

# The Mutual Influence Of The Intellectual Capital Of Universities And Regions And Their Location

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**Abstract**—The article contain results of a comprehensive study aimed at revealing the role and importance of universities' intellectual capital in the formation of integrated regional indicators of intellectual capital. The theoretical foundations of the intellectual capital of territories and universities were studied, that allowed to form systems of evaluation indicators. Processing of statistical data for 2014-2015 on materials of regional statistics allowed to test a number of hypotheses about the influence of the intellectual capital of universities on regions' intellectual capital. Hypotheses about the influence of universities' intellectual capital, as well as influence of their individual elements (human and reputational capital) on regions' intellectual capital were confirmed on the analysis basis. Also, within the framework of the study, the hypothesis for the influence of universities' intellectual capital on regions' human capital was confirmed.

**Keywords**—*Intellectual Capital, Region, University, Human Capital, Reputation Capital, Infrastructural Capital, Capital Of Intellectual Property.*

## I. INTRODUCTION

The subject of the region's intellectual capital and its significance in modern conditions is actively raised both in researches of scientists and specialists, and in state documents of various levels.

The purpose of the country's scientific and technological development in the Strategy for Scientific and Technological Development of the Russian Federation [1] is to ensure the independence and competitiveness of the country through the creation of an effective system of building up and making full use of the nation's intellectual potential.

Among the fundamental principles of state scientific and technological policy, the Strategy emphasizes the concentration of resources: the concentration of intellectual, financial, organizational and infrastructural resources to support research and development, and the creation of products and services [1].

The concentration of intellectual potential is one of the most significant resources within the boundaries of a particular territory that provides it with the additional competitive advantages necessary to meet the great challenges facing the country.

The identification of the mutual influence of the intellectual capital of the region and the universities located on its territory has the great importance for ensuring their development.

Higher education institutions within the framework of the "University 4.0" concept can ensure the formation and development of territories' intellectual capital, which in turn is the source and element of their own intellectual capital with due account for the formed ties with other subjects of the regional economy. All this, with proper management, can create the synergy effect from the interaction of the parties, which strengthens the role of intellectual capital of territory's individual subjects, as well as the multiplier effect that arises during development of a university's intellectual capital, increasing region's intellectual capital, that can be ensured only with active participation and involving territory's intangible resources in a university's activity.

## II. LITERATURE REVIEW

Terminological issues of a region's intellectual capital, as well as its structure, are examined in the works of domestic and foreign authors.

Most authors took Stewart's classical approach as the base and included the human, structural and consumer capital (capital of relations) in the classification of intellectual capital types [2, 3, 4, 5, 6, 7, 8].

Others authors interpret it with a very close structure, described in the works of Scandia Navigator: intellectual capital includes human and structural capital, which, in turn, is subdivided into client and organizational one, consisting of innovation and process capital [9, 10].

In a number of cases, classical classifications of intellectual capital types are supplemented by specific types of intellectual capital, the expediency of isolating them is determined by the specifics of the region as investigation object. Thus, individual authors allocate market capital [11, 12, 13], social capital [10, 11], development (renewal) capital [7, 12, 13], capital of intellectual property [4].

The literature analysis made it possible to single out the publications of individual authors [14, 15, 16, 17], devoted to the issues of mutual influence of intellectual capital of territories and universities within their borders, which for the most part has a framework nature.

We should separately note the work by Kirshin et al. [18], which formalized the task of assessing the intellectual capital of the country, region and universities on the basis of the index of intellectual potential development which the system of indicators of educational and scientific potentials was singled out the corresponding calculations were made and the system of measures to develop universities including the active growth of the region's intellectual capital was designed.

In foreign literature universities' role in the development of their locations is widely covered in the works by Bennenworth et al. [19].

Thus, in the paper "Building Localized Interactions Between Universities and Cities Through University Spatial Development," it has been shown that universities are important participants in the knowledge economy's global development, and they make a significant contribution to the economic development of cities of their localization, they are both centers of concentration and generation of knowledge, and suppliers of human and intellectual capital, on which the knowledge economy depends.

The formalization of a university's role in the development of primarily entrepreneurial activity in the region is represented in the work by Trequattrini et al. [20]. The authors primarily focus on the problem of territories' innovative development and view universities as a significant platform for the commercialization of research and development created on their platform.

### III. GOAL FORMULATION

Within the framework of this study, the goal was to study the degree of mutual influence of the intellectual capital of the region and universities located within the territory of their location.

### IV. THEORETICAL PART

The theoretical part of the study included the development of indicators system characterizing individual elements of the intellectual capital of universities and the region<sup>1</sup>:

#### 1. Human capital:

- 1) Knowledge capital
- 2) Capital of competencies
- 3) Capital of professional experience
- 4) Capital of professional and personal reputation
- 5) Health Capital

#### 2. Reputational capital:

- 1) Image capital
- 2) Client capital
- 3) Brand equity

#### 3. Infrastructure Capital<sup>2</sup>:

- 1) The capital of the regional environment
- 2) The capital of the regional management system
- 3) Regional infrastructure capital
4. Innovative capital:
  - 1) The capital of intellectual property
  - 2) The capital of ideas and projects

Information sources that determine, among other things, the choice of indicators for evaluating the region's intellectual capital are Federal State Statistics Service's data, as well as official regional ratings, including expert estimates of region's certain characteristics.

We used the Federal system for monitoring the performance of scientific organizations performing research, development and technological work (FSMSO) and Information and Analytical Materials on the results of monitoring the effectiveness of educational institutions of higher education as information sources for analyzing a university's intellectual capital.

The original values were normalized by dividing method by the maximum value. For each group of indicators that characterize the group of intellectual capital the coefficient of internal consistency (Cronbach's alpha) was calculated separately for each year.

### V. RESULTS

For four enlarged groups of region's intellectual capital and three enlarged groups of university's intellectual capital we calculated subindexes using the distance method and integral indexes as a product of subindexes.

Obtained results made it possible to verify the following hypotheses formulated in the framework of the study:

H1 – Universities' intellectual capital influences a region's intellectual capital

H2 - Universities' human capital influences a region's intellectual capital

H3 - Universities' reputational capital influences a region's intellectual capital

H4 - Universities' intellectual capital influences a region's human capital

H5 - Universities' intellectual capital influences a region's reputational capital

H6 - Universities' intellectual capital influences a region's infrastructure capital

H7 - Universities' intellectual capital influences a region's intellectual property capital

The hypotheses were tested by calculating the Pearson's correlation coefficient between the corresponding indexes of intellectual capital (Table 1).

<sup>1</sup>It's not given in the publication due to the pages limit

<sup>2</sup> It refers to the characteristics of university's intellectual capital

TABLE I. CORRELATION COEFFICIENTS AND THEIR SIGNIFICANCE FOR THE HYPOTHESES OF MUTUAL INFLUENCE OF THE INTELLECTUAL CAPITAL OF THE UNIVERSITY AND THE REGION

Hypothesis	2014			2015		
	Correlation coefficient	t-criterion	p	Correlation coefficient	t-criterion	p
H1	0,662	8,054	5,07E-12	0,598	6,804	1,47E-09
H2	0,680	8,455	8,06E-13	0,667	8,160	3,12E-12
H3	0,657	7,937	8,69E-12	0,668	8,173	2,95E-12
H4	0,673	8,293	1,7E-12	0,615	7,114	3,66E-10
H5	0,592	6,700	2,33E-09	0,496	5,200	1,41E-06
H6	0,508	5,380	6,76E-07	0,471	4,862	5,44E-06
H7	0,531	5,712	1,69E-07	0,471	4,868	5,31E-06

As the table’s data show, the relationship between indexes characterizing the hypotheses is average (interval 0.3-0.7), the significance is high.

The correlation coefficients’ values for the two studied periods for the H2, H3, and H4 hypotheses are close to the limiting value 0.7, which corresponds to a high correlation level. This allows us to conclude that influence's degree of universities’ human capital on region's intellectual capital, influence's degree of universities’ reputational capital on region's intellectual capital and influence's degree of universities’ intellectual capital in whole on region's human capital is above the average.

**VI. CONCLUSIONS**

Quoted results allows us to draw conclusions about universities’ essential role for regional development.

Higher indicators of influence of universities’ human capital on region’s intellectual capital are interpreted in connection with the implementation of universities’ main mission for the regions - training and knowledge transfer. All this forms region’s additional intellectual capital, which is used for the purposes of social and economic development.

Universities’ reputational capital is a source for attracting additional client capital to the region, as well as for its positioning as a territory with a high scientific and educational potential.

Region’s human capital is formed under the influence of universities’ cumulative intellectual capital, which is expressed in knowledge transferring, creation of R&D, development of entrepreneurial activity, etc. All this ensures the transformation of available human capital into a regional asset of new quality.

Thus, during research it was established that universities’ intellectual capital as a whole and its individual elements create the basis for the development of the region's intellectual capital as an asset for their future growth.

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