ISSN 0798 1015

REVISTA ESPACIOS

HOME Revista ESPACIOS ÍNDICES A LOS AUTORES

EDUCACIÓN • EDUCAÇÃO • EDUCATION Vol. 39 (# 21) Year 2018. Page 40

Human Capital in Russia's Economy: Issues in its Formation and Prospects for its Development

El capital humano en la economía rusa: Problemas en su formación y perspectivas para su desarrollo

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Received: 01/04/2018 • Approved: 20/04/2018

Contents

1. Introduction
2. Methods
3. Results
4. Discussion
5. Conclusion
References

ABSTRACT:

This paper examines some of the major trends in and prospects for the formation of human capital within Russia's economy. The current period of the world's economic development is characterized by stepped-up investment in intellectual human capital. In science, human capital is construed differently. On the one hand, it is viewed as a functional element of innovative activity that incorporates knowledge, skills, practical experience, and the intellectual capacity for producing new knowledge that will ensure the derivation of intellectual rent. On the other hand, the formation of human capital is influenced by investment in healthcare, intellect, productive labor, and the quality of people's life. The work identifies 3 groups of factors influencing the formation and development of human capital in Russia: demographic factors, social-economic factors, and the level of education and science. The authors have conducted an analysis of demographic and social-economic factors based on indicators of the size, structure, and lifespan of the nation's population, as well as those of the state of the nation's healthcare system, the state of its labor market, and the population's income levels. The paper provides an assessment of the effect of social-economic conditions on Russia's education system and examines both some of the positive changes in the system of education and science and some of the unresolved issues affecting the formation of human capital. Based on their analysis, the authors propose a set of activities aimed at boosting the quality of and enhancing the conditions for the reproduction of human capital within the frame of each group of factors. The work puts forward a systemic approach to resolving the integrated issue of the formation and subsequent development of human capital in Russia, which is expected to help guide the nation's economy to the innovative path of development.

Keywords: human capital; demographic factors; labor market; population's income levels; system of education; scientific activity; mechanisms for the development of human capital; innovative development

RESUMEN:

Este documento examina algunas de las principales tendencias y perspectivas para la formación de capital humano dentro de la economía rusa. El período actual del desarrollo económico mundial se caracteriza por una mayor inversión en capital humano intelectual. En ciencia, el capital humano se interpreta de manera diferente. Por un lado, se lo considera como un elemento funcional de la actividad innovadora que incorpora el conocimiento, las habilidades, la experiencia práctica y la capacidad intelectual para producir nuevos conocimientos que garanticen la derivación de la renta intelectual. Por otro lado, la formación del capital humano está influenciada por la inversión en atención médica, intelecto, trabajo productivo y la calidad de la vida de las personas. El trabajo identifica 3 grupos de factores que influyen en la formación y el desarrollo del capital humano en Rusia: factores demográficos, factores socioeconómicos y el nivel de educación y ciencia. Los autores han realizado un análisis de factores demográficos y socioeconómicos basado en indicadores del tamaño, la estructura y la duración de la vida de la población del país, así como del estado del sistema de salud de la nación, el estado de su mercado laboral y los niveles de ingresos de la población. El documento proporciona una evaluación del efecto de las condiciones socio-económicas en el sistema educativo de Rusia y examina algunos de los cambios positivos en el sistema de educación y ciencia y algunos de los problemas no resueltos que afectan la formación del capital humano. Con base en su análisis, los autores proponen un conjunto de actividades destinadas a aumentar la calidad y mejorar las condiciones para la reproducción del capital humano en el marco de cada grupo de factores. El trabajo presenta un enfoque sistémico para resolver el problema integrado de la formación y el posterior desarrollo del capital humano en Rusia, que se espera ayude a orientar la economía de la nación hacia el camino innovador del desarrollo.

Palabras clave: capital humano; factores demográficos; mercado de trabajo; niveles de ingreso de la población; sistema de educación; actividad científica; mecanismos para el desarrollo del capital humano; desarrollo innovador

1. Introduction

The global economic system is characterized by a change in the basis of competitive advantage which enables business entities to survive and develop in the outside environment. The industrial and post-industrial periods of society's development were characterized by the struggle of business entities for the ability to make rational use of resources to derive profit or obtain some other real gain. The current – innovative – period is distinguished by an augmentation of the role of non-material assets and an amplification of investment in intellectual human capital. The 21st century will be dominated by an innovative economy, in which economic growth is ensured through the application of new to existing knowledge. It is man who is the key carrier of knowledge, innovative ideas, and work skills. As early as in the 2nd half of the 20th century, T.W. Schultz noted that human capital formed through education becomes a decisive factor in the economy's competitiveness (Schultz, 1960). In fact, the issue of development of human capital is increasingly gaining significance for Russia with each passing day.

The Russian state is trying to create, on a market economy basis, the right conditions for the formation of human capital that is needed for the nation to shift to innovative development. The 1st attempt at valuation of Russia's human capital was made by scholar R.I. Kapelyushnikov, using the lifetime income method (Kapelyushnikov, 2013). The significance of issues related to the process of formation of human capital is due to the fact that the shift to an innovative economy, which presupposes the active use of new knowledge, requires enhancing the nation's education system with a view to changing the actual nature of the process of formation of human capital (Roshchin & Rudakov, 2014).

The application of the achievements of scientific thought within the frame of the theory of human capital in the present-day context has helped assess the effect of demographic and social-economic factors on the formation of Russia's human capital factoring in the latest transformations in the area of education and science.

2. Methods

2.1. Concept and structure of human capital

Scholars have long been divided over what human capital is, what its specific characteristics are, and, what is most important, what the primary factor for its formation is. Many scholars construe human capital based on the object of their research. For instance, L.C. Thurow viewed human capital as people's ability to produce products and services. E.G. Dolan and D.E. Lindsey construe human capital as a set of intellectual abilities acquired by learning or direct experience (Dolan & Lindsey, 1992).

Russian scholars A.I. Dobrynin and E.D. Tsyrenova see eye to eye in that human capital is humans' accumulated reserve of knowledge, abilities, skills, and motivations that are employed in public production and facilitate boosts in labor productivity and income (Korchagin, 2004). Within the context of this study, the most relevant definition of human capital is the one put forward by S.G. Mikhneva, who construes human capital as a functional element of innovative activity that incorporates all kinds of knowledge, skills, practical experience, and intellectual capacities for producing new knowledge that will ensure the obtaining of intellectual rent and other competitive advantages (Mikhneva, 2003). The authors are perfectly fine with this approach but deem it advisable, given the present-day state of the Russian economy, to supplement the definition of human capital with investment as another factor alongside health, intellect, high-quality and productive labor, and people's quality of life. This aspect draws attention to the issue of formation of human

capital, namely which factors or investment in which values, socially significant values, and moral-ethical and cultural mindsets will help form quality human capital capable of competing successfully in the present-day economy.

The concept of quality or positive human capital is employed by a number of scholars, including Yu.A. Korchagin, who suggests dividing human capital into negative (destructive) and positive (creative) (Korchagin, 2008). The key difference between these 2 concepts, in the authors' view, is in that in periods of major economic changes positive human capital will be an indispensable factor for economic growth and positive structural shifts in a recessional economy, while negative human capital will become unusable for resolving creative objectives.

The issue of identification of the quality of human capital is becoming important today for Russia, as its current strategy for economic development based on import substitution requires that the state and its citizens react in quality, creative, and prompt ways to emerging internal and external challenges. In this regard, the authors attach much importance to the issue of determining the structural elements of Russia's present-day human capital and identifying ways to form it.

2.2. Factors influencing the formation of human capital

G.S. Becker, one of the founders of the theory of human capital, believed that the basis for the formation of human capital is education. Its economic efficiency is determined as the difference between the lifetime income of those with a college degree and those who did not continue their education beyond high school (Becker, 1964). This kind of approach to determining ways for the formation of human capital is quite logical. Yet, to the authors, it works better for developed Western nations, which are traditionally characterized by robust processes of capital accumulation, steady growth in public reproduction, and the ability to always meet the needs of their citizens. When it comes to Russia, the issue of determining ways for the formation of human capital is of a systemic, structural, and multi-aspect nature. It is investing in education and science that ensured in the past the advanced development of Western civilization – the nations of Europe and North America – as opposed to other nations, including Russia. Present-day attempts by the Russian government to overtake arrears in creative activity and innovation are crashing against the incontestable postulate that human capital has to be formed through, above all, investing in the level and quality of people's life, including their health, upbringing, and education.

P.R. Gregory notes that "Russian infant mortality and death rates in 1861 were not much different from those of Germany, Italy, and Austria-Hungary a decade earlier. Forty years later, Russian infant mortality was virtually unchanged, whereas in the other countries it had declined significantly. The advances in public health services experienced in Europe were not shared by the masses in the Russian villages. Russia was obviously backward relative to its major European competitors" (Gregory, 2003). Note that back then already the Russian economy ranked 4th–5th among the top European economies, which had been achieved through tremendous labor costs – by no means based on the quality of labor itself and that of human capital. Right now, economic losses incurred in Russia as a result of premature mortality and disability total 10–14% of the nation's GDP per year (Solodukha, Vasyutina, Erokhin, Matraeva, & Starostenko, 2016).

Observations by P.R. Gregory closely echo a model proposed by A. Gerschenkron, who describes the Russian economy as an "Asian" development type economic model distinguished by the attainment of high capital accumulation levels mainly through major reductions in people's quality of life. The model is characterized by high levels of investment and low levels of consumption and by low indicators of economic development (Gerschenkron, 1965). Today, many decades later, these trends in the development of the Russian economy appear to have smoothed out only slightly and their boundaries are no longer that distinct, but they have not gone away entirely. The nation is still characterized by a great deal of income differentiation both monetarily and non-monetarily. In Russia, there is currently a 60–75 times gap between the nation's so-called 'elites' and 'lower classes', which is one of the primary signs of social tension and dissatisfaction in society. Based on official statistics, in 2015 the share of people earning less than the living wage was 13.3%, and with income below the poverty line – 6.9%. With contrasts like this, one can hardly visualize the formation of quality human capital in Russia from the perspective of the innovative development of its economy as a whole. This brings you back to the state's regulating role in the process of formation of human capital and makes you admit that investing in the quality of life of ordinary citizens is currently the basis for all subsequent positive changes in human capital.

Today – in the 21st century – we get to remember what A. Marshall stated back in the early 20th century regarding a set of key factors "on which depend health and strength, physical, mental and moral. They are the basis of industrial efficiency, on which the production of material wealth depends". To the scholar, these key factors include humans' most essential needs, satisfying which governs the quality of their life: food, the environment and housing conditions, and the state of health, which is determined by the accessibility of healthcare services. If you trace this thought a bit further, you will come across a chain of factors almost entirely aligned with A. Maslow's hierarchy of needs. A. Marshall stresses that leisure is as essential to the development of man as material means of subsistence, like food and clothing. Mindful of the state's role in ensuring people's quality of life, A. Marshall wrote: "There is no better use for public and private money than in providing public parks and playgrounds in large cities [for the benefit of the working man]" (Marshall, 1920).

Thus, the findings of the authors' examination of the issue in a retrospective of scientific thought and through the prism of many years' experience gained from the development of Western civilization indicate the absolute necessity of investing in people's quality of life and fostering in them a positive attitude toward the environment they live and work in. This is the foundation for the formation of national human capital. It is worth remembering that no factor of production will benefit society in a proper manner without the input of human effort.

2.3. Human capital as a key factor of production

Human capital can mitigate limitations associated with constant or diminishing returns in a broad sense and can, therefore, lead to long-term per-capita growth with no exogenous technological progress. Consequently, the production of human capital can be an alternative to improvements in technology as a mechanism for generating long-term growth (Barro & Sala-i-Martin, 2003).

R.J. Barro and X.I. Sala-i-Martin view human capital as a resource the use whereof is governed by the law of alternative costs. The use of this resource in the production of a certain good limits the potential for using it in the production of other goods. Yet, it is worth considering here the following crucial characteristic of human capital: compared with material factors of production, human capital is characterized by a great deal of mobility in terms of territorial placement. Man is the carrier of all production functions, the fundamental unit and basis of human capital. Governed by their own economic behavior, humans are capable of choosing where to be stationed and how to employ their skills in work activity, which can be done through migration.

The process of migration of human capital is analogous to the mobility of financial capital. The difference is in that financial capital moves from countries with a lower rate of return to those with a greater one, while human capital migrates from countries with lower pay and less favorable conditions for subsistence to those with higher wages and better living conditions. In characterizing this kind of movement of human capital, it is necessary to differentiate between 'migration' and 'circulation of minds'. It is logical to presume that the mass migration of manpower from one country to another should automatically improve the level and quality of the receiving country's human capital. But normally that is not the case, as immigrants would not only have to possess significantly greater human capital than an average resident of the receiving country but this difference would also have to make up for the losses incurred based on the fact that immigrants are unable to bring with them much physical capital. It is for this specific reason that R.M. Solow notes, in describing his model for economic growth, that this condition will hardly ever be fulfilled, as in the overwhelming majority of cases migrants are characterized by having less human capital than the residents of the receiving country (Solow, 1969).

Compared with migration and emigration, the circulation of minds covers various areas of the movement of human capital among countries and organizations for the creation, dissemination, and utilization of all kinds of knowledge, methods, and technologies, which may stimulate the development of national economies along the way. This phenomenon is more democratic in significance than "brain drain", as it rather implies an 'exchange of minds' between different countries and organizations, with each participant deriving a certain benefit from it. By contrast, "brain drain" presupposes high-level workers specializing in various areas leaving one country for another, i.e. moving to an area that offers better living conditions and better pay to those with decent professional skills and knowledge. The brain drain issue was a major concern in Russia in the early 1990s, when the lack of a clear understanding of the prospects for the nation's future economic development forced some of its best minds to leave their homeland for good and seek a better use for their knowledge overseas. Today, the issue is off the agenda, but this does not mean it is not there anymore. Under present-day economic conditions, many young and promising specialists, and, above all, young scientists, are having a hard time fulfilling their potential in light of declines in the prestige of certain occupations, with pay offered in these areas being not only much lower than in Western Europe but also low relative to the average figures across the Russian economy as a whole. This is indication that the basis for the formation of quality human capital in the nation going forward is quite unstable.

Thus, the process of formation of human capital in Russia lacks systemicity, with the nation lacking a clear-cut state concept on the strategic development of human capital. Huge income gaps among different groups within the population are impeding the development and practical implementation of a general concept on the formation of human capital in Russia.

3. Results

Among the numerous factors influencing the formation and development of human capital in Russia, the most significant ones fall into the following 3 groups:

- demographic factors;

- social-economic factors;

- level of education and science.

Demographic factors include indicators of the size, structure, and lifespan of the population and those of the existing healthcare system. The findings from an assessment of Russia's demographic indicators of the past 20 years indicate that, starting in 2014, they had been having an overall positive effect on the development of the nation's human capital. However, starting in 2015, the Russian Federation has been entering a long period of natural decrease in population. Based on projected estimates, one is to expect the continuation of the trend of the number of people of working age declining through to the late 2020s. The period 2015–2030 is projected to witness a 20% rise in the number of people of retirement age, and their share is expected to increase from 24% to 29%. Consequently, if Russia's retirement age does not change in the near future, 1 in 3 Russians will be a retired person. This trend may negatively impact on the size of human capital capable of taking part in the Russian economy.

An issue that continues to be a major concern in the Russian Federation today is modernizing the nation's healthcare system through boosting the quality of primary medical care. This is attested to by the population's growing need for quality first aid medical care. Boosting the quality of Russia's healthcare system is possible only through improving the efficiency of general practice doctors concerned with ambulatory care. An issue that remains relevant today is the further material-technical retrofitting of hospitals and bolstering their human resources potential. Russia's present-day healthcare system is in need of greater integration among different healthcare providers.

Among the social-economic factors influencing the formation of human capital and the efficiency of its use are the current state of development of all structural elements of the labor market and the size of household income. Today, a major issue in regulating Russia's labor market is not just the ability to meet the nation's demand for manpower but also achieve as much employment for the population as possible. No less importance is attached to keeping work motivation levels high, boosting the quality of a workplace, and raising the size of pay, which, in large part, determines the nation's household income.

The most acute issue facing the present-day Russian labor market is the high level of unemployment, which is taking toll on the social-economic situation in the nation. A surplus of manpower may lead to the overall underproduction of the social product, declines in tax revenue coming into the state budget, declines in the level of qualification among the unemployed, and declines in household income. Russia's labor market is characterized by a regional imbalance in level of employment, which is a result of the unequal distribution of industrial production across the country.

A key factor in increased unemployment is the degradation of human resources, which leads to overall declines in human capital. In this regard, special significance is attached to issues related to employment among the population and its professional training and retraining. The state's ineffective policy in the area of income regulation and insufficient support for the socially unprotected strata of the nation's population are resulting in large income gaps between the rich and the poor. The Russian Federation has yet to remediate the mismatch between the living wage and the national minimum wage, which may negatively reflect on workers' overall motivation and the potential for the reproduction of human capital. Under these conditions, there is special relevance in the need to put in place in Russia a more streamlined system of social-labor relations that will involve conducting systematic monitoring of the state of the nation's labor market and adjusting the state's policy for regulating employment and income levels.

The formation of human capital is influenced by the size of household income and the degree of development of scientific activity in the nation. A result of this process is accumulated knowledge and skills that are employed in certain types of activity. Today's social-economic conditions are having a predictable effect on the education system in Russia. The changes pursued by the government are aimed, on the one hand, at maintaining the guarantee of accessible education for the population, and, on the other hand, at amplifying the education system's role in boosting the nation's economic competitiveness through the development of professional competencies aimed at enhancing the quality of human capital.

The period 2010–2015 witnessed a number of transformations within Russia's system of secondary-level vocational and higher education. Upgrading curricula in alignment with requirements set by professional standards will help ensure the preparation of specialists in the most sought-after occupations and trades taught at institutions of secondary-level vocational learning. Implementing in a number of Russian constituent entities the state's project on the use of a dual model for learning has helped boost the quality of knowledge and practical skills acquired by graduates from educational institutions. The acquisition of these competencies helps boost the human capital of this group within Russia's population and has a positive effect on the prestige of secondary-level vocational education. Higher education continues to be in high demand in Russia. In 2015, the share of the nation's 17-year-olds admitted into institutions of higher learning totaled over 90% of the overall number of citizens in that age group. However, access to higher education varies across social-economic groups within the population. The labor market is calling for implementing in Russia special applied baccalaureate programs. These programs are expected to help boost the qualitative characteristics of the nation's accumulated human capital.

The structure of Russia's scientific workforce that formed in the period 2010–2015 and the efficiency of its scholarly activity may have a negative impact on the size and intellectual component of human capital going forward. In said period, the share of young scientists aged below 29 years in the total number of researchers rose from 19.3 to 20.2%. Scientific activity by Russian researchers is currently characterized by low levels of publication activity in journals indexed by Web of Science and Scopus.

In the period 2010–2015, the volume of investment in Russia's education system, which directly influences its accessibility and quality, remained below the average figures posted by the Organization for Economic Cooperation and Development (OECD). However, Russia's key achievement is the national education system being funded mostly by the state, despite the nation lagging behind the world's more developed regions.

4. Discussion

4.1. Effect of demographic factors on the formation and development of human capital in Russia

The development of human capital in Russia is influenced significantly by the size and structure of its population. The findings of an assessment of demographic indicators for the past 2 decades indicate that, starting in 2014, the nation has witnessed some positive dynamics reflected in an increase in the size of its population, which is due to not just the influx of migrants but also the fact that the number of births in the nation has exceeded that of deaths. In 2016, Russia's population increased 2.3% on 2005 and totaled 146.5 million people, posting a natural increase of 32,000 and a migration-based increase of 245,400 people. In addition, in March 2014 the nation's population also grew due to the incorporation of Crimea into and formation of the Crimean Federal District within the Russian Federation.

Russia's population continues to grow by virtue of migration. The total number of migrants officially registered in the Russian Federation in 2016 was 598,600 people, of which 531,100 came from CIS member states, 11,400 – from EU member states, and 50,900 – from other countries. Based on projections by the Russian Federal State Statistics Service, in the period 2016–2029 Russia's migration-based population increase is expected to total 3.1 million based on the agency's low projection, 4.6 million based on its medium projection, and 6.1 million based on its high projection (Rosstat, 2016).

When it comes to the gender-and-age structure of Russia's population, as of January 1 2015 males account for 68.1 million of the population and females for 78.4 million people. Of the overall population, 74% live in cities and 26% in rural areas.

Of the total population, those younger than working age account for 17.6% of the population, those of working age – 58.4%, and those of older than working age – 24%. Russia is currently witnessing a trend toward a decline in the number of people of working age. This is due to the small-numbered generation of those born in the 1990s entering the market and the large-numbered generation of those born in the 1950s exiting it. The incorporation of Crimea into the Russian Federation in 2014 increased the number of citizens of working age by 253,000 people. The negative trend is expected to continue through to the late 2020s, until comparatively large-numbered generations born after 2005 begin to enter the labor market.

The findings from an analysis of a set of forecasts indicate that maintaining the migration-based increase at a level of 300,000–350,000 people per year will virtually not have changed the size of Russia's population by 2030. This will be possible provided the current birth rate and trends in change in life expectancy persist.

The level of development of Russia's human capital is influenced, apart from the population's size and structure, by such a significant demographic indicator as its life expectancy. Over the past few years, the nation has posted the highest figures in terms of the birth rate and life expectancy at birth. In 2015, these were registered at 1.9 million people and 71.4 years respectively, with the nation's life expectancy coming in at 65.9 years among males and 76.7 years among females (Rosstat, 2016). However, in life expectancy Russia appears to be behind most of the world's more developed countries.

In the period 2010–2015, the average life expectancy in Western Europe was 81.2, in Japan – 83.3, in Israel – 82.1, and in the US – 78.9 years (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2017).

Life expectancy in Russia is directly linked to the process of aging. In 2014, the number of retired citizens in Russia increased by nearly 1.4 million people, including by 0.6 million as a result of the incorporation of Crimea into the Russian Federation, and came in at around 35.2 million at the end of the year (Higher School of Economics, 2016). Despite declines in the rate of increase in the number of people of retirement age, it is projected to increase by 7.2 million (20%) by 2030. This means that the number of retired people in Russia will increase from 24 to 29%, i.e. 1 in 3 Russians will be a retired person if the government does not change the nation's current retirement age. However, Russia is behind the world's developed nations in level of aging by nearly 25 years.

Right now, the share of Russia's citizens aged 65 and older is 13.5%. This indicator was posted by Germany in the late 1970s, Sweden – in 1975, and Japan – in the late 1990s. Around that time, Western European nations carried out reform of their retirement support system. By 2025, the share of people aged 65 and older is projected to increase to 25% in Germany, 30% in Japan, 22% in Sweden (Ministry of Health, Labour and Welfare, 2016), and just 17.8% in Russia (Higher School of Economics, 2016). This lag may be due to Russia's relatively high mortality rate, on the one hand, and short life expectancy at older ages, on the other hand.

Due to its high mortality at older ages, Russia's "depth of aging" (23%), measured by the share of people aged 80 and older in the group of people aged 65 years and older, is lower than Europe's, with Japan's approaching 30% and Germany's – 27%. Despite the nation's low aging levels, nearly 30% of older Russians live alone, i.e. are not part of a wedded couple (to compare, in Canada the figure is 25% and France – 23%), which has a direct effect on life expectancy.

In assessing the effect of life expectancy on the development of human capital in Russia, it is worth noting that the nation's share of lonely females in any age category is a lot greater than that of lonely males. This may be due to gender differences, both in life expectancy and in matrimonial status. Females live 12 years longer than males. In contrast with females, most males at older ages are part of a wedded couple.

A crucial factor that influences the formation and development of human capital in Russia is its healthcare system. For the 1st time in the past few decades the nation has managed to stop funding the sector in a residual manner. State expenditure on healthcare increased by 74% in real terms in the period 2005–2015 (Higher School of Economics, 2016). In the past 5 years, the capacity of Russia's outpatient care organizations has risen 5.7%. In total per-capita expenditure on healthcare Russia is currently behind Argentina, at the same level with Turkey and Brazil.

Despite the above gains, it should be noted that in the period under analysis the number of hospital organizations making up the basis of Russia's healthcare system has declined by 41% – in 2016 there were 5,600 of them with a total nursing staff of 1.5 million. A significant impact on the development of Russia's healthcare system has come from the effects of the global economic crisis, with the state experiencing an overall decline in fiscal revenue. In 2013, growth in real state expenditure on healthcare was halted (Rosstat, 2016).

Recently, due to the implementation of a number of large-scale state programs Russia has been able to thoroughly transform its healthcare's material-technical base, which is much different now compared with the post-Soviet period. Many institutions have been provided with state-of-the-art diagnostic and medical equipment, with a focus being placed on assimilating cutting-edge medical technology and scaling up activities related to the prevention of medical conditions. Hospital institutions in large Russian cities are currently well on a par with leading European clinics in technological infrastructure. As a result, the number of patients provided with high-tech medical care rose in 2015 by 63.9% and totaled 715,600 people.

Due to the state's policy on healthcare, the nation's mortality rate declined from 13.3 per 100,000 people in 2012 to 13.1 in 2015. A positive development was an increase in pay for medical workers: physicians – by 11%, middle grade medical staff – by 8.3%, and junior medical staff – by 3%. Russia has preserved access to free medical care and continues to implement activities aimed at restructuring its healthcare system with a view to boosting its efficiency. The measures undertaken by the government as part of its healthcare policy are expected to provide, in the mid run, boosts in people's quality of life and the reproduction of human capital in Russia.

4.2. Effect of social-economic factors on the formation and development of human capital in Russia

Among the crucial factors influencing the formation and development of human capital are the nation's standard of living and dynamics of employment and unemployment. During the period of transition to a market economy, Russia was faced with a plethora of social-economic issues, which were reflected in declines in Russian people's standard of living and in the efficiency of the labor market's operation.

Society's standard of living and welfare imply the degree to which the population is provided with material and spiritual benefits in correspondence with the existing system of needs. A key indicator to characterize people's welfare is household income.

In Russia, cash income per capita rose in the period 2010–2015 from 18,958 to 30,225 rubles (by 1.6 times). However, this increase is inclusive of the inflation factor, the impact of which is behind a significant drop in the rate of growth in real disposable income per capita (from 105.9 to 90.4%). Between 2014 and 2015, there was a trend of real household earnings declining. The largest relative share in the structure of household income in Russia in 2015 was held by wages – 66%, followed by pensions and social allowances – 18%. The share of household income from entrepreneurial activity and property was about 16%.

Russia's household income is highly differentiated across sectors of the economy. In 2015, the highest average monthly pay was registered in the sector of production of coke and petroleum products – 81,605 rubles, extraction of oil and gas – 71,418 rubles, and financial activity – 70,088 rubles, while the lowest pay was recorded in textile and garment manufacture – 15,758 rubles and agriculture and forestry – 19,721 rubles. Thus, there is a 5-times gap in pay across the nation's economic sectors.

In the period 2010–2015, Russia's living wage rose from 5,688 to 9,701 rubles (1.7 times). The share of people with income below the living wage increased in said period from 12.5 to 13.3%. A key reason behind this is declines in state support for the socially unprotected strata of the population. There is a significant gap between the nation's living wage and minimum wage. In 2015, the official national minimum wage was 5,965 rubles, which was 1.6 times less than the nation's living wage.

The trend toward declines in real per-capita income and increases in the number of citizens with income below the living wage is leading to social stratification in society, which is substantiated by a high Gini coefficient, a measure of statistical dispersion intended to represent the income or wealth distribution of nation's residents (Ho & Mauro, 2014). In said period, Russia posted a slight decline in the above indicator, from 0.421to 0.412. Comparing the figure with Gini coefficient values posted by European nations (0.2 to 0.3) leads to the conclusion about a major wealth divide in Russia (Dollar, Kleineberg, & Kraay, 2014; Solt, 2014). At year-end 2015, the Russian Federation ranked 58th among 142 nations in standard of living. This is quite a low figure attesting to the need to adjust the state's policy for regulating the nation's household income.

Household income is inseparably linked to the state of and trends in the development of the labor market. A key issue in its operation is the ratio of employment to involuntary (forced) unemployment. The size of economically active population in the Russian Federation rose in the period 2010–2015 from 75.5 to 76.6 million people, an increase of 1.5%. At year-end 2015, the employed portion of the population was dominated by workers from the manufacturing and processing sector (14.3%) and commerce and the service sector (18.4%). In the period under analysis, Russia's labor market was characterized by a trend toward boosts in the level of the population's participation in labor power from 67.7 to 69.1%. Consequently, the population's overall economic activity in the above period was characterized by a trend toward growth.

In the period 2010–2015, the level of unemployment in Russia, as calculated based on a methodology employed by the International Labour Organization (ILO), decreased from 7.3 to 5.6%. The findings from the authors' research suggest that the actual level of unemployment in the country is much higher that the official one, i.e. the one determined based on the ILO's methodology. On average, in the period 2010–2015 the total number of unemployed citizens in Russia was 4.7 times the number of people registered with job placement authorities. The results from sample surveys of the population on issues related to employment attest that in 2015 around 70% of the unemployed were searching for work on their own. Russian statistics do not factor in hidden unemployment, which arises when a worker is officially employed but is unable to work on a full-time basis. However, the issue is becoming quite relevant with many organizations in Russia at this time.

The Russian labor market is distinguished by a significant imbalance in the level of unemployment across regions. Russia's constituent entities territorially close to the capital are characterized by the lowest unemployment levels – 1–3%, while in remote regions, like Zabaykalsky Krai and the Tyva Republic, the figure is as high as 10–15%. A key reason behind this is the unequal distribution of industrial production across regions. Within the unemployed portion of Russia's population, the largest relative share in the period 2010–2015 was held by the urban population – an average of 66%. The share of males in the total number of unemployed citizens exceeded that of females in said period by 6%. The average age among the nation's unemployed in 2015 was 38 years, while the highest level of unemployment was posted by youth aged below 25 years. This may be due to strict requirements set by employers to potential human resources, including in the way of previous work experience, which most young graduates from institutions of higher learning may not have physically. In addition, Russia has been characterized by low levels of employment among youth, which

may be attributed to the desire to receive higher education (Lyashok & Roshchin, 2017).

High unemployment levels in Russia are a consequence of the low efficiency of the national economy, declines in industrial production volumes, and declines in the state's fiscal revenue. Thus, one of the highest-priority objectives for the Russian government to pursue is enhancing state policy in the way of creating new jobs and generating as much employment as possible. Today, this issue is not being given the attention it deserves, with official unemployment levels in Russia being low and not reflecting the real state of affairs in the labor market, which is having a negative impact on the formation and reproduction of the nation's human capital.

4.3. The effect of education and science on the formation of human capital in Russia

Education, as a component part of human capital, will have a "positive effect on the rate and quality of economic growth" (Kapelyushnikov & Luk'yanova, 2010), if it is used rationally. Research indicates that "human capital is distributed unequally across the nation's major social-demographic groups: males have greater human capital than females, young people have greater human capital than older people, and people with higher education have greater human capital than those with lower levels of education" (Borshcheva, 2016). Thus, the nation's current system of training and retraining directly influences the quality and size of human capital. The May 2016 'How's Life in the Russian Federation?' report by the OECD placed Russia into the Middle Performers group in level of education with a rank of 24th out of 38 nations. Having said that, the report points out that in Russia, in terms of "education and skills, 94.7% of adults have attained at least an upper secondary education, much higher than the OECD average of 76.4%" (Bobylev & Grigor'ev, 2016).

The present-day level of development of production requires new approaches to preparing qualified workers, office employees, and mid-level specialists, including by reference to best international practices. Russia's system of secondary-level vocational education has undergone some major changes over the past few years. The government has upgraded most school curricula in alignment with requirements set by major professional standards. Some of the activities undertaken are aimed at training specialists in 50 most promising and sought-after fields as part of secondary-level vocational education. Changes in the content of learning will not only help learners boost their competencies but will also enable them to take part in the WorldSkills Competition to demonstrate their excellence in skilled trades and technology training. Russia's entry into WorldSkills International is one of the major steps in boosting the attractiveness of the national system of secondary-level vocational education taken in recent years.

To improve the quality of training of mid-level workers and specialists, in 2016 the government set up interregional competence centers in 7 constituent entities of the Russian Federation (the Republic of Tatarstan, the Chuvash Republic, Khabarovsk Krai, Moscow Oblast, Tyumen Oblast, Ulyanovsk Oblast, and Sverdlovsk Oblast). These centers will provide the basis for testing experimental curricula for the training of specialists for the market's most sought-after occupations and subsequent use of the best of them within Russia's system of secondary-level vocational training.

For the purposes of developing and testing educational models combining theoretical preparation with practical on-site training, the government is currently implementing in 13 constituent entities of the Russian Federation a special project entitled 'Training of Human Resources Meeting the Needs of High-Tech Sectors of Industry based on Dual Education'. The project involves 105 institutions of learning, nearly 21,000 students, more than 5,500 mentors, and over 1,000 companies. It has helped to work out a set of methodological recommendations for RF constituent entities regarding the implementation of the dual model, inclusive of best practices in secondary-level vocational training aimed at preparing highly qualified human resources.

Thus, secondary-level vocational training is currently becoming Russia's most sought-after and mobile sector of education, which is also having a positive effect on the size and quality of human capital. However, there are some issues that may impede the innovative development of professional school going forward. For instance, the nation is currently making irrational use of specialists with a secondary-level vocational education, including due to the lack of prospective forecasting of the needs of the labor market. In this regard, it may help to conduct monitoring of the quality of training for human resources and job placement activities for graduates from institutions of secondary-level vocational learning. Activities of this kind will help obtain information on the nation's accumulated and actually employed human capital within the frame of this specific group within Russia's population. This is going to facilitate the development of more efficient ways to manage human capital aimed at the innovative development of the Russian economy.

Higher education is a crucial factor in boosting human capital. In Russia, the relative share of the adult population with a higher education is quite high among OECD member states, but it somewhat varies across age groups. In 2015, it was 40.3 and 20.8% for individuals ages 25–34 and 55–64 respectively, while in Switzerland the figure was 48.6 and 32%, the UK – 41.6 and 24.3%, Japan – 39.2 and 23.0%, the US – 36.1 and 30.9%, Canada – 34.4 and 22.3%, Germany – 29.2 and 24.9%, and France – 27.7 and 11.9%.

In Russia, higher education programs covered 35.4% of the population ages 17–25 in 2010 and 32.1% in 2015. Demand for higher education in Russia has remained quite high in recent years. In the period 2010–2015, the share of the nation's 17-year-olds admitted into institutions of higher learning was 80.0–91.1% of the overall number of citizens in that age group, the figure totaling just 50.1% in 2000 (Bondarenko et al., 2017). Notwithstanding that Russian higher education is accessible almost for everyone, access to it remains unequal among different social-economic groups within the population. Among the factors limiting the potential for receiving it are living in a rural area, a large family, and financial strains.

Areas for and the quality of training for individuals with a diploma of higher education do not always meet the needs of the Russian labor market. To improve the situation, the government has been engaged in developing and implementing special applied baccalaureate programs. These programs are aimed at enabling learners to acquire both the theoretical knowledge and practical skills sought after the most in the market. In 2015, entrants admitted into applied baccalaureate programs accounted for 5% of all entrants admitted to pursue a bachelor's degree or a specialist's degree. In 2018, the share of applied bachelors is expected to total no less than 30% of all college students in Russia. These changes in the system of professional training should have a positive effect on the qualitative characteristics of the nation's accumulated human capital. Knowledge and skills acquired as part of applied higher learning will help graduates get a job in the field that they majored in. Thus, the maximum alignment of the characteristics of the nation's future workers with the needs of the workplace will facilitate the effective management of human capital and development of competitive sectors within the Russian economy.

The development of human capital results in the engagement of huge volumes of information in production. That being said, in recent years Russia has witnessed a decline in the number of personnel engaged in research and development. In 2000 the figure was 887,700 individuals, while in 2015 – 738,900 (Rosstat, 2016). The development of science directly depends on the size and continuity of researchers' generations. In the period 2010–2015, the share of young scholars aged below 29 in the total number of researchers rose from 19.3 to 20.2%, and aged 30–39 – from 16.3 to 22.7%. The share of researchers aged 60 and older stayed virtually unchanged in the above period and remained the highest in the nation – 25.8% in 2010 and 25.5% in 2015. This trend may signify that research-and-development organizations are not capable of retaining young talent, and youth are not willing to do science and prefer other, more lucrative and attractive, types of activity.

An indicator that characterizes the successfulness of scientific activity is citation count. It is commonly believed that the greater the significance of a scientific finding, the more often it will cited. As a result, they determine the citation index, which is currently quite low with Russian publications. In the period 2011–2015, citations per article among Russian scholars publishing in journals indexed by Web of Science and Scopus totaled 3.84 and 3.54 respectively. Other nations have demonstrated much higher rates in that respect. For instance, in Azerbaijan the figures are 7.36 and 5.69, Australia – 10.36 and 9.48, Germany – 9.73 and 9.31, Italy – 8.92 and 8.89, Norway – 8.88 and 9.83, the US – 6.90 and 9.78, Japan – 5.52 and 6.21, China – 8.88 and 4.77, and Singapore – 6.96 and 11.25. One of the key reasons behind low citation levels among Russian scholars is their low publication activity. In 2015, Russia accounted for just 2.42 and 2.61% of the overall number of publications in scholarly journals indexed by Web of Science and Scopus respectively. To compare, publication activity among foreign scholars was as follows: in Australia – 3.63 and 3.27%, Germany – 6.72 and 6.13, Italy – 4.30 and 3.88, the US – 23.95 and 22.32, Japan – 4.92 and 4.64, and China – 19.29 and 18.04% (Gorodnikova et al., 2017). Thus, the current situation may have negative implications in the future for the intellectual component of human capital. If the findings of research conducted by Russian scholars are published domestically only, there will be no international exchange of views on issues from various areas of activity.

The accessibility and quality of education are directly associated with investing in the education system. These factors not only help increase human capital but also help foster competitive advantages globally for the nation. Russia's rate of growth in expenditure on education has been on the decline due to global trends of economic development rates falling within the system of funding the education sphere.

In the period 2010–2015, amid stabilizing volumes of state expenditure on education in the GDP of developed nations (over 5% in 2015), most developing economies were characterized by an effort to, likewise, direct state policy at growth in this indicator (an average of 3% in 2015) (United Nations Development Programme, 2016). These differences are associated with not just the level of economic development of different nations and their access to financial resources but also with different objectives pursued as part of their state educational policy. The share of state expenditure on education in Russia's GDP (3.6% in 2015) is below the average figure for OECD member states (5.6% in 2015), including Norway, which has the highest figure (6.2%). The Russian Federation is also behind in share of expenditure on education in the overall volume of state expenditure (10.2% in 2015 as opposed to 12.9% across OECD member states, with the highest figure posted by New Zealand – 18.4%) (Bondarenko et al., 2017). However,

while Russia is behind the world's top 7 developed economies in this respect (exclusive of Japan), it is still leading the way in one significant area: the sphere of education being funded predominantly by the state (with Finland and Poland following a similar system of funding).

The findings from the authors' analysis indicate that the Russian state is currently characterized by both positive changes in the system of education and science and a set of unresolved issues affecting the formation of human capital.

5. Conclusion

Over the past 10–20 years, Russia has experienced a decline in the size and quality of its human capital. The findings from the authors' analysis indicate that the issue is of an integrated nature and its resolution, therefore, requires taking a systemic approach. This presupposes developing, and then implementing in practice, a set of activities within the frame of each group of factors influencing the formation and development of human capital in Russia.

To augment the positive effect of demographic factors on human capital in Russia, it will help to:

- minimize mortality among citizens of working age through putting in place a cutting-edge system of prevention and diagnosis of medical conditions;
- put in place a healthcare delivery system that will ensure a maximum increase in indicators of health status in the population per unit of input;
- continue the process of material-technical retrofitting of hospitals and bolstering their personnel potential;
- boost the integration of input by different medical services and units at healthcare institutions.

All of the above-mentioned activities are expected to boost the population's lifespan, which the efficiency of Russia's human capital directly depends on.

To boost the positive effect of social-economic factors on Russia's human capital, it helps to employ an integrated approach to regulating the labor market, with a focus on the following activities:

- boosting the targeting of state support for the employment of the nation's population;
- raising minimum unemployment benefits to the level of the national minimum wage;
- organizing the interaction between the public employment service and private staffing agencies;
- facilitating the mobility of workers in accordance with strategy for the state's economic and innovation-based development;
- enhancing the system of social support for the population;
- indexing pay to inflation and raising the national minimum wage to the level of the living wage;
- developing and funding special programs for fostering small business and self-employment amongst the population, including freelancing.

In order to boost the potential of the system of education and science with a view to boosting the size and quality of human capital in Russia, it is required to:

- enhance the quality of education to enable each individual to achieve accredited learning outcomes that lend themselves to evaluation, including through the development of cutting-edge learning materials and relevant curricula;
- fostering youth human capital through cultivating in youth, as part of the learning process, the skills sought after in the market today and taking appropriate measures to resolve the issue of getting employment in the occupation trained for;
- overhauling existing mechanisms underlying financial support for the system of education and science with a view to boosting their efficiency.

The issue of how big Russia's human capital will get in the event the activities proposed are carried into effect in practice and how it will differ from that of other nations requires further analysis. It will help to have access to detailed data characterizing the outcomes of implementation of various programs at the federal and regional levels. This information will help to establish a correlation between the various groups of factors influencing human capital *and* its size in Russia.

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Revista ESPACIOS. ISSN 0798 1015
Vol. 39 (Nº 21) Year 2018

[Index]