

International Experience in Managing Intellectual Capital of Territories for Innovative Development

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Abstract—Actuality. Today the role of intellectual capital, which integrates in its structure a significant part of intellectual assets and constitutes a basis of innovative development of the country, is consolidated at the legislative level and acquires formalized features of the priority direction of state activity. The transition to an innovative economy, which is characterized by high speed of socio-economic development, formation of intellectual capital as a market and increase of its role, forces countries to develop strategies for innovative development.

Methods. Using the summary of the conceptual framework review and the existing approaches to the formation and development of intellectual capital market used methods of abstraction, logical analysis and synthesis, we obtained a complete picture that describes conditions and factors of the intellectual capital market formation. Methods of evolutionary-historical approach provided identification of cause-and-effect relations and establishment of key regularities describing transformation of the market of intellectual capital. In order to concretize trends and identify promising areas of intellectual capital market development for the purposes of innovative development strategy choice, the methods of formalized representation of control systems, combinatorial and situational modeling are applied.

Results. The essence of intellectual capital is revealed, intellectual capital market term is more closely defined, its subjects and structural elements are presented.

The obtained results made it possible to develop a classification of innovative development strategies. This classification allows to expand the theoretical basis for studying the features of innovative development of various countries with practice-oriented knowledge to simplify and boost efficiency in exchange of experience among the professional scientific community.

Provided this, the matrix of a choice of a strategy of innovative development at the country level is developed with regard to comparison of the offered classification and type of the market of intellectual capital. This tool is based on the identification of the optimal combination of the national innovation system model and level of influence of intellectual capital on the development of the country's innovation system.

The scientific novelty of this study contributes to development of a matrix of formation and implementation of the innovative development of the country's strategy model based on the characteristics of the intellectual capital market operating in this country.

Keywords: *innovation economics, innovative development, strategy, intellectual capital, intellectual capital market, national innovation system*

I. INTRODUCTION

Innovative way of development is chosen by the leading countries as a priority. Meanwhile, the intellectual component of innovative processes evolves at a higher rate and provides superiority in the competitiveness. Innovative development is a systemic process of socio-economic development based on knowledge and innovation, which allows to implement competitive advantages of the country's economy, secure sustainable economic growth, improve quality and population's standard of living through harmonization of participants interests in the informational space. Transition to an innovative economy causes significant change in the quality standards of human resources, intellectualization of labor process and economic relations. In this regard, the key

intent of innovative development is to achieve maximum efficiency of intellectual capital usage.

II. LITERATURE REVIEW

Comprehension of intangible assets impacted on the change in value of companies which in turn caused formalization and specification of new categories and actualization of existing conceptual apparatus in line with current processes. It caused origin of the term "intellectual capital", followed by first scientific and then practical usage in the 60s of the 20th century.

There are many author's interpretations of "intellectual capital" concept, but number of approaches distinguish definition by following methodological principles:

- Similar as a balance sheet value. Intellectual capital is regarded as an intangible asset that can be measured within existing accounting and valuation system, resulting in addition company value (E. Brooking, A. Gaponenko, L. Prusak, O. Novoseltsev, A. Pulik, et al.).
- Measured as a resource. Intellectual capital is considered as an intangible resource and a source of competitive advantage (E. Jamay, G. Chernoles, T. Fortune et al.).
- Systematic. Intellectual capital is considered as a set or sum of knowledge, abilities, skills of employees and intangible elements of corporate and management culture coexisting in the organization (T. Stewart, J. Roos, L. Edvinsson, D. Zeghal, A. Maaloul, et al.).

Review of theoretical assumptions indicates that most researchers tend to interpret corporate intellectual capital as a set of knowledge, skills and abilities of employees and intangible assets that create added value and increase the welfare of stakeholders.

Focus of scientific interest in region's or country's intellectual capital research lies in measurement of affection on strategic management influence and its impact on well-being and wealth of the nation. The most impactful papers which formed concept of intellectual capital at the national level are N. Bontis, José Martí Maria Viedma, D. Andriessen, S. Stem, Th. Malhotra, A. Rimbaud, E. Pashera, D. Wasiak. By reference to research of the above-mentioned authors, it is possible to formulate the following distinctive characteristics of the national intellectual capital:

- Absence of single universally recognized concept definition, common approach to identification of intellectual capital structural components on national scale, as well as their measurement.
- The core concepts commonly based upon resource approach, where intellectual capital acts as a resource for the formation of national wealth and competitiveness of the country.
- Expanded structure in comparison with intellectual capital at the enterprise level, which is explained by

functioning complexity of the socio-economic system which include large number of functional and procedural relationships.

- Applicability of corporate-level methodologies to national intellectual capital measurement, which are usually based on the calculation of integral indicators.
- Geographical linkage of national capital to a specific territory, which determines the heterogeneity and limitation of its movement [1].

"Intellectual capital" as an economic phenomenon have distinguishing cornerstone features. The essence of intellectual capital consists from the system of operations forming it. Intellectual capital is formed not by addition of its individual parts, but as a property of their interaction. This condition emphasizes importance of structural composition of intellectual capital and the importance of each of its parts. Scientific community have following consensus: division of intellectual capital into three parts such as human capital, relational capital and structural capital. Such method applicable to both corporate and regional and national levels. Based on the analysis of scientific papers of authors who studied this aspect of the theory of intellectual capital (see table I), we will define the introduced concepts [2].

TABLE I. APPROACHES TO DETERMINING THE STRUCTURE OF INTELLECTUAL CAPITAL AT DIFFERENT LEVELS OF MANAGEMENT

Author and year	Elements of intellectual capital structure
<i>enterprise level</i>	
Roos et al., 1998	human capital, structural capital, relational capital [3]
Stewart, 1997 Mouritsen, 1998 Zeghal, and Maaloul 2010	human capital, structural capital [4]
Haanes, Lowendahl, 1997	human capital, organizational capital (procedures, guidelines and administrative systems), customer capital (customer loyalty, product brands and corporate image) [5]
Lowendahl, 1997	competencies and relationship resources [5]
Sveiby, 1997	individual competencies, collective competencies, individual relational resources, collective relational resources [6]
O'Donnell, O'Regan, 2000	employee competencies (analogous to human capital), internal structure (analogous to structural capital), external structure (analogous to relational capital) [5]
Leana, Van Buren, 1999	human capital, innovation capital, process capital, relationship capital [5]
USA (DTI), 1999	people (analog of human capital), market (analog of relational capital), system (analog of structural capital) [5]
Cohen, Kaimenakis, 2007	hard capital (the value of which the company can determine, patents, R & d costs, etc.), functional capital (including organizational processes), soft capital (the value of which cannot be determined) [7]
<i>regional level</i>	
P. Makarov, 2014	human capital, relational capital, structural capital, renewable (the ability of the region to reproduce intellectual capital) [8]
Liu Chao, Li Xiao and Xu Lingyu, 2015	regional human capital, regional relational capital, regional structural capital [9]
V. Kireeva, 2015	human capital, structural capital, social capital (analogous to relational capital), innovation capital [10]
<i>national level</i>	
A. Rembe, Sweden, 1999.	human capital, market capital, process capital, renewable capital [11]
N. Bontis, Malaysia, 2000	financial well-being, human capital, market capital, technological capital [12]
J. Pomedá et al., Spain, 2002	human capital, organizational capital, technological capital, reputation capital, social capital [13]
A. Bonfo, EU Countries, 2003	resources, processes, results [14]
N. Bontis, Arab countries, 2004	financial well-being, human capital, market capital, technological capital [15]
P. Stahly, A. Pöyhönen, Finland, 2004.	human focus, market focus, process focus, renewal and development [16]
E. Pashera, Israel, 2007	financial capital, human capital, market capital, technological capital, renewal and development fund [17]
D. Wasiak, EU, 2007	human capital, relational capital, structural capital, renewable capital [18]

Human capital is a part of intellectual capital, which includes human resources and reserves, as well as formation

of elements of the system, for example: the quality level of education, healthcare, social security.

Structural capital is a part of intellectual capital related to the administrative and organizational-managerial component in the aggregate (procedures, technologies, management systems, technical and software, administrative structure) and contributes to the codification of knowledge.

Relationship capital, being a part of intellectual capital, reflects the possibility of building mutually beneficial relations with external and internal counterparties, which affect socio-economic, trade and economic relations, political relations, organizational and psychological relations that are built within the socio-economic systems.

Thus, intellectual capital is a complex heterogeneous phenomenon, which can be defined as an intangible resource of innovative development, formed and reproduced as a result of interaction of human, structural, relational capital, which forms basis of competitiveness and well-being of the territory in the transition to an innovative economy. Interaction of the intellectual capital elements is the basis of its reproduction. The human capital reflects quality of knowledge transmitters, structural capital reflects level of knowledge codification, and relational capital reflects opportunities for exchange of codified knowledge through their transmitters.

These processes at the corporate and national level take place in the ecosystem, which can be defined as the intellectual capital market.

Intellectual capital term considered to include totality of economic relations arising in the process of transformation of intellectual capital in the market.

It consists from the creators of intellectual capital, which form the supply, and consumers of intellectual capital, which form the demand for it and its consumption. The object of purchase and sale in the market are knowledge, abilities, skills, inventions, innovative products, etc. The framework of the intellectual capital market consists from state, investment and infrastructure support and markets of expertise, intellectual property and innovation [19].

III. RESULTS

At present, the role of intellectual capital, which integrates a significant part of intellectual assets in its structure and the basis of innovative development of the country, is in active phase of legislative institutionalization and acquires formalized signs of the pivotal direction of state activity.

The key points, concretizing principles and recommendations for required development of mechanism aimed toward effective functioning of intellectual capital of the region can be found in system-forming documents of the strategically-aimed nature. They include revealing the long-term and short-term plans and activities for creating environment and infrastructure to ensure the region's competitiveness in the context of sustainable innovative development [20].

Currently many regions and countries have approved system and policy documents containing national strategies of innovative development. For instance, programs of scientific, technical and technological development, concepts of intangible resources` management, in particular human capital and intangible infrastructure. To illustrate, in last three years (since 2017), more than 25 countries have presented national strategies for the development of artificial intelligence, which opens up new prospects for the formation and use of intellectual capital, since the use of AI completely changes the value chain.

On the basis of countries` program and development strategies analysis, which has set goal of transition to innovative model of economic development, classification of countries` strategies has been proposed, in relation to the type of influence on innovative development [21]. This classification allows to extend the theoretical basis of studying the characteristics of innovation development of the countries by bringing practice-oriented knowledge to simplify and improve the efficiency of the process of exchange of experience in the professional scientific community (table II).

TABLE II. CLASSIFICATION OF INNOVATION DEVELOPMENT STRATEGIES

Parameters	Influence of intellectual capital on innovative development through		
	<i>The carriers quality (human capital)</i>	<i>The level of codification (structural capital)</i>	<i>The exchange process (relationship capital)</i>
Management focus	Personnel	Science and technology	Relations regulation system
Main activity	Development of skills, competences of personnel resources, creation of conditions for cultivation of unique highly qualified personnel	Fundamental research, development of high-tech products and services	Attraction of highly qualified personnel of the international level, development of mechanisms of social and economic partnership and cooperation
Areas and areas where significant changes are planned	Medicine, education, security, small business	Finance, global databases, digital infrastructure, cybersecurity	Socially important areas and spheres, urbanistic, national security, mobility, legislation
The sources and agents of change	Small business, startups, professionals	Scientists, researchers, innovation clusters	State institutions and specialized civil services
Examples	South Korea "Artificial intelligence research and development strategy in South Korea", 2018 Sweden "Nationell inriktning för artificiell	Singapore Program AI Singapore, 2017 Russia "National strategy for the development of artificial intelligence for the period	Japan "Artificial Intelligence Technology Strategy", 2017 Taiwan "The actions of Taiwan in the field of artificial intelligence", 2018 New Zealand "Artificial intelligence: shaping the future

	intelligens", 2018 Canada «Pan-Canadian Artificial Intelligence Strategy», 2017 Australia «Australia 2030: Prosperity through Innovation» 2017	up to 2030", approved by the decree of the President of the Russian Federation in October 2019, UAE "UAE Strategy for Artificial Intelligence", 2017 Mexico "Towards an AI strategy in Mexico: Harnessing the AI Revolution", 2018 China "A Next Generation Artificial Intelligence", 2017 India Discussion Paper "National Strategy for Artificial Intelligence", 2018 Germany "Germany Federal Government's Artificial Intelligence strategy" 2018	of New Zealand", 2018 Italy White paper "Artificial Intelligence at the service of the citizen", 2018
Type of strategy	Breakthrough strategy, build-up strategy, defensive strategy	Exploratory strategy, patient strategy, violent strategy	Cooperative interaction strategy, diversification strategy, integration strategy

Also, depending on how effectively elements of intellectual capital market function and interact with each other, a particular type of market is configured. On these grounds, grouping classification of the intellectual capital market is proposed, based on following classification features: level of market development, level of market efficiency, territorial feature and the specific market model (figure 1) [22]. Based on the hierarchical structure of the intellectual capital market, it can be divided on a territorial basis on the following types: regional, country and world scale. It is also possible to distinguish the municipal scale type market of intellectual capital, but at this scale it is hardly possible to review it as fully formed market. The reason for this may be lack of various resources, absence of some structural elements of the market, etc.

Market of intellectual capital defined by stage of build-up can be categorized into emerging and developed market. Efficiency of market and its elements is next classification feature. Thus, intellectual capital market can be divided into a low-efficient, a medium-efficient, and an efficient type [23].

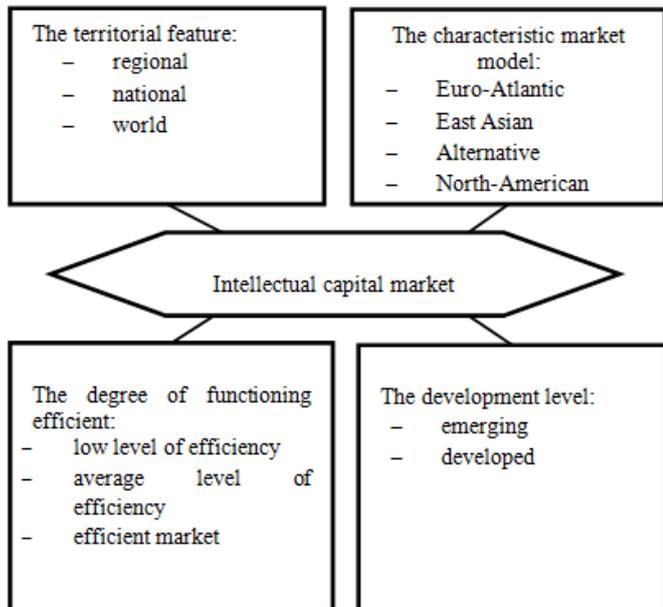


Fig. 1. Classification of intellectual capital market

National innovation system model determined by influence of state political structure, cultural characteristics and differences between countries, as well as many other factors, whereby caused change of model's properties, which itself is the basis of the intellectual capital market. Taking into account elements formation and functioning peculiarities of intellectual capital market in different countries, there are four main market models: Euro-Atlantic, East Asian, alternative and North American.

In summary, we can conclude that intellectual market capital functioning proceeds under influence of many factors, and the formation of a particular market type is greatly influenced by the interaction of market elements among themselves.

Thus, proposed classification is not fully comprehensive, and it, like any other, can be modified by addition of new classification features, or by enlarging or detailing existing features.

Considering the efficiency level of the intellectual capital market and the proposed classification, provided composed matrix for selection of innovative development strategy at the country level (table III).

TABLE III. MATRIX OF INNOVATIVE DEVELOPMENT STRATEGY SELECTION AT THE COUNTRY LEVEL

Classification of the intellectual capital market by the degree of efficiency of functioning	Innovative development strategy based on the use of intellectual capital		
	Influence of intellectual capital on innovative development through		
	<i>The carriers quality (human capital)</i>	<i>The level of codification (structural capital)</i>	<i>Exchange process (relationship capital)</i>
The low level of performance (alternative model)	Breakthrough strategy	Exploratory strategy	Cooperative interaction strategy,
The average level of efficiency (the East Asian model)	Build-up strategy	Patient strategy	Diversification strategy
The efficient market (Euro-Atlantic and North American models)	Defensive strategy	Violent strategy	Integration strategy

IV. CONCLUSION

Complex analysis of international ratings, statistical data exploring the topic of countries innovative development, regulatory framework, etc. defined problems specific to the intellectual capital market.

Key factors include: lack of a legislative framework regulating the intellectual capital market, low level of infrastructure support of the market, lack of investment platform for the market.

Continuous common trend in the intellectual capital market is integration of the markets of different countries into a single scientific, technical and innovative space to ensure strengthening of scientific and innovative potential.

From these considerations, it is appropriate to create tools that allow to choose suitable strategy for innovative development, as well as to coordinate the strategies of different levels among themselves.

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