1. Concept of Human Capital

The term "human capital" refers to the stock of skills and knowledge embodied in the ability to perform labor so as to produce economic value. It is the knowledge and skills gained by a worker through education and experience. Many early economic theories refer to it simply as workforce, one of three factors of production, and consider it to be a fungible resource—all the same and easily interchangeable. Other conceptions of labor dispense with these assumptions.

Adam Smith, the founder of classical economics, defined fixed capital as that which affords revenue without circulating or changing masters. He included productive capacities of workers in fixed capital.

In some way, the idea of "human capital" is similar to Karl Marx's concept of labor power: he thought in capitalism workers sold their labor power in order to receive wages. But Marx strongly distinguished between somebody's capacity to work, labor power, and the activity of working. A free worker cannot sell his capacities in one go; it is far from being a liquid asset. He does not sell his skills, but contracts to utilize those skills, in the same way that an industrialist sells his produce, not his machinery. An employer must be receiving a profit from his operations, so that workers must be producing what Marx thought of as surplus-value, i.e., doing work beyond that necessary to maintain their labor power. Workers are still dependent on the owners of non-human wealth for their livelihood.

Human capital and the productive power of labor are both dependent on the division of labor. There is a complex relationship between the division of labor and human capital.

The modern concept on human capital was formalized by T. Schultz, G. Becker and J. Mincer. The best-known application of the idea in economics is that of the "Chicago School". Becker's book entitled Human Capital, published in 1964, became a standard reference for many years. In this view, human capital is similar to physical means of production, e.g., machines, into which additional investment yields additional output. Human capital acquisition is an asset and is substitutable, but not transferable like fixed capital.
The introduction of the term is explained by the unique characteristics and role of knowledge. Unlike physical labor and the other factors of production, knowledge is expandable and self-generating with use, transportable, and shareable. Now human capital is central to debates about education, health care, migration, and welfare.

Following Becker, economists often distinguish between “specific” and “general” human capital. Specific human capital refers to skills or knowledge that is useful only to a single employer or industry, whereas general human capital (such as literacy) is useful to all employers. Economists view firm specific human capital as risky, since firm closure or industry decline lead to skills that cannot be transferred.

Some labor economists have criticized the Chicago-school theory, claiming that it tries to explain all differences in incomes in terms of human capital. But wages can be higher for employees on aspects other than human capital. Some variables include gender and nativity wage differentials, discrimination in the workplace, and socio-economic status. Some economists point to the existence of market imperfections such as non-competing groups and labor-market segmentation.

Educated individuals migrate from poor countries to rich ones seeking opportunity and incomes. Often it has been pointed with respect to the “brain drain” or “human capital flight”. The loss of human capital is considered a problem that can only be offset by further draws on the human capital of poor nations via immigration. Being able to move from one area to the next is ability and a benefit of having human capital.

The 20th century is sometimes named as the “human capital century” by scholars. A new mass movement toward secondary education paved the way for a transition to mass higher education. New techniques and processes required further education than the norm of primary schooling, which thus led to the creation of more formalized schooling across the nation. These advances produced a need for more qualified and skilled labor, which caused the wages of occupations that required more education to considerably diverge from the wages of ones that required less. This divergence created incentives for individuals to postpone entering the labor market in order to obtain more education.

There is a positive correlation between high school enrollment rates and GDP per capita. Less developed countries have not established a set of institutions favoring equality and role of education for the masses and therefore have been incapable of investing in human capital stock necessary for technological and innovative growth.

In 1990s some researches concerning “intellectual capital” in organizations have appeared. Study in “social capital” and even “creative capital” has actively developed in 2000s. The World Bank has used the idea of human capital in new concept of national wealth.
In Russia active studies in these topics have begun in 1990s, although some economists conducted research into economics of education and healthcare already in Soviet period.

I guess that human capital is complex dissimilar phenomenon of a post-industrial economy. It has complex stratified internal structure, which is dynamic developing. Therefore human capital should be describe not only on individual level (as personal capital), but on collective levels as well. According to aggregate levels it can be studying at micro-level (individuals, families, firms), at medium level (regions or corporations), and at macro-level (national economy or multinational corporations), and even at whole world scale.

In each level human capital might be divided in different, relatively independent components, which characterize different economic aspects of individuals or coalition of people. Those elements I call funds of human capital as they create certain stocks, which exist in real terms and have some potential. And I name them assets of human capital in case they flow, are actively used and generated incomes.

In my opinion, the main assets (funds) of human capital include:
- Intellectual capital (education, knowledge, scientific and innovative (R&D) funds);
- Capital of skills (qualifications, competences, experience);
- Capital of health;
- Capital of mobility (migration);
- Capital of economic motivation;
- Capital of entrepreneurship (competitiveness);

<table>
<thead>
<tr>
<th>Assets (funds) of human capital</th>
<th>Aggregate levels</th>
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<tr>
<td></td>
<td>micro</td>
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<td></td>
<td>Individual</td>
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<td>Intellectual capital</td>
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<td>education fund</td>
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<td>(competitiveness)</td>
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<td>Social capital</td>
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Social capital.

The general structure of human capital might be formalized like in a matrix:

That performance pretend to estimate and analyze different aspects of human capital and investment in it based on a system, regularly, without contradictions and just easier presentation.

Further I'd like to describe some aspects of Russia's national human capital. As human capital present people’s economic capacities, merge with individuals, it is important to bear in mind demographic situation.

2. Demographic Development

Russian Federation is the ninth most populous nation with 142 million people in 2009, including work-force as of 74 million. It is a diverse, multi-ethnic society. Though population is comparatively large, its density is low because of the country's enormous size. 73% of the population lives in urban areas. The median age of Russians — 37.6 years — is relatively low.

Russia's population peaked in 1991 at 149 million but began to experience a rapid decline starting in the mid-90s. The decline has slowed to near stagnation in recent years. The first stage of the Russian demographic crisis emerged in the mid-1960s. In 1992, the latent depopulation became manifest. The population was declining as a result of social, economic, and lifestyle changes.

In 2006, for the first time in eight years of economic growth, a significant increase of life expectancy at birth was reported. In 2007, the average life expectancy in Russia was 61.5 years for males and 73.9 years for females. The combined average life expectancy of 67.7
years at birth was 10.8 years shorter than the overall figure in Europe. The gender imbalance remains and there are 0.86 males to every female. In 2008, the population declined by 121,400 people, or by $-0.085\%$ (0.15% in 2007 and 0.37% in 2006).

The main causes of Russia’s population decrease are a high death rate and low birth rate. Russia remains among countries with very low fertility. The biggest factor contributing to relatively low life expectancy for males is a high mortality rate among working-age males from preventable causes (e.g., alcohol poisoning, stress, smoking, traffic accidents, and violent crimes).

The next stage is continuation of natural population decrease coupled with unfavorable changes in age composition. The resulting demographic challenges of Russia are:

- natural population decrease, entailing decline of total population;
- rapid natural decrease of working-age population;
- growing demographic burden on the working-age population;
- general ageing of the population;
- decline in the number of potential mothers;
- a large influx of immigrants;

Russia faces a unique task of supporting high economic growth rates despite decline in labor force.

3. Migration

The complex and contradictory are migration processes. To sum up, Russia has received 80% of the Soviet territory, 60% of assets, 65% of industrial facilities — yet only 51% of the population. An expansive territory with a relatively small population explains the present-day large-scale migration to Russia. This is a classical type of migration of an active labor force to economically active regions.
About 2 million immigrants have arrived in Russia mainly from the former Soviet republics. There are also an estimated 10 million illegal immigrants. At the same time the most active people — about two million from the former Soviet Union — have preferred to emigrate abroad. A large number of them were well-educated and skilled people who formed the core of Russia's intellectual capital.

In 2008 migration increased by 2.7% with 280,000 migrants arriving to Russia, of which 95% came from CIS countries. The number of emigrants has declined by 16% (40,000).

The feature of internal migration is so-called "western drift", i.e. population outflows from eastern regions of the country to its European part. Economic development has caused a phenomenon of temporary labor migration. Residents of villages and towns are flooding big cities in search of well-paid jobs.

As national human resources continue to decline, Russia will need even greater numbers of migrants. Natives of former Soviet republics earn much less than the native population. As they are cheap, Russian businesses make profits from their labor. Migrants also transfer their earnings — about $10 billion a year — to their home countries and purchase goods and services in Russia.

Thus, Russia imports unskilled cheap labor force for low-paid jobs and exports highly educated and skilled one-quality human capital to the developed countries. This seems to be a normal state of affairs and this is how things stand in the whole world.

4. Russia's Human Capital during the Transition Period

The Soviet Union was a leader in some scientific and technology fields. It gained a significant level of development in mass education, science establishment and in the basic
applied research, coordinated at national level. The high quality of human capital was mainly achieved by ensuring that the labor force had a high level of general education. The planned system offered a peculiar scheme of non-market incentives to the intellectual elite. Scientists and researchers could benefit from a high social status and higher wages than those paid to the rest.

The new Russia inherited two areas of comparative advantage, one in the resource extraction sector and the other in the human capital sector. While the first area made great strides in the world market, the second one did not keep pace with international standards. Natural resources were the most intensively exploited assets and occupy a central place in the economy.

By contrast, the situation in the human capital-intensive sector was not so good. It was particularly affected in 1990s. Research institutes underwent a severe crisis due to underfunding, and their staffs often survived thanks to moonlighting and foreign grants. Many scientists simply changed professions or emigrated. As the result Russia became a net importer in the sectors which make intensive use of human capital.

Government investments in national human capital (science, education, and health care), fell dramatically during the transition period. In 1990s the public expenditure on education halved. Spending on basic science dropped even more intensely.

Investments into new technology were also very sluggish. Gross domestic expenditure on R&D, shrank from 2% in 1990 to 1% until 1998 (of GDP, and real GDP halved), before rising to 1.24% in 2002. Such values were far below those recorded in developed and in some developing countries. Most of the Russian R&D efforts were devoted to machinery and aerospace branches. They were mainly financed by the government (about 55%), industry (about 35%), and foreign aids (12%). The lack of investments caused a drop in the number of researchers in the labor force and an intense “brain drain” phenomenon.

![Figure 4 Percentage Differences in Total Earnings, Men](image)
The outflow of human capital from Russia was significant during the transition period. It is supposed Russian programmers were responsible for developing 30% of Microsoft products. In addition, the number of temporary emigrants, i.e. researchers and intellectuals who leave their country for short-term or medium term contracts, exceeded the number of officially recorded cases. The low return of investment in their intellectual capital and poor living conditions prevented many young people to start a scientific career.

The human capital itself, hence, had little choice. Its funds dramatically depreciated. The government did not encourage innovation and its attention was not directed towards the value of research. Since the existing firms were not profitable, any investment in development their human capital was unnecessary. Besides, there was no support for improvements of vocational and technical training.

Thus the large endowment of human capital in Russia did not lead to economic growth in 1990s. Incentives to boost any form of human capital based industry were missing. Russia's long-term potential was ignored by policy makers and international investors. Although with its significant stock of human capital Russia could improve the competitive structure of an economy, foster economic growth, and move to the forefront of the information and innovation revolution and take a leading place in the world economy.

Another relevant problem was linked to the general insecurity of property rights, especially in intellectual property, which prevented domestic and foreign investment in the human capital sector.

5. Human Capital and Economic Growth in 2000s

Labor force of Russia in 2008 was about 74 million. Industry employed 22%, services 60% and agriculture 12%. The official unemployment rate just now is 8.2%. Unemployment is highest among women and young people. Since 2000 the standard of living has been raised. By 2008 about 14% of the population was living below the national poverty line. The average monthly salary was $640 (about $1150 PPP).

The labor force has undergone tremendous changes. Although well-educated and skilled, it was largely mismatched to the changing needs of the modern economy. After the 1998 debt crisis, firms in the computer, mass communications, IT and other innovation industries were actively employing new personnel and were offering quite attractive salaries by Russian standards.

The Russia has a double benefit in the innovation sector. Firstly, it still owns a massive technological research infrastructure. Secondly, there is a highly qualified work force to encourage innovations. With such a significant base of expertise, Russia could become a
major centre for IT, computer software, and nanotechnology and biotechnology development. A significant amount of R&D was addressed to innovation sector: IT, telecommunication equipment, nano-and biotechnology.

According estimates made by experts of Institute of Economics Russia is very rich in public wealth, especially per capita. It is interesting, that the main asset is not natural resources but human capital.

The World Bank Report for 2006 contains others estimates of contribution by various assets to growth of public wealth. One of the principal conclusions is that higher levels of economic development are correlated with lower shares of natural resources in total public wealth. In poor countries, the share of natural resources is, on average, as high as 26%; in countries with medium levels of development it is about 13%, and it is about 2% in developed countries.

Lower share of natural resources is always accompanied by growing share of intangible assets, consisting mainly of various human capital components. Viewed in this context, Russia's situation looks very unfavorable. The share of natural resources in its wealth is far in excess not only of developed countries, but of most poor countries. The share of intangible assets in Russia's public wealth is about four times lower than the average for the world's developing countries.

Russia is in the top 15% most developed countries of the world measured by the
educational component of the Human Development Index, but it is among the 15% least successful countries in contribution of human capital to national wealth. It would be natural to suppose that low share of intangible assets is due to the large share of resource rent in the Russian economy.

However, there are developed countries, whose economies are also reliant on large-scale production of raw materials. In Norway, the contribution of natural resources to national wealth is 12%, which is 6 times more than the average for developed countries. Nevertheless, the contribution of intangible assets to Norway's national wealth is 4 times higher than in Russia.

Nowadays, human capital-intensive industries are attracting worldwide attention. Owing to its abundant, yet devaluated and underutilized human capital and to the world's largest pool of scientists and engineers, Russia has relevant potential in innovation and knowledge-based development. If properly fostered, Russia's human capital intensive sectors could lead to the revival of the whole economy and promote its integration in the world market.

The reason why Russia still lags behind can be described according to which economic growth is generated by investments in its human capital. Since expenditure on R&D and education have been cut during the transition, it is clear that Russia's per capita GDP ($16100 on PPP) does not match the potential inherent in its human capital endowment.

In 2000s Russia's rapid economic growth has been driven primarily by energy exports. This provided the first opportunity to articulate a long-term development trajectory for Russia. The Concept for Socio-Economic Development up to 2020 foresees Russia attaining levels of prosperity similar to those of developed countries.

Attainment of this goal seemed possible, assuming average annual economic growth of about 7% throughout the period. However, never in history has a country been able to achieve growth rates of 7% annually for 15 successive years while suffering annual decline
of the working-age population by 1%, which is expected to be the case for Russia.

All else being equal, increase by 2020 of the contribution from human capital to creation of wealth in Russia, even to the level of countries with medium levels of development, will add about 3 percentage points of economic growth annually. This is equal to the difference between growth rates in innovative (best) and inertial (worst) scenarios of Concept.

However, improvement of the contribution from human capital to public wealth in Russia is largely complicated by adverse demographic changes and resulting difficulties on the labor market. Decline of the population of working age causes reduction of supply and structural distortions on the labor market becomes a major negative factor, making optimistic scenario for economic growth harder to attain. And the deterioration in the quality of human capital is likely to have adverse effects in the long run. The only way to overcome this problem is to adopt policy which will boost the human capital intensive sectors.

It should be noted that Russian President D. Medvedev recognizes the importance to diversify the economy and to develop the nation’s innovative industry. He therefore announced an ambitious plan to expand the high-tech sector. President Medvedev declared at the international economic forum held in St. Petersburg in 2008 that Russia’s economic priorities should include “investment in human capital, the stimulation of innovation, the strengthening of institutions, and the modernization of infrastructure”. These measures must help Russia improve its position on the global scene.

6. Russian Education

Russia has a developed education system guaranteed to all citizens, and has a literacy rate of 99.5%. Education in state-owned secondary schools is free. First tertiary (university level) education is free with reservations: roughly half of students are enrolled for full pay as many state institutions started to open commercial positions in the last years. Entry to free higher education is highly competitive. On average, educational standards in Russia are higher than international ones, but in terms of scientific research they have been decreasing.

The demand for education in Russia has increased, which inspires hope for the future. Russia gradually becomes a 100% high education nation. If the country featured 2.82m undergraduates in 1990, their number was 7.06m in 2005. The 150% hike in 15 years is unprecedented.

As a result of great emphasis on science and technology, at the Russian universities the number of applicants for the departments of physics, biology, medicine, mechanics, mathematics and informatics has once again increased. These professions open good career prospects since graduates have proven themselves to be competitive workers.
In 2007 state spending for education amounted to 3.6% of GDP, or 13% of consolidated state budget. In recent years the share of education spending has begun to grow due to national project in education.

The Government allocates funding to pay the tuition fees within an established quota for each state institution. It provides access to higher education to all skilled students. Moreover students are paid a small stipend and provided with almost free housing. Apart from state higher education institutions, many private ones have emerged to address the need for a skilled labor force for emerging industries.

It is expected that decline in population age groups using tertiary education will lead to reduced numbers of higher education facilities in the next 10 years, as well as competition between facilities for each applicant. This entails various challenges for the education system, including reduced efficiency investment in education.

Overall socio-economic processes make it important to develop and further extend supplementary vocation education, aimed to update knowledge and skills acquired by employees in the past to ensure that it corresponds to the standards of today.

7. Russia's Human Development Index

The Human Development Index is an indicator used to rank countries by level of "human development". To my mind, it is also convenient and clear indicator of country's national human capital as combines such three dimensions:

1. Life expectancy at birth, as an index of population health and longevity.
2. Knowledge and education, as measured by the adult literacy rate and the combined primary, secondary, and tertiary gross enrolment ratio.
3. Standard of living, as measured by the natural logarithm of GDP per capita at PPP.

The 2009 Report was released on October 5, 2009, and covers the period up to 2007. In the mid-2000s Russia became a country with a high level of human development, achieving HDI score above 0.800. In 2007 Russia has 71 ranks in the world.

Life expectancy at birth, education levels and income levels are the three major factors, which determine development of human potential. This triad has been in a state of imbalance in post-Soviet Russia: despite high levels of education, the two other components have lagged far behind. Economic recession in 1990s was not overcome until 2006. Subsequent economic growth pushed per capita GDP closer to that of European countries with medium development levels. In 2007 GDP per capita is estimated as of $14,600. But the long period of economic growth was not supported by any positive changes in the third major human development component, i.e. longevity. The last numbers showed certain positive shifts, both
Russia’s HDI

<table>
<thead>
<tr>
<th>Year</th>
<th>HDI</th>
<th>Life expectancy at birth, years</th>
<th>Adult literacy rate, % ages 15 and above</th>
<th>Combined gross enrolment ratio, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>0.809</td>
<td>71</td>
<td>89</td>
<td>95</td>
</tr>
<tr>
<td>1995</td>
<td>0.765</td>
<td>68</td>
<td>92</td>
<td>71</td>
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<tr>
<td>1998</td>
<td>0.790</td>
<td>70</td>
<td>93</td>
<td>66</td>
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<tr>
<td>2002</td>
<td>0.735</td>
<td>69</td>
<td>95</td>
<td>74</td>
</tr>
<tr>
<td>2005</td>
<td>0.802</td>
<td>66</td>
<td>99.4</td>
<td>88.9</td>
</tr>
<tr>
<td>2007</td>
<td>0.817</td>
<td>86.2</td>
<td>99.5</td>
<td>81.9</td>
</tr>
</tbody>
</table>

For comparison, 2007

- 1. Norway (0.971)
- 1. Japan (82.7)
- 1. Georgia (100.0)
- 1. Australia (114.2)


Social and economic.

The HDI put Russia among countries with high human capital assets. In 2000s the Index grew in all Russian regions. Growth was dramatic in 2006, mainly thanks to increased longevity.

The number of regions, where the HDI was similar to that of developed countries, grew sharply; from 4 in 2004 to 12 in 2006, with Moscow attaining an even higher level of 0.9 to overtake Central Europe. Overall economic and social development of regions with highest HDI levels is better balanced.

Most of the contribution to positive HDI dynamics was from rapid economic growth and appreciable increase of life expectancy, with biggest increases of latter in regions where the indicator had been lowest. However, economic inequality between Russian regions remains great. Almost every fourth region has per capita GRP less than half of the national average. But regional indexes grew relatively evenly in 2005-2006, without widening of the gap between leaders and outsiders. Almost 30% of the citizens is resident in regions with high HDI levels. However, two thirds of people remain concentrated in below-average regions, and have limited human development prospects.

No rapid growth of HDI is possible without the combination of two trends: economic growth and positive social changes in the environment and lifestyle of the population.

There is also the Gender-related Human Development Index (GDI) first calculated for Russia and its regions in 2007. This Index also places Russia and its human capital among developed countries.
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