STUDY OF PECULIARITIES AND REGULARITIES OF DYNAMICS OF HUMAN DEVELOPMENT INDEX IN RUSSIA

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Abstract: In the present article the authors have conducted the research of human development dynamics in Russia. The research was conducted by calculating the HDI integral index and its components of basic indicators, as well as indicators characterizing the level of welfare of the population. Characteristic features of behavior of indicators of well-being of the population have been revealed, the nature of influence of these indicators on HDI dynamics in modern conditions has been analyzed. The contradictions between the patterns of HDI development and welfare indicators have been identified. Measures have been proposed to improve methods for analyzing the dynamics of human development.

Keywords: Lorenz curve, Ginny coefficient, Human Development Index, income differentiation, welfare level.
JEL Codes: O15

1. Introduction

Currently, the level of human development is becoming as significant as the level of gross domestic product (GDP), the level of scientific and technological progress (STP) and many other indicators. This is due to the fact that the main resource for sustainability and competitiveness in today's environment is information, which becomes an advantage only if it is used competently by a person.

The beginning of the transition period in Russia was characterized not only by a general decline in the level of household incomes, but also by a continuous positive dynamic of their differentiation. To date, serious differences in the wages of different groups of the population remain due to many factors. While there is a list of indicators to measure progress in human development, there is an objective need for a generalized assessment

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that would focus on human well-being rather than income by calculating an integral measure of progress. For this purpose, a human development index indicator has been developed and is being successfully applied. This indicator provides a summary of the main dimensions of human development.

Unlike the measurement of state income, human development is much harder to measure; therefore, very often the human development index is replaced by the national income index as a good indicator of human well-being. While the first and second indicators are closely linked, as economic growth is an important means of human development, human well-being does not depend solely on economic growth and the level of national income. It is largely determined by the effectiveness of the use of economic growth and national income as resources to support people's livelihoods. And people's activities, such as democratic participation in decision-making and equality, do not depend on their income. While the GDP indicator reflects the economic component of the state's development, the human development indicator reflects citizens' education, life expectancy and income level. The Human Development Index makes it possible to assess not only the overall level of development, but also to detail the different directions of development through indicators of the components of the index. The detailed indicators included in the index provide a basis for identifying the causes of low human development and enable the development of effective measures to improve it.

2. Methodology

The Human Development Index comprises three indicators reflecting the most important aspects of human life: the Longevity Index, the Education Index and the Gross National Income Index. The indicators and measurements of these indices are presented in Table 1. [1, p. 50].

Table 1 - Indicators for measuring HDI

Measurements	**Longevity and health**	**Knowledge**	**Decent standard of living**
Indicators	Life expectancy at birth	Average duration of education, expected duration of education	GNI per capita (calculated at purchasing power parity in US dollars)
Indices of measurement	Life expectancy index	Education Index	GNI Index
Human Development Index			

These indices are calculated using a comparable methodology. The method of calculating the index and the inclusion of various aggregated indicators suggest that the development should be reflected in the HDI measurement process.

Life expectancy index is calculated using formula 1. The minimum life expectancy in the UN Development Program is 25 years at birth and the maximum is 85 years. [2, p. 52]:

$$LEI = \frac{X_1 - 25}{85 - 25} \quad (1)$$

Where: LEI – life expectancy index;

X_1 – previous year's average life expectancy.

The education index is calculated by formula 2 as the average of the two sub-indices:

$$EI = \frac{MYSI + EYSI}{2} \quad (2)$$

Where: MYSI – Mean Years of Schooling Index;

$$MYSI = \frac{MYS}{15} \quad (3)$$

EYSI – Expected Years of Schooling Index.

$$EYSI = \frac{EYS}{18} \quad (4)$$

Where: MYS – Mean years of schooling;

EYS – Expected Years of Schooling.

The income index is calculated by formula 5 [2, p. 52]:

$$II = \frac{\ln(GNIpc) - \ln(100)}{\ln(75000) - \ln(100)} \quad (5)$$

Where: GNIpc – Gross national income at purchasing power parity per capita in US dollars.

The human development index can be found by formula 6 as the geometric mean of these three indices [2, p. 52]:

$$HDI = \sqrt[3]{LEI * EI * II} \quad (6)$$

Where: HDI – human development index;

LEI – Life expectancy index;

EI – education index;

II – income index.

The closer the value of this index is to one, the higher the degree of human development in a country and the closer society is to the desired goals. At this stage, the specialists of the international development program consider such goals to be the increase of life expectancy to 85 years, access to education for all and ensuring a decent level of income for the population.

The maximum possible HDI value is one, the minimum value is zero.

However, it should be noted that the determinant of human development is human welfare, which directly depends on the level of income of the population and the effectiveness of the system of redistribution of income between the poor and the well-off. The efficiency of the redistribution system, can be determined by Gini's coefficient.

The Gini coefficient is also called the *income concentration index*. It reflects the degree of inequality in income distribution. This indicator is based on formula 7:

$$G = \sum p_i q_{i+1} - \sum p_{i+1} q_i \quad (7)$$

Where: G - income concentration index (Gini coefficient);

p_i - population size within range;

q_i - total cash flow on an accrual basis [3, p. 9].

The Gini Coefficient is measured from zero, which means perfect equality, to one - perfect inequality, respectively, the closer the index to one, the more unequal the distribution of income in society. The high level of income inequality has a clear negative impact on the well-being of the population, and consequently on the level of human

development.

The Lorentz curve is a graphical representation of income concentration. "There is always inequality in income distribution in society, which reflects Lorenz's curve. For example, the first 20% of the population can receive 5% of income, 40% of the population can receive 15% of income, 60% of the population can receive 35% of income, 80% of the population 60% can receive of income, and naturally 100% of the population can receive 100% of income. If there were equal distribution of income in society, the Lorentz curve would take the form of a straight line (bisector in the graph), called the line of absolute equality, and the reverse dynamics is observed, if only 1% of the population received all income in society, this would be reflected in the graph by a vertical straight line, called the line of absolute inequality". [3, p. 11].

The Lorenz curve helps to visualize the degree of income inequality in an economy by its bending. To quantitatively measure income differentiation, the above-mentioned "Gini coefficient, which in this case is equal to the ratio of the area of the figure limited by the straight absolute equality and the Lorentz curve to the area of the entire OME triangle" is used. [3, p. 11].

The Lorentz curve is also characterized by the *Lorentz coefficient*, which also reflects the degree of uneven distribution of income. The Lorentz coefficient is calculated using the formula 8:

$$L = \frac{\sum|y_i - x_i|}{2} \qquad (8)$$

Where: L – Lorentz coefficient;

y_i – total household income within a range;

x_i – population size within a range [3, p. 12].

3. Results

The actual inequality line requires data on the distribution of total cash income for every 20% of the population, where the first group is the lowest income group and the fifth group is the highest income group. If incomes are distributed unevenly, the Lorentz curve lies to the left of the even distribution line, and the greater the degree of inequality, the stronger the Lorentz curve bend.

Table 2 - Input data

Population Group	Year								
	2010	2011	2012	2013	2014	2015	2016	2017	2018
1 group	5,2	5,2	5,2	5,2	5,2	5,3	5,3	5,4	5,3
2 group	9,8	9,9	9,8	9,8	9,9	10	10,1	10,1	10
3 group	14,8	14,9	14,9	14,9	14,9	15	15	15,1	15
4 group	22,5	22,6	22,5	22,5	22,6	22,6	22,6	22,6	22,6
5 group	47,7	47,4	47,6	47,6	47,4	47,1	47	46,8	47,1

Figure 1 shows the Lorenz curve, which shows the distribution of total cash income by 20% of the population in 2018. As can be seen, the curve is approaching the even distribution line, indicating a low degree of inequality in income distribution among the population.

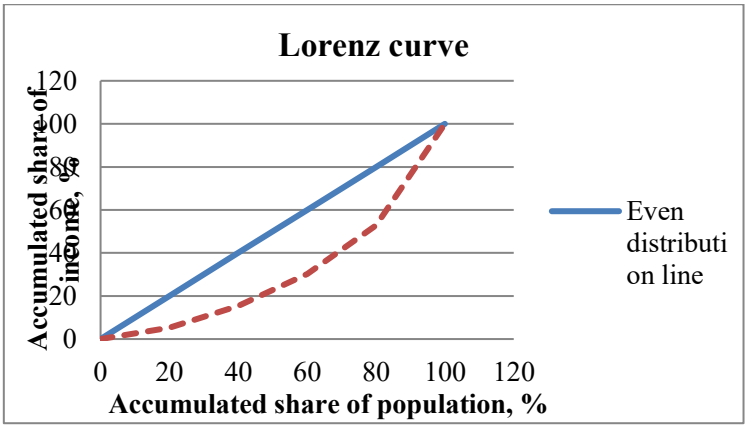

Figure 1 - Lorentz Curve of total cash income distribution for 2018.

Comparative analysis of Lorentz curves for 2018 and 2017 (Fig. 1 and Fig. 2), shows a consistently low distribution of household incomes in Russia, as well as no changes in the distribution of household incomes during the year, because the graphs are almost identical to each other.

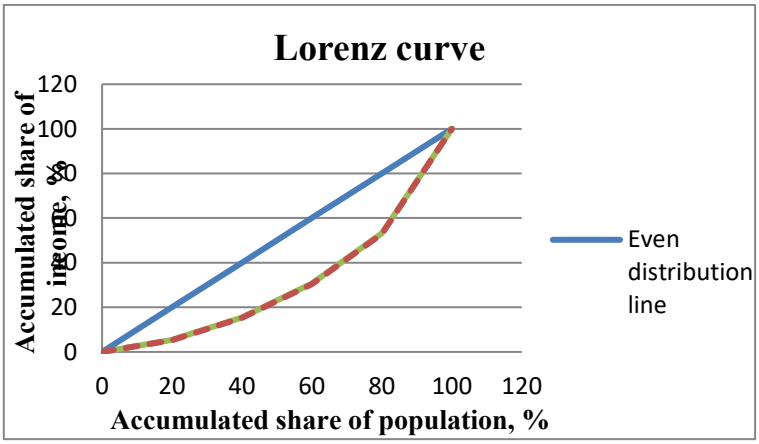

Figure 2 - Lorentz Curves of total cash income distribution for 2017 and 2018.

The Lorenz curve allows to judge the degree of income inequality in the economy in the form of visual presentation of data. To quantify the degree of income inequality in numerical terms, we will calculate a special Gini coefficient.The Gini Coefficient for the period from 2000 to 2018 was calculated based on the input from Table 1 and the results are summarized in Table 3.

Table 3 - Gini coefficient for the period 2000-2018.

2000-2005	Result	2006-2010	Result	2011-2015	Result	2016-2018	Result
G2000	0,3724						
G2001	0,3696	G2006	0,386	G2011	0,3884	G2016	0,3836
G2002	0,37	G2007	0,3924	G2012	0,3900	G2017	0,3812
G2003	0,3752	G2008	0,3924	G2013	0,3900	G2018	0,3848
G2004	0,3808	G2009	0,3908	G2014	0,3884		
G2005	0,3808	G2010	0,3908	G2015	0,3848		

To make the results of the study of the dynamics of the quantitative index of income differentiation for the last 19 years more demonstrative, the values of the index obtained in the process of calculations were graphically shown in Figure 3.

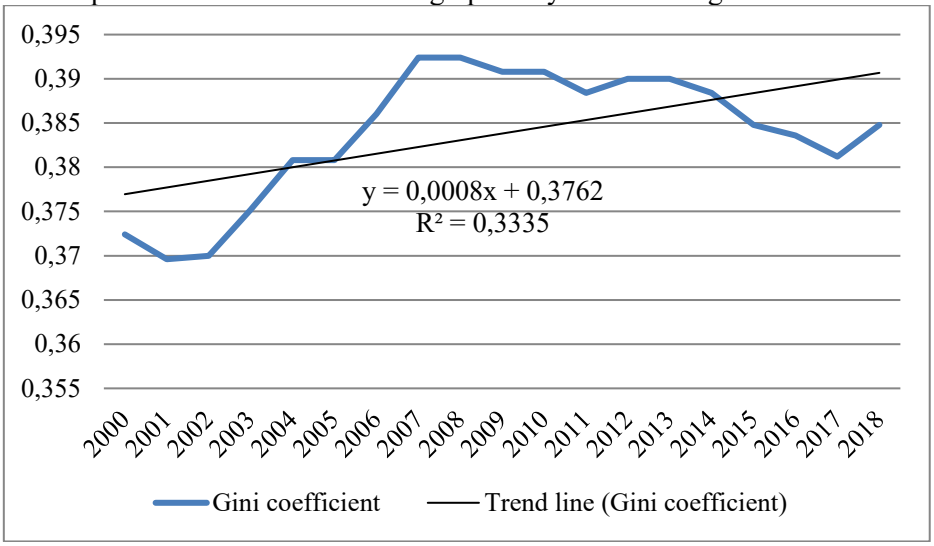

Figure 3 - Dynamics of the Gini coefficient for the period 2000-2018.

As can be seen from table 2 and figure 3, the evolution of the Gini coefficient from 2000 to 2008 is characterized by a sharp increase in the values of the indicator, and after 2008 by a sharp decline up to 2017 inclusive. Summarizing the results of the calculations, it can be concluded that from 2001 to 2007, against the background of positive economic growth of the country, there was an increase in key indicators, indicating an increase in the uneven distribution of monetary incomes of the population. Since 2008, the Gini coefficient has been decreasing, which indicates an increase in the uniformity of distribution of total cash income. The downward trend of the indicator since 2014 is especially pronounced. However, the upward trend of the indicator in 2018 is indicative of a more significant stratification of society by incomes in Russia.

As differentiation (distribution) of incomes of the population plays an important role in the analysis of the level of human development, in other words, separation of different layers and groups of the population depending on the level of income, the research of differentiation of the population depending on the level of average per capita monetary income which characterizes the stratification of the population by the size of material wealth and differentiates separate groups of the population by the number having a certain level of average per capita monetary income was carried out.

Based on the data of the Federal State Statistics Service for 2013-2018, the dynamics of distribution of personal income by the size of material wealth was visualized (Fig. 4). From 2013 to 2018, the percentage of the population with a minimum income (up to 19,000 rubles per month) is decreasing and the percentage of the population with an average income is increasing. From 2013 to 2018, the percentage of the population with income over 60,000 rubles per month almost doubled from 6.9% to 12.4%. The

share of the population with income over 60,000 rubles per month, as well as the share of the population with income over 100,000 rubles per month, is also growing smoothly. However, as can be seen from Figure 4, both for the analyzed period and in previous years, the largest percentage of the population has an average income (from 19000 to 45000 rubles per month).

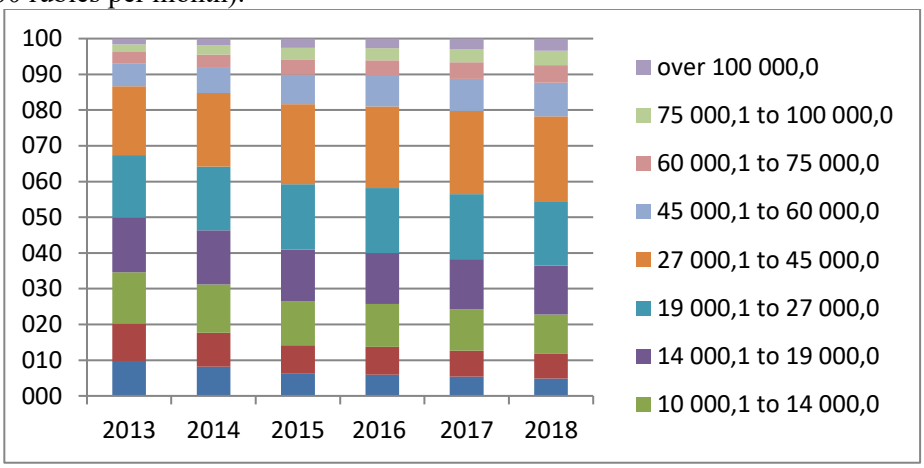

Figure 4 - Distribution of population by average per capita income.

The level of income of the population provides its purchasing power, which depends on the cost of living. The dynamics of the cost of living can be traced on the example of the cost of a fixed set of consumer goods and services, which characterizes the level of material welfare of the population, reflecting the consumption of both food and non-food products and services, and serves for interregional comparisons of purchasing power of the population.

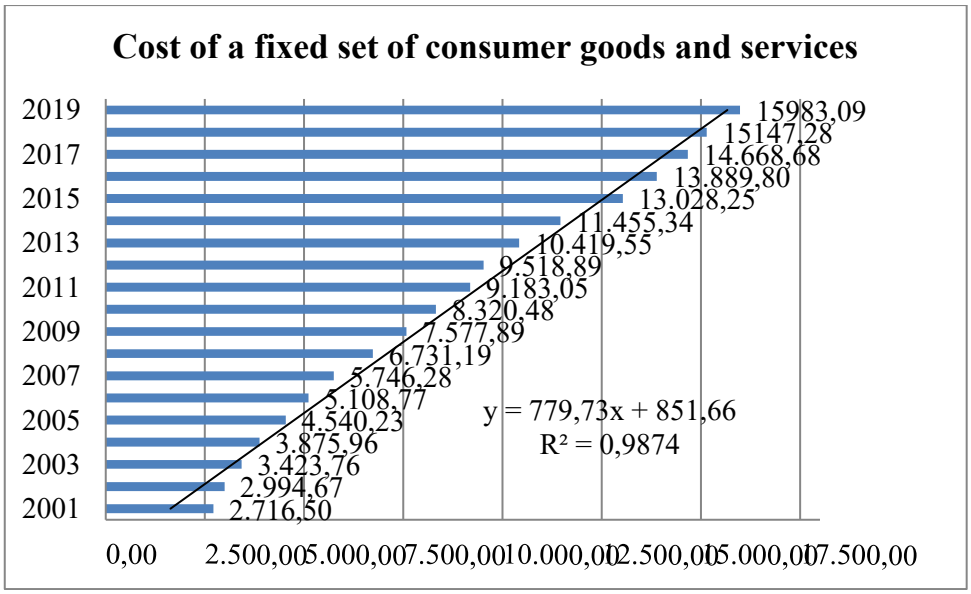

Figure 5 – Dynamic cost of a fixed set of consumer goods and services for 2001-2019.

Figure 5 shows the dynamics of the fixed consumer set value, which shows that the cost of living increased almost 6 times in the period from 2001 to 2019. If we consider this indicator as a measure of the cost of living in its temporal comparisons, we can conclude that the cost of living in Russia has increased at least fivefold over nineteen years.We will carry out detailed expenditures reflecting the cost of living of the population. For this purpose, we will examine the structure of consumer expenditures for 2017 and 2018, which is visually presented in Figures 6.7.

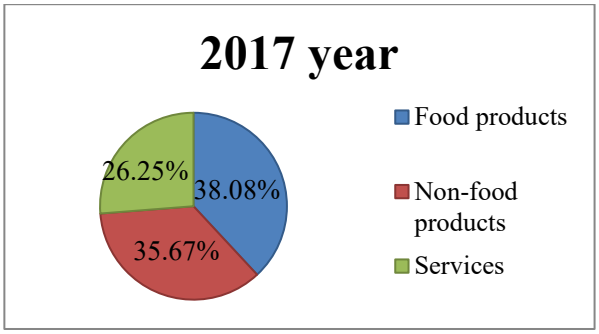

Figure 6 - Structure of consumer expenditures of population in 2017

The comparative analysis of Fig. 6 and Fig. 7 has shown that over the last 3 years expenditures for services have increased among the population (by 1.33%), which resulted in a decrease in expenditures for foodstuffs (by 0.47%) and non-food products (0.86%).

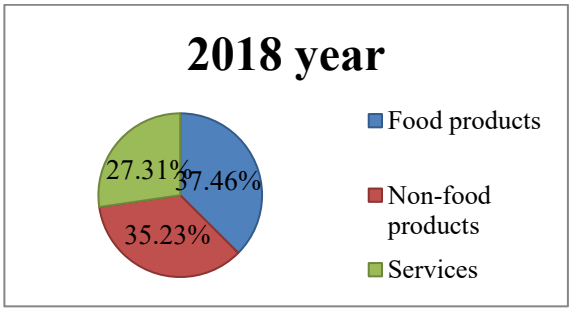

Figure 7 - Structure of consumer expenditures of population in 2018.

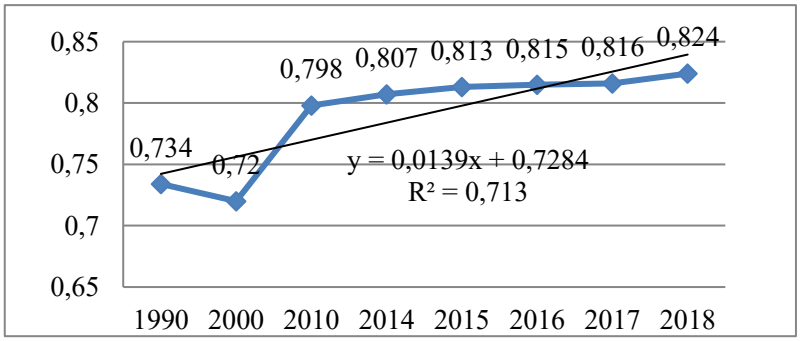

Figure 8 - Russian Federation HDI dynamics in 2014-2018.

The growth of expenditures on services of the population is connected with the increase in the cost of public utilities rather than with the increased purchasing power of the population.

Based on the Human Development Index data, over the past twenty-eight years Russia has greatly improved its living standards and is now on the list of countries with a very high level of development.

Accordingly to Bucur and Stangaciu (2015), the values of HDI in the European Union countries have evolved within the following intervals:

1995: 0.680 to 0.870
2000: 0.710 to 0.900
2005: 0.756 to 0.907
2012: 0.782 to 0.921

4. Discussion

Despite the fact that, according to the dynamics presented in Figure 8, the HDI indicator is constantly increasing, which indicates an increase in the well-being of the population, the real situation is different from that described by the indicator.

Thus, almost all medical services in Russia are paid for and there are a large number of commercial places in educational institutions. The analysis of the structure of consumer spending presented in Figures 6, 7 shows a low level of welfare of the population, as the largest share of spending is on foodstuffs, that is, food of prime necessity. This fact shows that most people do not have enough financial resources for such necessary purchases as housing or personal transport, as well as decent annual recreation and many other things that have a positive impact on human development.

There is also a discrepancy between the results of the analysis of the human development index and the income differentiation index, as there is an increase in the differentiation of incomes of the population. The widening gap between the affluent and unsecured segments of the population leads to the impoverishment of a larger share of the population, which consequently reduces the level of human development.

High level of differentiation of incomes has not only negative but also positive impact as the main negative point is the percentage of population below the poverty line, and in case of high level of differentiation have incomes that are below the poverty line, it indicates the improvement of welfare of population.

5. Conclusion

The Human Development Index is a composite indicator that captures the development of the world's population. This indicator is used by the United Nations Development Program to create a world ranking of countries in terms of human development. It is defined as the geometric mean of such indices as: life expectancy index, education index and gross national income index.

A country is assigned to a certain development group depending on the arrival of the calculated value of the indicator in one of the confidence intervals:
(a) [0 : 0,550] - low human development; (b) [0.550 : 0,699] - average human development; (c) [0,700 : 0,799] - high level of human development; (d) [0,800 : 1] - very high level of development .

Thus, until the end of 2010, the Russian Federation was at a high level of human

development. Figure 7 clearly shows the impact of the economic situation in Russia in the 1990s: from 1990 to 2000. It should be noted that this was the worst situation in Russia over the past thirty years - below 0,72 (2000) the Human Development Index did not fall. With the beginning of the new millennium, the situation in the country has clearly improved and by 2010 the HDI had risen to almost a very high level of human development - to 0,798. Over the past decade, the HDI has grown evenly. According to data for 2018, the Human Development Index in Russia was 0,824, which is currently the highest level in the last 30 years.

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