (G7: Canada, France, Germany, Great Britain, Italy, Japan, USA) and Russia. When referring to these countries together, the article uses the term "G8". The purpose of the article is to analyse labour resources using in the national economies of G8 countries.

S. Pshenichnikova (✉) · E. Kolesnik · V. Plotnikov
St. Petersburg State University of Economics, St. Petersburg, Russian Federation

A. Rumyantseva et al. (eds.), *Challenges and Solutions in the Digital Economy and Finance*, Springer Proceedings in Business and Economics,
https://doi.org/10.1007/978-3-031-14410-3_12

Materials and Methods

The research used data from international (World Bank, OECD, etc.) and Russian (Federal Agency of State Statistics of Russia) statistics, as well as quantitative and qualitative assessments and developments cited in the literature and business media. The analysis of the use of labour resources in the G8 was carried out by examining data on employment. The analysis used a binary classification of types of employment—flexible and rigid:

1. Flexible employment is associated with high labour market volatility. With flexible employment, the market reacts to changes with small losses in time, effort, costs, and efficiency. Flexible employment is provided by two factors: flexibility of the workplace; flexibility of payment for work. Employment flexibility means weakening the value of the standard work contract. Temporary, seasonal contracts, work on schedule, self-employment, outsourcing, etc. are being developed (Vertakova & Kurbanov, 2016).
2. Hard employment is associated with the execution of traditional labour contracts. On the one hand, it gives rise to high inertia and weak adaptability of the labour market. On the other hand, tough employment is the stabilizer of the economy, allowing it to be more resilient in the face of crises.

The concept of flexible and rigid employment was developed by Pshenichnikova in relation to the macroeconomic level of the economic system (Pshenichnikova, 2017). Pshenichnikova's concept is based on econometric modelling. Flexible employment implies a unidirectional, synchronous change in the dynamics of the number of employed and the dynamics of the volume of GDP. The coefficient of employment elasticity in terms of GDP in the long run is equal to or close to this value (unit elasticity). Rigid employment is due to either multidirectional or asynchronous changes in the studied indicators. In this case, the coefficient of elasticity takes values in the range from zero to one, or more than one. Then, in general terms, the dependence of employment on the volume of GDP can be interpreted as inelastic or elastic.

Rigid employment is heterogeneous in essence and form of manifestation. It may differ not only in the value of the elasticity coefficient, but also in the peculiarities of the relationship between the dynamics of employment and GDP. There are several typical situations:

1. Percentage fluctuations in GDP are more significant than fluctuations in the size of the employed labour force. This is "straight" rigidity.
2. The fall in GDP is more catastrophic compared to employment. This is "reverse" rigidity, which implies the impossibility of reducing employment. In this case, employment is maintained within a certain range, naturally, there may be an inefficient use of labour. At the same time, unemployment does not increase significantly, and, consequently, social tension does not reach the "boiling point". At the same time, the decline in production, while maintaining the number of

employees and the absolute size of the wage fund, reduces the amount of income of other factors of production.

In an earlier study (Pshenichnikova & Pshenichnikov, 2016; Romanyuk et al., 2019) A classification of the G7 countries and Russia was proposed by the type of labour strength. As a result, two groups of countries were identified:

1. Germany, Russia, France, Japan. From the point of view of identifying the types of macroeconomic employment in these countries, at the beginning of the study period, the inverse rigidity of employment is observed, which then turns into direct rigidity of employment. That is, the type of employment in these countries is "mixed rigid". The transition from reverse to direct employment rigidity in Germany took place in 2003, in Russia in 2005, in France in 2004, and in Japan in 2010. The inverse employment rigidity determines the unstable dynamics of economic growth and labour productivity. This transition indicates positive processes: there is a positive growth rate of labour productivity, stabilization of the situation in the traditional sector of the economy and the creation of conditions for the further development of the innovation sector.
2. Great Britain, Italy, Canada, USA. The largest GDP growth in 2018 compared to 1995 is achieved in Canada (301.9%) and the United States (292.1%). In this group of countries, the type of employment is direct, rigid, which indicates an efficient sectoral structure of production, as well as an effective structure of the labour force consumed. Constant positive growth rates of labour productivity arising from the direct rigidity of employment indicate a favourable economic situation in both the traditional and innovative sectors of the economy.

Results and Discussion

A study was carried out on the demographic situation, economic activity of the population, gender and age composition of the population, unemployment rate, level of education, state of fundamental science, growth of labour productivity, level of wages. Based on this analysis, it is possible to single out the features of the quantitative and qualitative characteristics of the reproduced labour force in the G7 countries and Russia.

1. The number of employed in different countries differs significantly (Table 1). For example, in Russia, the number of employed is more than two times less than in the American economy: in the Russian Federation in 1990–75.3 million people, in 2014–75.7 million people, in 2017–72.1 million people; in the USA in 1990–-151.0 million people, in 2017–153.3 million people. The maximum number of employed among the group of countries studied was reached in the USA in 2013–163.1 million people.
2. After the 2008 crisis, the G8 countries have seen a drop in GDP and a slight increase in employment, except for Japan, where the number of employed fell from 67.4 million people in 1997 to 65.3 million people in 2013. In 2009, labor

Table 1 The number of employed labour force in the G7 and Russia, 1990–2017, thousand people

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Russia	75,325	75,421	75,580	73,289	71,003	71,160	70,322	68,837	67,877	72,978	73,524	72,311
G8 share, %	18.8	18.6	18.6	18.1	17.5	17.4	17.1	16.7	16.4	17.2	17.3	17
Great Britain	29,340	29,231	28,933	28,729	28,733	28,720	28,847	29,006	29,032	29,353	29,589	29,574
G8 share, %	7.3	7.2	7.1	7.1	7.1	7.0	7.0	7.0	7.0	6.9	6.9	6.9
Germany	37,155	39,773	39,693	39,756	39,800	39,931	40,203	40,405	40,645	40,491	40,445	40,481
G8 share, %	9.3	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.6	9.5	9.5
Italy	23,830	24,006	23,255	23,134	22,964	22,826	22,925	22,947	23,078	23,239	23,311	23,519
G8 share, %	5.6	5.9	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.5	5.5	5.5
Canada	14,669	14,746	14,720	14,807	14,931	15,023	15,151	15,386	15,647	15,949	16,206	16,465
G8 share, %	3.7	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.8	3.8	3.8	3.9
USA	131,154	131,437	133,025	134,067	136,192	137,995	139,994	142,528	144,665	146,800	148,723	149,967
G8 share, %	32.8	32.5	32.7	33.1	33.6	33.8	34.1	34.5	34.8	34.7	34.9	35.2
France	25,716	25,696	25,887	26,017	26,102	26,258	26,595	26,587	26,775	27,060	27,220	27,283
G8 share, %	6.4	6.4	6.4	6.4	6.4	6.4	6.5	6.4	6.4	6.4	6.4	6.4
Japan	63,257	64,403	65,335	65,755	66,082	66,372	66,872	67,447	67,427	67,194	67,006	66,861
G8 share, %	15.8	15.9	16.1	16.2	16.3	16.3	16.3	16.3	16.2	15.9	15.7	15.7
G8 total	400,446	404,713	406,428	405,554	405,807	408,285	410,909	413,143	415,146	423,064	426,024	426,461
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2013	2017
Russia	73,020	72,208	72,999	73,773	74,661	75,788	76,421	76,350	76,185	76,213	75,928	72,100
G8 share, %	17.0	16.8	16.8	16.8	16.9	17.0	17.0	17.0	16.9	16.9	16.7	16.7
Great Britain	29,866	30,169	30,394	30,662	31,108	31,205	31,573	31,690	31,783	31,965	32,381	32,000
G8 share, %	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.1	7.1	7.1	7.4
Germany	40,430	40,287	40,868	41,394	41,849	42,190	42,267	42,411	42,465	42,390	42,144	41,700
G8 share, %	9.4	9.4	9.4	9.4	9.5	9.5	9.4	9.4	9.4	9.4	9.3	9.6
Italy	23,874	24,247	24,738	24,674	24,864	24,923	25,289	25,133	25,151	25,282	25,472	23,000
G8 share, %	5.6	5.6	5.7	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.3

Canada	16,936	17,353	17,583	17,738	17,964	18,342	18,656	18,751	18,930	19,123	19,488	18,400
G8 share, %	3.9	4.0	4.1	4.0	4.1	4.1	4.2	4.2	4.2	4.2	4.3	4.3
USA	151,083	152,030	153,226	155,191	156,990	158,168	159,731	159,692	159,300	160,635	163,166	153,300
G8 share, %	35.2	35.3	35.3	35.4	35.5	35.5	35.5	35.5	35.4	35.6	35.9	35.4
France	27,609	28,246	28,443	28,717	28,863	29,100	29,332	29,645	29,752	29,847	30,029	26,900
G8 share, %	6.4	6.6	6.6	6.6	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.2
Japan	66,380	66,122	65,855	65,899	65,937	66,259	66,142	65,917	66,190	65,952	65,383	65,300
G8 share, %	15.5	15.4	15.2	15.0	14.9	14.9	14.7	14.7	14.7	14.6	14.4	15.1
G8 total	429,198	430,662	434,106	438,048	442,236	445,975	449,411	449,589	449,756	451,407	453,993	432,700

Source: UNCTAD, World Bank

Table 2 Unemployment rate in the G8, 2019

Country	Unemployment rate, %
Italy	10.0
France	8.4
Canada	5.7
Russia	4.5
United States	3.7
Great Britain	3.7
Germany	3.1
Japan	2.4

Source: International Labor Organization

force employment increased in the UK—by 0.3%, Germany—by 0.3%, Canada—by 0.4%, France—by 1.2%. In the USA, labor force employment increased significantly over the period under study—by 32 million people, namely from 131.1 million people in 1990 to 163.1 million people in 2013, but then decreased by ten million people.

As can be seen from these indicators, crises in the global economy have had a significant impact on fluctuations in the number of employees and the level of employment. The level of economic activity (the ratio of the economically active population to the total population) in the Russian economy has grown in recent decades. It reached the maximum value among the studied countries and amounted to 53%. The minimum value of the indicator was observed in 2012 in Italy (42%), and the maximum value (52%)—in Germany. Thus, the level of economic activity in Russia is higher than in the G7, which indicates a more intensive use of labor in the Russian economy.

According to data for 2019 (as in previous years), the lowest unemployment rate in the G8 is observed in Japan (2.4%), and the highest in Italy (10.0%) (Table 2). Russia occupies, as is the case with the level of employment, the average position in terms of unemployment, behind Japan, Germany, Great Britain, and the United States.

Labor productivity growth is observed in all G8 countries. This is because in these countries a lot of attention is paid to technological progress and innovation (Bodrunov & Plotnikov, 2017). The Russian Federation has the lowest labor productivity during the period 1990–2013. In the G8 countries, on average, labor productivity per hour worked increased by 38.82% over 1990–2013. In the United States, this parameter is the highest, which indicates the presence of a highly skilled workforce and the widespread use of modern technology. According to the data for 2019, the leader among the G8 countries in terms of production per employee (in purchasing power parity) is the United States (USD 116,384). The lowest values of the indicator are in Japan and Russia (Table 3).The average monthly nominal wages in the G8 countries, except for Japan (decrease by 1.02 times), are growing steadily. In Canada, during the study period, it increased 1.9 times, in France—1.8 times, in Italy—2 times, in Great Britain—2.4 times. The minimum wage in 2013 was recorded in Russia, and the maximum—in Canada.

Table 3 The volume of production per 1 employee (in 2011 prices, at PPP, 2019)

Country	Volume of production, USD
USA	116,384
France	96,446
Italy	92,296
Germany	90,492
Canada	85,726
Great Britain	81,370
Japan	75,384
Russia	75,384

Source: International Labor Organization

Conclusion

An analysis of the materials presented allows us to assert that most of the quantitative parameters characterizing the labor force in the Russian economy correspond to the level of the G7 countries. These indicators include the level of official unemployment, the share of the economically active population. However, in terms of the qualitative characteristics of the total labor force, Russia lags far behind the economically developed countries of the world. This is evidenced by such indicators as the low share of spending on education and science in the structure of GDP; low proportion of specialists with secondary vocational education; low costs for training one student and one scientist; ineffective system of training and retraining of personnel; unfavorable demographic situation; low wages; low level of labor productivity.

The unfavorable reproductive characteristics of the total labor force in Russia are holding back economic growth. It is necessary to minimize them through the implementation of a well-thought-out public policy. To achieve this goal, it is necessary to solve a set of tasks, the most important of which should be the following: targeted training of specialists for the innovation sector; allocation of additional funds to finance fundamental science; implementation of various social projects and programs to increase the number of research and teaching staff; taking measures to reduce unemployment.

Analysis of data on the reproduction of labor in the Russian economy allows us to conclude about a general decrease in the efficiency of this process. During structural transformations for the transition of the economy to a market type of management, the Russian economy, which in the Soviet period of development occupied a leading position in the quantity and quality of the labor force, began to reduce efficiency. The observed inverse rigidity of employment testifies to this: the characteristics of the reproduced labor force reduced the efficiency of the functioning of the national economy. Structural transformations, together with the introduced market institutions, have reduced the overall efficiency of the sectors of the economy.

The G8 countries can be grouped into two groups in terms of labor productivity. The leading positions are occupied by the USA, France, and Canada, in which there has been a constant and steady growth in labor productivity over the period

1990–2013. The rest of the countries can be included in the second group. The socio-economic successes of the developed countries of the world are due to the effective use of production factors, namely, the interaction of a highly qualified workforce and an active purposeful investment process. The efficiency of interaction of factors of production is expressed in the growth of labor productivity.

The qualitative and quantitative characteristics of the reproducible labor force, when interacting with investments in the economic system, can provide a change in the type of employment of the labor force; change the ratio of the scale and volume of the traditional and innovative sectors. As a result, the efficiency of the functioning of the entire economic system may change, since a competitive innovation sector is able to ensure the progressiveness of economic development, and in the long term, affect the type of economic system.

References

Akaev, A. A., & Hirooka, M. (2009, April). A mathematical model for long-term forecasting of the dynamics of innovative economic activity. In *Doklady Mathematics* (Vol. 79, No. 2, pp. 275–279). SP MAIK Nauka/Interperiodica.

Bodrunov, S., & Plotnikov, V. (2017). Institutional structures influence on the technological development of the economic system. In *Proceedings of the 30th International Business Information Management Association Conference, IBIMA 2017-Vision 2020: Sustainable Economic development, Innovation Management, and Global Growth* (pp. 2658–2665).

Borio, C. (2020). The Covid-19 economic crisis: Dangerously unique. *Business Economics, 55*(4), 181–190.

Nadezhina, O., Zaretskaya, V., Vertakova, Y., Plotnikov, V., & Burkaltseva, D. (2021). European integration risks in the context of the COVID-19 pandemic. *International Journal of Technology, 12*(7), 1546–1556. https://doi.org/10.14716/ijtech.v12i7.5396

Pirogova, O., Temnova, N., & Markova, E. (2021). Online education in Russia: Status and development trends. In *E3S Web of Conferences (Vol. 258). EDP Sciences*. https://doi.org/10.1051/e3sconf/202125810020.

Pogodaeva, T., & Senchenko, N. (2017). Institutions and economic growth in the resources intensive use economies. In *Country Experiences in Economic Development, Management and Entrepreneurship* (pp. 105–123). Springer.

Pradhan, R. P., Arvin, M. B., Nair, M., Bennett, S. E., & Bahmani, S. (2019). Short-term and long-term dynamics of venture capital and economic growth in a digital economy: A study of European countries. *Technology in Society, 57*, 125–134.

Pshenichnikova, S. N. (2017). *The structure of the economic system: The role of the labor force*. Kultinform-Press.

Pshenichnikova, S. N., & Pshenichnikov, R. S. (2016). The impact of employment and investment on economic growth in the G8 countries. *Proceedings of the St. Petersburg State University of Economics, 3*(99), 7–16.

Romanyuk, I., Pshenichnikova, S., & Plotnikov, V. (2019). The relationship of employment, economic growth and economic structure (The example of Russia). *Revista ESPACIOS, 40*(32), 30.

Saleem, H., Shahzad, M., Khan, M. B., & Khilji, B. A. (2019). Innovation, total factor productivity and economic growth in Pakistan: A policy perspective. *Journal of Economic Structures, 8*(1), 1–18. https://doi.org/10.1186/s40008-019-0134-6

Senhadji, A. (2000). Sources of economic growth: An extensive growth accounting exercise. *IMF Staff Papers, 47*(1), 129–157.

Shabbir, A., Kousar, S., & Kousar, F. (2020). The role of natural resources in economic growth: New evidence from Pakistan. *Journal of Economics, Finance and Administrative Science.* https://doi.org/10.1108/JEFAS-03-2019-0044

Vertakova, Y. V., & Feoktistova, T. V. (2020). Implementation of anti-crisis measures for the population and business in the context of the COVID-19 pandemic. *Economics and Management, 26*(5), 444–454. https://doi.org/10.35854/1998-1627-2020-5-444-454

Vertakova, Y., & Kurbanov, A. (2016). Outsourcing as a form of disintegration process administration in the economy. In *Vision 2020: Innovation Management, Development Sustainability, and Competitive Economic Growth* (pp. 2158–2167).

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters, 36*, 101528.