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# Targeted Management of the Regional Human Development

**ABSTRACT**
The main investment resource of the region's economy changes in the condition of transition to the sixth technological way. So, the role of human capital, its components and derivatives in the development of the territory has increased more than ever before. It has pushed into background the financial capital, which was the main investment resource of the fourth technological way. Therefore the methodology of target management by human development has high relevance. In the article there is a definition of region's human development, that describes the elements and the factors shaping it. Special attention is paid to the methodology of target management by region's human development, that bases on internal dynamic model of socio-economic territorial system. For model development we used the technology of cognitive modeling. It is modern technologies of system analysis, the methodology of which was developed at the Institute of Control Sciences of the Russian Academy of Sciences. All the researches were carried out on the example of the Rostov region. It is the average subject of the Russian Federation located in the south of the country. The territory of Rostov Region is some 100.8 thousand square kilometers and equals to the territories of Belgium, the Netherlands and Denmark taken together.
**Key words:** *region, economic growth, human development, human capital, human development index, social policy, rapid assessment of human development.*

For the last twenty-five years of the new history Russia's economy has gone from a command model, where there was a developed system of planning and control over the resources distribution and use by the state federal government. But it has been unable to reach a liberal model in which the development of all socio-economic processes is dictated by the laws of the market. Russia has taken an intermediate position between such economic models due to the oil and gas export policy. With help of export earning the budget revenues and the raw type companies' profits have been growing. Thus, price explosion on the raw material resources promoted to the growth of the investments and final consumption. It's created favorable conditions for economic development of the country.

But the geopolitical and geoeconomic situation which became aggravated now proved insolvency and instability of such economic model.

So, it's necessary to create the adaptive model of economic development. Its main resource is the human development. The multidimensional modeling have proved that it's able to overshadow the potential of the natural resource and financial (main investment resource of the fourth technological way's economy), which formed the basis of the Russian economy and the economies of certain regions throughout the period of new history. The multidimensional system and dynamic model of the region socio-economic mechanism created by A. Granberg. The model was built in software Vensim PLE (Fig. 1).
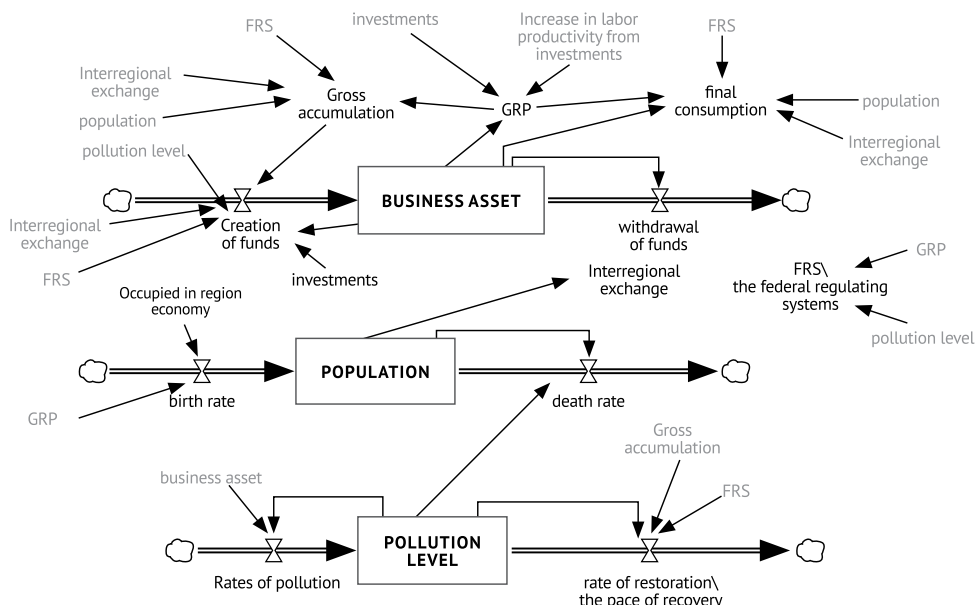


*Figure 1.*
**Integrated System Dynamics Model of the Region Socio-Economic Mechanism (A. Granberg)**

In the Russian and foreign literature to definition and specification of the concept "human development" tried many researchers in their works: S. Anand, C. A. Ayvazyan, A.B. Doctorovich, V.A. Dolatowski, A.V. Kashepova, A. Sen, F.P. Sakiko, A.G. Vishnevsky, N.In. Zubarevich, R.I. Kapelyushnikov, E.S. Kotyrlo, N.M. The Rimashevskaya, L.L. Rybakovsky, I.V. Soboleva, N.P. Khodasevich, L.S. Chizhova, etc. But despite the large number of works, at the moment the "human development" has not been strictly defined as a scientific category.

But despite the large number of works, at the moment the "human potential" has not been strictly defined as a scientific category. It complicates the use of the economic device for analysis of the management processes of its development. Therefore, in this paper the human development of the region is understood as the accumulated by the population the stock of physical and moral health, general cultural and professional competence, creative, entrepreneurial and civic activity, implemented in a variety of activity's fields and in the sphere of consumption. Thus, the economic form of the human development's realization is "the region's human capital", which is defined as the stock of knowledge, skills, culture and morality, abilities, health, income-producing (Fig. 2) (Gorelova, Zakharova. & Ginis, 2005). So, in 2014 the world's wealth is estimated at 553 trillion dollars, 66% of it is human capital (365 trillion dollars). Russia has the human capital about 30 trillion dollars. (50% of national wealth, 8% of the human capital) (Doktorovich, 2003).
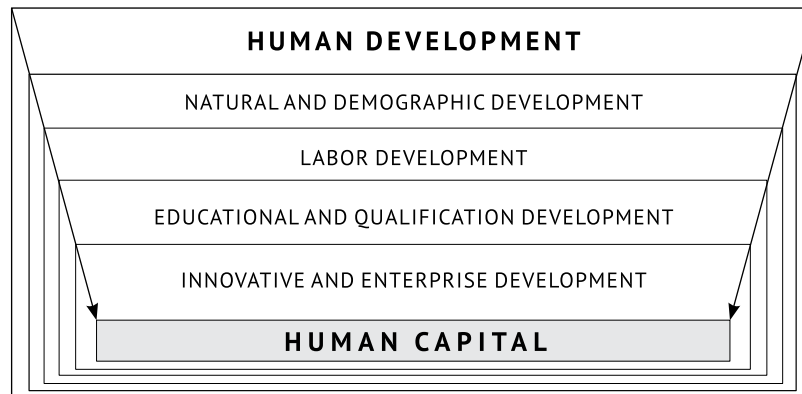


*Figure 2.*
**The Structure of the Region's Human Development**

The region's human development is a set of elements such as: demographic, labor, personal-social, educational qualification, innovation and entrepreneurship, which are characterized by certain factors (tab. 1) (Doliatovskii, & Topilina, 2013).

*Table 1.*
**The Elements and Factors of the Region's Human Development**

| | *THE ELEMENTS* | *THE FACTORS* |
|---|---|---|
| 1. | **DEMOGRAPHIC POTENTIAL** | • HEALTH CARE SYSTEM;<br>• SUPPORT OF THE FAMILY;<br>• THE QUALITY AND STANDARD OF LIVING;<br>• THE POLICY OF QUALITY OF WORK LIFE IN ORGANIZATIONS;<br>• SOCIAL RESPONSIBILITY IN THE REGION AND EMPLOYERS;<br>• STRATEGY AND POLICY OF REPLENISHMENT AND REPRODUCTION OF LABOR RESOURCES. |
| 2. | **LABOUR POTENTIAL** | • THE NUMBER OF ECONOMICALLY active population;<br>• THE EMPLOYMENT RATE;<br>• THE UNEMPLOYMENT RATE. |
| 3. | **SOCIAL AND PERSONAL POTENTIAL** | • THE POLICY OF THE GENERAL LEVEL OF CULTURE, CIVIC CONSCIOUSNESS, VALUES AND NEEDS;<br>• THE COMMUNICATION SYSTEM IN THE REGION THAT SUPPORT THE INITIATIVE AND WORKFORCE PARTICIPATION;<br>• MANAGEMENT OF THE LEVEL OF CONFLICT IN THE REGION;<br>• THE POLICY OF HUMAN RESOURCE DEVELOPMENT OF THE REGION: INTELLECTUAL ABILITIES, TALENTS, KNOWLEDGE, BY THE EDUCATION SYSTEM. |
| 4. | **EDUCATIONAL AND QUALIFICATION POTENTIAL** | • SYSTEM OF PROFESSIONAL EDUCATION AND PROFESSIONAL DEVELOPMENT;<br>• PERSONNEL POLICY OF ORGANIZATIONS AIMED AT DEVELOPING AND MOTIVATING STAFF, CREATING OPPORTUNITIES TO REALIZE THE ACQUIRED COMPETENCIES IN THE WORKPLACE. |
| 5. | **INNOVATION AND ENTREPRENEURIAL POTENTIAL** | • INFORMATION MANAGEMENT AT THE REGIONAL LEVEL, ENSURING THE AVAILABILITY OF INFORMATION;<br>• PRIORITY POLICY OF CREATIVITY, INNOVATION, LATERAL THINKING IN THE REGION;<br>• MOTIVATION AND STIMULATION OF LABOUR RESOURCES IN THE REGION FINANCIALLY AND THROUGH «ENRICHMENT LABOUR»;<br>• SUPPORT INITIATIVES OF LABOR RESOURCES, INCLUDING ENTREPRENEURSHIP. |

In the policy documents of the UN, in the strategy of socio-economic development of the Russian Federation and in the works of Russian scientists the human development is seen as both a goal and a measure of socio-economic development, as a basis for achieving sustainable economic growth and overcoming the ongoing demographic decline. The most common assessment method of assessing of human development is the calculation of the integral index (HDI) by the UNDP methodology. According to this methodology, Russia belongs to the group "with a high index of human development" and is in 57th place. In 2013 its HDI amounted to 0,778. Among its immediate neighbor are Libya, Oman, Bulgaria, Barbados and Belarus.

Taking into account the extreme heterogeneity of the development of Russian regions, the most interesting ones are the values of the HDI for the certain subjects of the Russian Federation. Thus, the human development index (HDI) of regions of the Russian Federation is officially calculated by the old methodology of UNDP in the absence of official statistics on the average and expected years of schooling.

The Human Development Index (HDI) consists of components that have equal weight:

- income as measured by the gross domestic product (gross regional product) in purchasing power parity US dollars (PPP US$);
- education as measured by the adult literacy rate (with two-thirds weight) and the gross enrolment ration among children and young people between the ages of 6 and 23 (with one-third weight of 1/3);
- life expectancy, as measured by the life expectancy at birth. Fixed minimum and maximum values are established for each of the dimension indices: the life expectancy at birth: 25 and 85 years;
- adult literacy rate: 0% and 100%;
- gross enrolment ratio among children and young people: 0% and 100%;
- real GDP per capita (PPP US$): $100 and $40,000. The dimension indices are calculated using the following formula:

$$Index = \frac{actual.value\,X_i - min.value\,X_i}{max.value\,X_i - min.value\,X_i}$$

The income index is calculated slightly differently: it uses the base-ten logarithm of the real GDP per capita. Income is adjusted in view of the fact that, beyond a certain point, increases in income do not lead to a higher level of human development. Taking the logarithm limits the spread of income values and thus decreases the contribution of high income to the HDI:

$$W(Y) = \frac{\log y_i - \log y_{min}}{\log y_{max} - \log y_{min}}$$

The Human Development Index is the arithmetic average of the three dimension indices: the life expectancy index, the education index (which consists of the adult literacy rate with a two-thirds weight and the gross enrolment ratio with a onethird weight) and the income index. Additional procedures are used for calculating the income index for the constituent members of the Russian Federation:

- adjusting (proportionally increasing) the gross regional product (GRP) of each constituent member of the Russian Federation based on the undistributed part of the national GDP;
- adjusting the GRP for the difference in prices by multiplying it by the ratio of the average national cost of living to the cost of living in the region;
- converting it into purchasing power parity US dollars (PPP US$) for the given year.

For the purposes of calculating the education index, the adult literacy rate is taken to be 99.5% of the population. The gross enrolment ratio is taken to be the ratio between the number of students in all the different types of educational establishments (schools and primary, secondary and higher educational establishments) to the total population between the ages of 6 and 23. The Human Development Index can take values between 0 and 1. The lower limit for developed countries is 0.800 (*Doklad o chelovecheskom razvitii, 2014*).

The Rostov region is of particular interest in this research. It is the average subject of the Russian Federation located in the south of the country. The territory of Rostov Region is some 100.8 thousand square kilometers and equals to the territories of Belgium, the Netherlands and Denmark taken together. The population of the region is 4245.5 million people. This includes 2878.4 million people who reside in cities and 1367.1 million people who live in rural areas.

The region ranks 6th place in Russia in terms of resident population after Moscow, Moscow region, Krasnodar region, Saint Petersburg and Sverdlovsk region. Among other Southern federal district entities, the region comes second after Krasnodar region.

Population density is 42.0 people per 1 square kilometer. In terms of national composition, 90.3% of the population are Russians, 2.6% Armenians, 1.9% Ukrainians, 0.9% Turks, 0.4% Azerbaijani. Representatives of over 150 different nationalities live in the Rostov region. Mutual respect of the peoples and traditionally though economic and cultural ties are the main values cherished on the Don.

The working-age population makes 56.0% of the total amount. The educational level of the people in the economically active age is sufficiently high.

The average annual number of individuals employed in economic activities is 1.9 million people, including 1.3 million people employed in private enterprises and organizations.

Demographic situation in the Rostov region shows decreased natural decline in population, increased life expectancy. Number of born per 1000 is 11.7, number dead 13.8. Natural decline in population decreased by 2.1 per mille. Life expectancy at birth makes 71.4 years.

According to this technique, the Rostov region ranks 40th by HDI among the regions of the Russian Federation and the 3rd place among the regions of the southern Federal district of the Russian Federation (tab. 2).

*Table 2.*
**HDI in Regions of The Southern Federal District (SFD)**

| | GDP PER CAPITA, USD AT PPP | INCOME INDEX | LIFE EXPECTANCY AT BIRTH | LONGEVITY INDEX | LITERACY | ENROLLMENT OF EDUCATION OF PERSONS AGED 7 TO 24 YEARS | EDUCATION INDEX | HDI | POSITION |
|---|---|---|---|---|---|---|---|---|---|
| **ADYGEA REPUBLIC** | 8760 | 0,747 | 69,99 | 0,750 | 99,6 | 0,714 | 0,902 | 0,799 | 63 |
| **KALMYKIA REPUBLIC** | 7185 | 0,713 | 69,00 | 0,733 | 99,4 | 0,707 | 0,898 | 0,782 | 75 |
| **KRASNODAR REGION** | 14372 | 0,829 | 70,84 | 0,764 | 99,8 | 0,707 | 0,901 | 0,831 | 19 |
| **ASTRAKHAN REGION** | 12298 | 0,803 | 68,52 | 0,725 | 99,3 | 0,739 | 0,908 | 0,812 | 44 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **VOLGOGRAD REGION** | 13673 | 0,821 | 69,60 | 0,743 | 99,7 | 0,711 | 0,902 | 0,822 | 30 |
| **ROSTOV REGION** | 11438 | 0,791 | 69,62 | 0,744 | 99,7 | 0,744 | 0,913 | 0,816 | 40 |

Krasnodar, Volgograd and Rostov regions are leaders on the index of human development among the southern regions. In this case, the Rostov region is inferior on all counts to the leader of the Krasnodar Krai. As for literacy, the proportion of pupils from 7 to 24 years and the index of education of the Rostov region has occupied a leading position among the regions of the SFD. As for literacy, the proportion of pupils from 7 to 24 years and the index of education of the Rostov region has occupied a leading position among the regions of the SFD.

Such factors as fertility, mortality, life expectancy, age-sex structure of population, migration increase, the increase in the number of students and graduates of primary, secondary and higher educational institutions, as well as the number of establishments are not all the factors that characterize the region's human development.

In addition, an important indicator of the state of human development in the region is the dynamics of the level of population's satisfaction with the policy of the regional Executive authorities in the field of education, health, physical culture and sports, etc. (tab. 3).

*Table 3.*
**The Level of Satisfaction of Residents of the Rostov Region With the Social Policy of the Executive Authorities of the Region**

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| **MEDICAL CARE** *(GPA – 30 - 44 %)* | 38,4 | 32,0 | 34,9 | 31,5 | 34,0 | 43,3 |
| **CONDITIONS OF THE PHYSICAL CULTURE AND SPORT** *(GPA –34 - 54 %)* | 28,0 | 30,1 | 37,1 | 32,7 | 41,3 | 49,5 |
| **CONDITION OF THE EDUCATIONAL SYSTEM** *(GPA – 63 - 77 %)* | 58,8 | 64,8 | 61,5 | 62,8 | 69,7 | 75,8 |
| **SAFETY OF CITIZENS** *(GPA –28 - 46 %)* | 27,9 | 23,3 | 25,2 | 22,8 | 32,2 | 41,1 |

From table 3 it can be seen that the satisfaction level of the citizens of the Rostov region grows and falls within the range of average for the Russian Federation. It means that the regional Executive authorities have created the favorable environment for human development.

Along with these factors special significance have level of culture, civic awareness, values and needs, the level of conflict in the region, etc. Among them are large number of quality characteristics which information is not contained in the bodies of the Federal service of state statistics, and, therefore, is not used to assess the human development of the territory. Therefore, for evaluation and decision making in the field of target management of the regional human development we propose to use cognitive analysis and developed on its basis cognitive technologies - modern technologies of system analysis. Cognitive analysis is universal enough scientific tools for understanding the behavior of complex systems (which is the socio-economic system of the region). Its methods are developed at the Institute of Control Sciences of the Russian Academy of Sciences. Based in the software environment of PECM a cognitive model of assessment and management of human development in the region was built (Fig. 3).
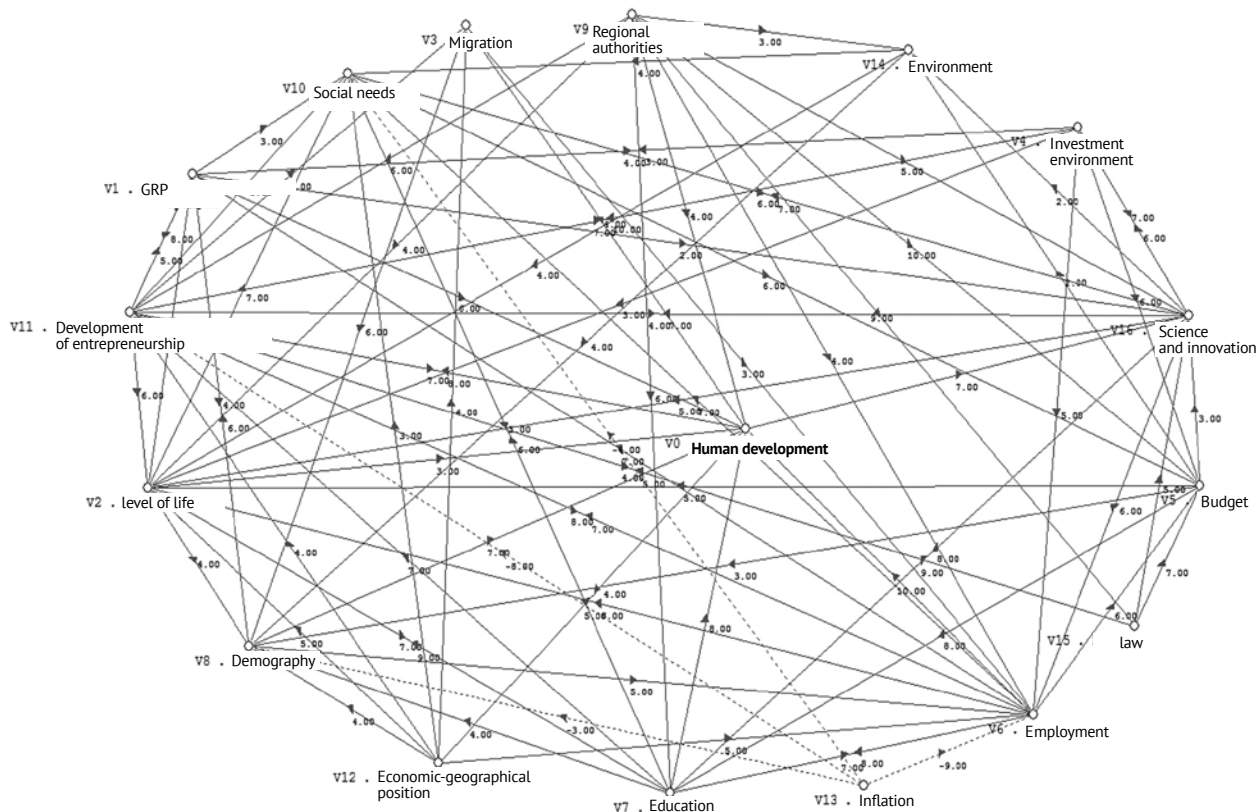


*Figure 3.*
**Cognitive Model of Assessment and Management of Human Development in the Region**

The model allows the use of cognitive analysis to study the interaction between factors. For the mathematical description of the model we built the corresponding to it adjacency matrix $R\varphi$ (Fig. 4).

$$R_\varphi =$$

| | V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 | V9 | V10 | V11 | V12 | V13 | V14 | V15 | V16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| V1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| V2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| V3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| V4 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| V5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| V6 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| V7 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| V8 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| V9 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| V10 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| V11 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| V12 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| V13 | 0 | 0 | 0 | 0 | 0 | 0 | −1 | 0 | −1 | 0 | −1 | −1 | 0 | 0 | 0 | 0 | 0 |
| V14 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| V15 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| V16 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |

*Figure 4.*
**The Adjacency Matrix Rφ, Showing the Links Between the Factors**

The links between the factors represented in the form 1 (with sign " + " is a positive correlation between the factors, i.e. the increase of one factor increases the other, or " - " in a negative correlation, i.e. the increase of one factor decreases the other) and 0 (no link).

On the developed cognitive models we will conduct a scenario analysis of human development in the Rostov region. The bases of the scenarios are events prescribed in the government programs of the Rostov region till 2020.

Currently on the territory of the Rostov region 21 state programs are in force that regulate all spheres of socio-economic development of the region. 15 of them have a social orientation, and 6 - economic (tabl. 4).

*Table 4.*
**State Programs of Development of the Rostov Region**

*thousands of rubles*

| NAME OF A STATE PROGRAM | CATEGORY | FUNDIG |
|---|---|---|
| 1 | 2 | 3 |
| THE  DEVELOPMENT OF THE HEALTH CARE | SOCIAL | 287 866 236,2 |
| THE DEVELOPMENT OF THE EDUCATION | SOCIAL | 240 031 253,2 |
| YOUTH OF THE ROSTOV REGION | SOCIAL | 645 646,1 |
| SOCIAL SUPPORT OF CITIZENS | SOCIAL | 199 470 643,3 |
| ACCESSIBLE ENVIRONMENT | SOCIAL | 182 190,9 |
| PROVIDING AFFORDABLE AND COMFORTABLE HOUSING | SOCIAL | 23 829 646,7 |
| THE PROVISION OF QUALITY UTILITY SERVICES | SOCIAL | 25 755 120,3 |
| THE PROMOTION OF EMPLOYMENT | SOCIAL | 5 909 663,3 |
| THE MAINTENANCE OF PUBLIC ORDER | SOCIAL | 578 418,0 |
| PROTECTION OF POPULATION AND TERRITORIES FROM EMERGENCY SITUATIONS | SOCIAL | 5 246 207,6 |
| THE DEVELOPMENT OF CULTURE AND TOURISM | SOCIAL | 13 272 369,7 |
| ENVIRONMENTAL PROTECTION | SOCIAL | 9 974 962,8 |
| THE DEVELOPMENT OF PHYSICAL CULTURE AND SPORTS | SOCIAL | 11 999 523,4 |
| ECONOMIC DEVELOPMENT AND INNOVATIVE ECONOMY | ECONOMIC | 1 166 125 940,6 |
| INFORMATION SOCIETY | SOCIAL | 3 560 080,3 |
| THE DEVELOPMENT OF THE TRANSPORT SYSTEM | ECONOMIC | 112 073 620,3 |
| THE DEVELOPMENT OF AGRICULTURAL | ECONOMIC | 18 404 792,3 |
| ENERGY EFFICIENCY AND ENERGY DEVELOPMENT | ECONOMIC | 611 520,5 |
| REGIONAL POLICY | ECONOMIC | 1 834 323,6 |
| SUPPORT COSSACKS | SOCIAL | 4 894 291,0 |
| THE MANAGEMENT OF PUBLIC FINANCES | ECONOMIC | 61 446 740,4 |
| TOTAL | | **2 193 713 190,5** |

The financial relationship between social and economic spheres of the region is presented in figure 5.
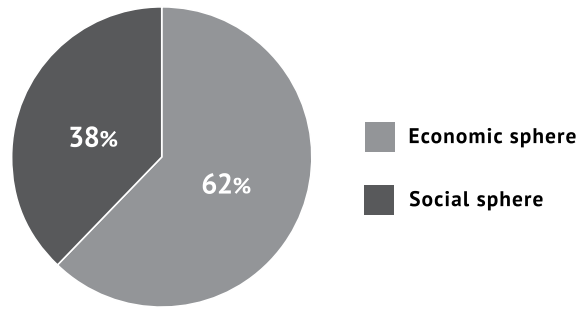
**Figure 5.**
**Financing of Social and Economic Sphere of the Rostov Region Through State Program**

Scenario 1. The situation is simulated when entering the model following control actions: qv5 = +9 (V5 "budget") (the development of vocational training), qv11 = +8 (V11 "development of entrepreneurship") (the provision of services in the sphere of professional education) (Fig. 6)
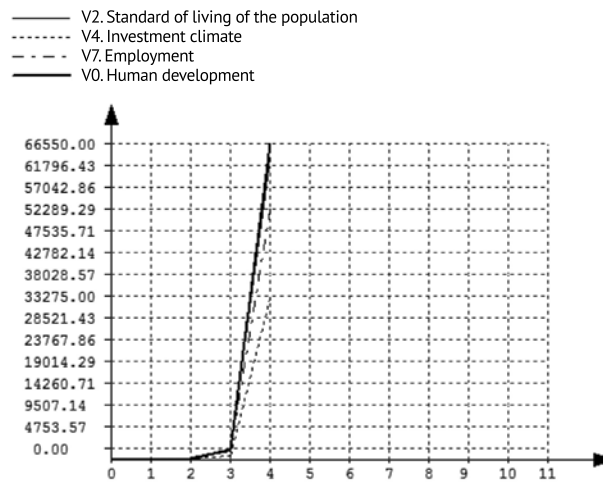.



**Figure 6.**
**Scenario of Development of Personnel Development and Other Socio-Economic Indicators of the Region in Introducing Control Action Qv5 = +9 And Qv11 = +8 in V5 "Budget" and in V11 "Development of Entrepreneurship"**

During the second step of modeling we observed the increase of V0 "human development" in the region, resulting in improved socio-economic situation in the region to improve the education and gradual improvement of the investment climate. Let's consider the possible scenarios based on the data of the state program of the Rostov region "Promoting to the employment".

Scenario 2. The situation is simulated when entering the model of following control action: qv7 = +5 (V7 – education) (active policy of employment and social support of unemployed citizens from 2014 to 2020), the target factors in this case are human development (V0), the standard of living of the population (V2), investment climate (V4) and employment (V6) (Fig. 7).
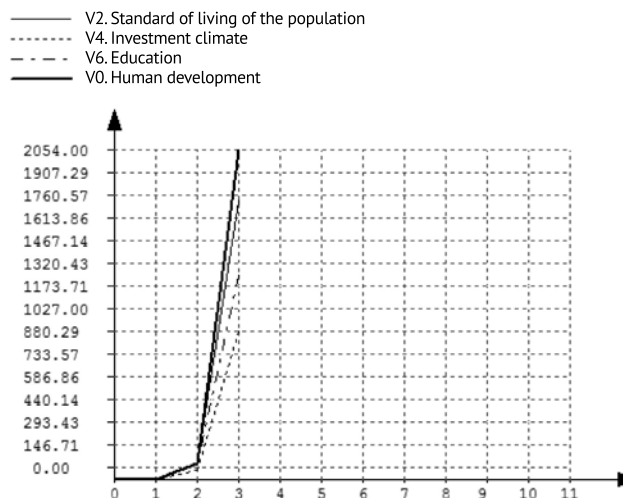


**Figure 7.**
**Scenario of Development of Personnel Potential and Other Socio-Economic Indicators of the Region in Introducing Control Action qv7 = +5 in V7 "Education"**

At the first step is the development of all of the factors, at the second step V0 "human development" of the region increases against the background of improving the situation with the V6 "employment" of the population, in accordance with this V2 the standard of living of the population" gradually becomes higher and in the region is becoming more attractive V4 "investment climate".

Based on the example of scenario analysis and the scenarios it can be concluded that the event stated in state programs will undoubtedly lead to the development of human potential of the Rostov region. However, the figures show that the coincidence of trends in the development of the main targets of the region, their growth rates are significantly different.

Thus, the proposed cognitive model is an effective tool in the decision-making in the target (programmed) management of the human development.

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