

# *Employee potential in the transition to new industrialization: approaches to formation and evaluation*

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**Abstract**—The article deals with the formation and evaluation of employee potential in the transition to a new industrialization. The purpose of the study was to identify the key problems of the formation, use and assessment of the quality of the personnel potential of the regions and the country, taking into account new technological conditions for the activities of business entities. The main research methods used were: abstract-logical, monographic, regression analysis method, extrapolation method, as well as methods of tabular and graphical representation of statistical data. The processing of the original statistical information was carried out using the Excel and Statistica application packages. The indicators for assessing the quality of employee potential were substantively analyzed and classified, highlighting groups of physical, intellectual, educational and its economic characteristics. A method of calculating the integral index of personnel potential was proposed and tested on the example of the regions of the Siberian Federal District, while clusters of regions with high, medium and low values of the integral index of employee potential were identified. More detailed studies conducted on the example of the Omsk region. According to the results of the research, the directions of increasing the efficiency of the formation and use of the employee potential of the region in the context of the transition to a new industrialization are substantiated.

**Keywords** – *employee potential, new industrialization, region, Omsk region, formation of employee potential, assessment of employee potential.*

## I. INTRODUCTION

Overcoming the stagnation of economic growth and boosting the Russian economy are tasks of a paramount importance. All resources required for this should be aimed to its implementation, backed up by urgent changes. The emerging unfavorable external conditions of the Russian economy only increase the awareness of the export-raw model

exhaustion of economic growth, which largely determined by the nature of the Russian's economy development in the post-Soviet period. In order to implement the growth policy more effectively, as well as to solve more general tasks: rebuilding the existing economic system.

Thus, the study on the issues of evaluation, forecasting and justifying approaches to assessing the quality of human potential is relevant, has practical value and will be interesting to a wide range of people.

## II. LITERATURE REVIEW

The issues of the new industrialization content are discussed by A. Tatarkina, S. Rummyantsev, A. Zhironkina, A. Neshitu, S. Gubanova, L. Orlenko, V. Ryazanov, E. Animits, Ya. Silin, S. Bodrunov, and others [1-3, 6, 8-17]. The majority of research scientists agree that the processes of industrialization are determined by the transformation of the life cycles of technological structures. In scientific literature there are not enough studies on the issues of resource support for the conduct of new industrialization, in particular, the problems of formation and usage of appropriate human resources and assess its quality. In research, the issues of labor in the new industrial system, the requirements for education, professional, qualification competencies are not adequately reflected. Thus, the foregoing suggests that the study on the issues of evaluation, forecasting and justifying approaches to assessing the quality of human potential is relevant. It has practical value and will be interesting to a wide range of people.

## III. RESEARCH METHODOLOGY

The purpose of the study was to identify the key problems of the formation, usage and quality assessment of

human resources capacity in regions and countries in the context of the transition to neoindustrialization. Theoretical and methodological basis of the study, devoted to the study of essential processes of ensuring the personnel component in neo-industrialization, methods of its forecasting and approaches to assessing the quality of personnel potential. The problems of assessing employee potential are considered on the example of a typical peripheral region of the Russian Federation - Omsk Region. Corresponds to the all-Russian trends.

The survey of the current state of the formation of employee potential in the region was based on statistical research methods that contribute to the rationale of the conclusions and recommendations proposed in the article. In this case, the collection and analysis of statistical data, grouping and synthesis of results was carried out. As a statistical toolkit, we used regression analysis, methods of demographic forecasting, and also methods of tabular and graphical presentation of statistical data. The processing of the initial statistical information is carried out using the software packages Excel and Statistica. The development of recommendations for the employee potential assessment was based on such research methods as abstract-logical and monographies.

#### IV. THE PRACTICAL SIGNIFICANCE OF THE STUDY

The practical significance of the study consists in substantiating the ways to increase the efficiency of the formation and use of the region's personnel potential in the

transition to new industrialization. According to the results of the study, the authors developed a personnel module of the region, with particular attention being paid to substantiating the program for staffing the implementation of priority areas of technological development of the regional economic sectors.

#### V. THE DISCUSSION OF THE RESULTS

The formation of new sectors of the economy, the modernization of traditional industries, changes in technology are the basis for the transformation of modern production. They ensure the economic development of the country and regions and the formation of a new industrial society. The result of technological innovation changes is the development of new industries, which ultimately will lead to changes in the organization, personnel management, the need for advanced training of employees and their retraining [1-3, 6, 9-11].

Consequently, new industrialization is inextricably linked with the preparation of innovatively oriented workers for new technological sectors. The most important condition for the sustainable innovation development of Russia is the formation, development, distribution and rational use of human resources [4,5,7].

In our opinion, when forming the personnel potential necessary for use in the conditions of transition to a new industrialization, it is necessary to consider its physical, intellectual, educational and economic characteristics (Table 1). Personnel potential can be formed both at the governmental level and at the level of a specific region, as well as a specific industry.

TABLE I. CHARACTERISTICS OF EMPLOYEE POTENTIAL

Groups of indicators	Characterizing indicators	Influencing factors
<b>State</b>		
Physical	Age, gender, life expectancy, the population of working age	The level and quality of life ecology, state health care costs
Intellectual and educational	Professional qualification, education level of working population, labor mobility	Accessibility to higher education, education costs
Economic	Labor productivity	Investments in digital technology
<b>Region</b>		
Physical	Age, gender, life expectancy, the population of working age	The level and quality of life in the region, the environment, access to medical support, the quality of working life in the region
Intellectual and educational	Professional qualification, education level of working population, labor mobility	Accessibility of higher education, development of retraining, advanced training
Economic	Labor productivity	Investments in fixed assets and digital technologies
<b>Industry</b>		
Physical	Number of employees, injuries and morbidity, average age of employees	The cost of creating safe working conditions, the quality of working life
Intellectual and educational	Professional qualification, education the level of workers, the distribution of staff according to work experience, labor mobility	Expenses for retraining, advanced training, stimulating the creation of innovation and invention
Economic	Labor productivity, labor yield	Investments in fixed assets and digital technologies

To assess the employee potential, we suggest using the methodology, the essence of which is that the scale of measuring the indices of life expectancy, education, efficiency is set in the range from 0 to 1, the calculation is based on using the highest and lowest values of indicators in the

whole country, regions, branches. The integral index of personnel potential is calculated as the geometric average of the index of life expectancy, the index of education and the index of efficiency. For each of the three groups of indicators we chose one, which most fully characterizes the corresponding parameter (Table 2).

TABLE II. INDEX VARIABLES EMPLOYEE POTENTIAL

Parameters	Physical	Intellectual educational	Economic
State			
Characterizing indicators	Average life expectancy, years	Proportion of employed with higher and secondary vocational education	GDP per employee, RUB
Parameter Indicator	Life expectancy index (I1)	Education Index (I2)	Labor efficiency index (I3)
Method of calculating indicators	Measurement Index = Actual Value / Maximum Value		
Human Resource Quality Index	$I_{quality} = \sqrt[3]{I1 * I2 * I3}$		
Region			
Characterizing indicators	Average life expectancy, years	Proportion of employed with higher and secondary vocational education	GDP per employee, RUB
Parameter Indicator	Life expectancy index (I1)	Education Index (I2)	Labor efficiency index (I3)
Method of calculating indicators	Measurement Index = Actual Value / Maximum Value		
Human Resource Quality Index	$I_{quality} = \sqrt[3]{I1 * I2 * I3}$		
Industry			
Characterizing indicators	The average age of employees, years	Proportion of employed with higher and secondary education	The volume of production on the number of employees, RUB.
Parameter Indicator	Middle age index (I1)	Education Index (I2)	Labor efficiency index (I3)
Method of calculating indicators	Measurement Index = Actual Value / Maximum Value		
Human Resource Quality Index	$I_{quality} = \sqrt[3]{I1 * I2 * I3}$		

The evaluation of the personnel potential was tested using the example of the Siberian Federal District regions, more detailed studies were conducted on the materials of the Omsk region. As a result of the obtained calculations, three clusters (groups) of territories were identified:

1. a group of regions with a high-quality value of personnel potential (0.820 –1,000) - Krasnoyarsk Territory, Tomsk, Irkutsk Oblasts
2. a group of regions with an average value of the quality of human resources (0.700–0.800) - Altai Territory Omsk Region, Novosibirsk Region, Republic of Khakassia, Kemerovo Region, Republic of Buryatia;
3. a group of regions with a low ICTD value (0.600–0.700) - Trans-Baikal Territory, the Altai Republic, and the Tyva Republic.

## VI. CONCLUSION

According to the results of the research, we can conclude that in the Omsk region there is a tense situation with the formation and use of human resources. The most acute are demographic problems, they turn out to be a negative impact on the development of human potential, and we attribute to the problems of a demographic nature: 1) population decline, 2) population decline in working age; 3) a decrease in the rate of natural population growth in 2012–2016; 4) a gradual increase in the level of urbanization of the region; 5) an increase in the migration outflow of the population, especially the most "qualitative" part of it (the population of working age and with a high level of education), in terms of the formation of personnel potential. It should also be noted the low level of

labor efficiency in the region and the average intellectual and educational level.

Improving the efficiency of formation and use of personnel potential at the regional level in the context of the transition to new industrialization should be carried out in the following areas:

- 1) improving the system of professional orientation of students which study in general education institutions, which will allow them to be more efficiently oriented when choosing their future profession and to take into account data on actual and forecasted demand from employers;
- 2) ensuring the link between education and further employment in the specialty.
- 3) developing of labor mobility, including the use of continuous professional education systems, retraining, planning and career development.
- 4) developing public-private partnership principles between employers and organizations of vocational education in training
- 5) creating a single information portal on the development of employee potential in the Omsk region, including information on promising areas of socio-economic development of the region, types of labor activity that are in demand in the labor market, quality of educational services, job vacancies and career opportunities.

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