

# Constructing a National Intellectual Capital Concept

Irena Mačerinskiene<sup>1</sup>

Rasa Aleknavičiūtė<sup>2</sup>

**Abstract** Intellectual capital at the national level has recently emerged as a new area of research, where the focus is on understanding and measuring the intangible factors influencing national wealth creation. The paper analyses how such abstract concept is constructed and what characteristics prevail in recent national intellectual capital research. Different perspectives of national intellectual capital were identified. The prevailing one defines national intellectual capital as a static object, which could be measured and represented by structural factors. But national intellectual capital could be understood as a process, where the dynamic characteristics are the most important. In order to represent national intellectual capital, its elements and their structural relations should be analysed inseparably.

**Index Terms:** National Intellectual Capital, Knowledge, Knowledge Resources, Knowledge Capital.

## I. INTRODUCTION

Intellectual capital is an abstract and complex concept, difficult to identify and operationalize. Therefore there is no unanimous definition of intellectual capital neither at the organizational nor at the national level of research. Marr and Chatzkel (2004) state that the concept of intellectual capital is not well understood and rarely clearly defined. Guthrie, Petty and Johanson (2001) have shown that the concept of intellectual capital often is poorly defined or not defined at all in many research papers. The cross-disciplinary nature of the intellectual capital research means that different people with diverse backgrounds use the same terms that carry completely different meanings.

More recently researchers have started to use the concept of intellectual capital for analysis from the territorial perspective (Hervas-Oliver and Dalmau-Porta 2007). Research of intellectual capital originated from the level of organizations and later was transferred to regional and national levels (Stahle 2008; D. G. Andriessen and Stam 2004). But transferability of this concept received no serious questioning (Stahle 2008). National intellectual capital is the object of multidisciplinary research, so the nature of this concept should be well understood and defined. The research of Salonius and Lönnqvist (2012) has shown that policy officials are not familiar with the concept of intellectual capital, though they are more or less

familiar with the general meaning of intellectual capital and elements of intellectual capital. National intellectual capital concept definition was seen as a very difficult or even impossible task, though having a lot of potential. That is where the problem arises – how to improve the national intellectual capital concept definition. The object of this paper is national intellectual capital.

**The aim** is to summarize characteristics of national intellectual capital.

**The objectives** of are as follows: 1) to analyse the perspectives of knowledge and to apply them to explain the meaning of the national intellectual capital concept, 2) to summarize the characteristics of intellectual capital defined by various perspectives, 3) to investigate what characteristics prevail in the national intellectual capital research.

**Methods** of the research: comparative analysis of scientific literature and textual analysis.

## II. PERSPECTIVES OF NATIONAL INTELLECTUAL CAPITAL

The idea of intellectual capital is based on a metaphorical conceptualisation of knowledge (Andriessen and Stam 2011; Andriessen and Boom 2009; Andriessen 2006). Machlup (1962) was the first to coin the term “intellectual capital”, and he used it to emphasize the importance of general knowledge as an essential factor for growth and development (Bontis, 2004). Leif Edvinsson and Pat Sullivan (1996) defined intellectual capital as “knowledge that can be converted into value” (Ileanu and Tanasoiu 2008, 367). In this paper the same approach is followed describing intellectual capital as knowledge involved in the value creation process. Different perspectives of knowledge and the influence of these perspectives on the research of intellectual capital are presented. Specifically aspects of knowledge reflected in the research of national intellectual capital are defined.

*The approach of the symbolic school to intellectual capital*

The symbolic school defines cognition as information processing in terms of symbolic computations or symbol manipulation based on rules (Lavanderos, Fiol 2011). From the standpoint of the symbolic school, if national knowledge is a reality that is observable and can be reduced to symbols, then an observer would have a universal character (Arenas and Lavanderos 2008). From

<sup>1</sup>Irena Mačerinskiene is with the Faculty of Economics and Finance Management, Mykolas Romeris University, Ateities st. 20 LT-08303 Vilnius, Lithuania

<sup>2</sup>Rasa Aleknavičiūtė is with the Faculty of Economics and Finance Management, Mykolas Romeris University, Ateities st. 20, LT-08303 Vilnius, Lithuania

this perspective only objects can be represented. National intellectual capital in most cases is conceived to be representable as a generalization of objects to which the knowledge is associated. A structural approach to national intellectual capital is used in order to define objects which represent national intellectual capital.

Most works describe intellectual capital as an intangible object (see Table 1). National intellectual capital is reflected by using such terms as “intangible assets”, “intangible resources”, “knowledge and knowing capability”, which clearly describe intellectual capital as a static object.

TABLE 1  
NATIONAL INTELLECTUAL CAPITAL DEFINITIONS

| Author                     | National intellectual capital definition                                                                                                                                                                          |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lin and Edvinsson, 2011    | National intellectual capital is comprised of knowledge, wisdom, capability, and expertise that provide a country with a competitive advantage over other countries and determine its potential for future growth |
| Lazuka, 2012               | National intellectual capital is defined as being all intangible assets of a nation, which provide a comparative advantage and enhance wealth creation                                                            |
| Andriessen and Stam, 2005  | National intellectual capital is described as “all intangible resources available to a country or region, that give relative advantage, and which in combination are able to produce future benefits”             |
| Kapyla et. al. 2012        | National intellectual capital refers to national knowledge and knowing capability involved in a society’s value creation processes                                                                                |
| Salonius and Lonnqist 2012 | National intellectual capital is a bundle of assets, which help a nation to pursue its goals related to economic, social and environmental development                                                            |
| Bontis, 2004               | Intellectual capital of a nation includes hidden values of individuals, enterprises, institutions, communities, and regions that are current and potential sources for wealth creation                            |

From the perspective of the symbolic school, statements about intellectual capital are based on metaphors (Andriessen 2005). As intellectual capital is an abstract concept, there is no alternative for reasoning about it but to use metaphors (Andriessen and Boom 2009). The power of a metaphor is that it can transport large amounts of meaning that is familiar to us from the source domain to an abstract concept. Knowledge is a fundamental concept in understanding intellectual capital. Intellectual capital can be viewed as metaphorical conceptualization of knowledge or more specific a knowledge capital (Andriessen and Stam 2011; Andriessen and Boom 2009; Andriessen 2006).

Intellectual capital is composed of several metaphors. First two metaphors are expressed by the word “capital”, which includes knowledge as a resource metaphor and knowledge as a capital metaphor. The perspective of the resource-based view of organizations is used and the

accumulation of knowledge is emphasized. The knowledge resource metaphor integrates resource-based and knowledge-based views on a company. A collection of sticky and difficult to imitate resources and capabilities are seen as a company, and knowledge is the most strategically important. As a resource knowledge can be stored, managed and shared. Knowledge as a capital metaphor is close to the idea of knowledge as a resource, where capital is viewed as a particular type of resource that has specific characteristics. There is a tendency to label as capital any factor used in the production process to transform inputs (Dean and Kretschmer 2007). Knowledge as a capital reflects characteristics of a capital. Traditionally the capital concept includes the following aspects (Andriessen 2005; Dean and Kretschmer 2007):

- Capital is an accumulated surplus from past investments;
- Capital is a stock;
- Capital is durable, though depreciates through time;
- Capital supports commercial activity;
- Capital increases productivity;
- Capital can be owned and ownership is clear;
- Capital can be valued financially;
- Capital is additive ( $1+1=2$ ).

Not all of these aspects of the traditional capital concept are fit to describe the nature of intellectual capital, but these aspects provide guidelines on what aspects should be considered.

The term of intellectual capital is characterized by the word “intellectual”. It could be discussed if this term is also used metaphorically as it does not describe an attribute of capital but instead describes where this capital originates (from the intellectual activities of human beings) (Andriessen 2005). This means that term “intellectual” is used with its direct meaning and not with a metaphoric one. Such perspective allows to explain the logic of composing the meaning of intellectual capital components, structural capital (that results from the internal structure), and relational capital (capital that results from the relationships with the environment).

The concept of national intellectual capital is specific as it clearly states the level in which analysis of intellectual capital is done. A nation could be analysed as a separate object and characterized by common characteristics. National intellectual capital incorporates intellectual capital of lower level entities “individuals, enterprises, institutions, communities and regions” (Bontis 2004). Intellectual capital in each of these defined levels constitutes generalized national intellectual capital. But it is not clear how this generalization happens and if structural components of national intellectual capital are able to characterize this integration representatively.

National intellectual capital incorporates the metaphorical meaning of knowledge as resource and as capital. These metaphors describe national intellectual capital as a sticky and difficult to imitate resource, which determines the creation of a competitive advantage of a country. Also it emphasizes the ability to use this type of

capital in the value creation process. This characteristic is seen as a core for the concept of national intellectual capital. The wealth of nations is understood from the resource-based perspective as a sum of produced capital, natural capital, and intangible capital (Hamilton et al. 2006). The value of national intellectual capital is reflected as a function of the components of national intellectual capital (such as human capital and structural capital). Such description shows that intellectual capital is understood as an object.

From the perspective of the symbolic school national intellectual capital is understood as an object, which is representable as a generalization of objects, to which the knowledge is associated. The meaning of the concept of intellectual capital is explained by using metaphors of knowledge as a resource and knowledge as a capital. The resource-based approach is applied. The value of national intellectual capital is gained by employing rules of generalizing values of the structural component of intellectual capital.

#### *The approach of the connectionist school to intellectual capital*

From the viewpoint of the connectionist or internal representation school the meaning of the concept consists not of symbols and rules, but of the connective dynamics among elements. The processing rules respect the semantics of the internal representation of knowledge, which is what generates value (Arenas, Lavanderos 2008). Knowledge arises in the communication process and could be described as the interpretation made by an observer in the interaction between two observers. Knowledge is neither a thing nor the property of a thing, because it primarily addresses a process; it cannot be localized independently from the network that generates it. Hence, it follows that it is not possible to represent knowledge as an object.

Intellectual capital would be seen as a product of a relational element. An internal representation of intellectual capital is the representation of an internal structure (a specific organization) (Lavanderos and Fiol 2011). Attention is given to the description of the process of communication, which is characterized by structural capital in the approach of intellectual capital. In order for communication to happen the interaction between two observers should be based on determined equivalences, which help to transfer the meaning. At the macro level such equivalences as language and culture are developed. At the macro level the metaphor of knowledge management is related to the metaphor of language, which is conceptualized in linguistics (Steen 2010). Based on this approach national intellectual capital could be described by its structural capital, which characterizes communication channels and value created in them.

#### *The approach of the relational school to intellectual capital*

The relational view compels to think that knowledge constitutes territoriality by way of networks configurations within a process, which designates itself as value (Lavanderos & Fiol 2011). This means that the notion of value in the network configuration is located in the exchange activity with other networks instead of the network itself.

Culture is an important element, which defines the network and configuration making approach. This approach stresses processes rather than substances. National intellectual capital interpreted as knowledge from the relational approach is neither a thing nor a property as it describes a process, which cannot be identified independently from the network that generates it. Intellectual capital locates the process emerging from decisional history made up of the relational form or network structure, determined by the culture and conservation of territoriality (Lavanderos and Fiol 2011). Structure effectiveness is measured through closeness evaluation, which is called coherence. It is at this instance where intellectual capital indexes become structural descriptors of the decisional process.

This view relies on anti-dualism, i.e. the recognition that everything that is has no sense apart from its relationship with other things. In this context tangible and intangible capital couldn't be analysed separately from each other. Value is created through relations of tangible and intangible capital, so the most attention should be given to the analysis of these relations and not to distinct capital types. The relation of intellectual capital with the external environment is described by the term of relational capital and can reflect the value of network interdependencies. Such approach is not emphasized in current research of national intellectual capital.

### III. THE CHARACTERISTICS OF NATIONAL INTELLECTUAL CAPITAL

The analysis of the concept of intellectual capital from symbolic, connectionist and relational approaches has shown the complexity of this concept. Intellectual capital is defined as a resource, which is essential for the competitive advantage and value creation. At the national level the importance of value creation is understood by interpreting intellectual capital as a factor of growth or even development. National intellectual capital definitions (Table 1) describe national intellectual capital as a static object, which reflects "intangible assets," "intangible resources," "knowledge and knowing capability." The concept of national intellectual capital is used to describe total intellectual capital of lower level entities. Also national intellectual capital has a strategic importance for the development of a country.

The list of defined national intellectual capital characteristics is composed according to the analysed perspectives (see Table 2).

TABLE 2.  
NATIONAL INTELLECTUAL CAPITAL CHARACTERISTICS

| <b>National intellectual capital as an object</b> |                                                              |
|---------------------------------------------------|--------------------------------------------------------------|
| <b>Symbolic school approach</b>                   | observable                                                   |
|                                                   | can be represented                                           |
|                                                   | can be reduced to symbols                                    |
|                                                   | can have a universal structure                               |
|                                                   | can be generalized from structural components                |
| <i>Metaphor of knowledge as a resource</i>        | valuable                                                     |
|                                                   | produces benefits                                            |
|                                                   | generates a competitive advantage                            |
|                                                   | a sticky resource                                            |
|                                                   | difficult to imitate resources                               |
|                                                   | can be stored                                                |
|                                                   | can be managed                                               |
|                                                   | can be shared                                                |
|                                                   | can be transferred                                           |
|                                                   | can be accumulated                                           |
| <i>Metaphor of knowledge as capital</i>           | it is an accumulated surplus from past investments           |
|                                                   | it is a stock;                                               |
|                                                   | it is durable though depreciates through time                |
|                                                   | supports commercial activity                                 |
|                                                   | increases productivity                                       |
|                                                   | can be owned, and ownership is clear;                        |
|                                                   | can be valued financially;                                   |
|                                                   | it is additive (1+1=2);                                      |
| can be invested                                   |                                                              |
| <i>Intellectual nature</i>                        | originates from the intellectual activities of human beings  |
| <b>National intellectual capital as a process</b> |                                                              |
| <b>Connectionist approach</b>                     | obtained individually                                        |
|                                                   | subjectively interpreted                                     |
|                                                   | internal representation is available                         |
|                                                   | has value only in a network                                  |
|                                                   | socially constructed                                         |
|                                                   | can be described by analysing the internal network structure |
| <b>Relational approach</b>                        | constitutes territoriality                                   |
|                                                   | creates value in exchange of activity with other networks    |
|                                                   | determined by culture                                        |
|                                                   | cannot be analysed independently from tangible capital       |

A basic difference of these approaches is the interpretation of intellectual capital as an object or as a process. But a direct answer could not be found which view describes intellectual capital in the best way because intellectual capital research incorporates both views. Such characteristic is based on the two sides of reasoning about knowledge. Knowledge concept characteristics vary (Andriessen 2005):

- From physical to abstract,
- From tangible to intangible,
- From static to dynamic.

This relates with the two streams of semantic evolution of knowledge defined by Nonaka and Takeuchi (1995): the Cartesian dualism of body and mind, and the Japanese

oneness of the body and mind environment (Bratianu et al 2011).

According to the Cartesian view mind is fully rational, and knowledge has the same nature. It can be obtained through a knowledge transfer process from other people or through an internal reasoning process. Such knowledge is characterized as explicit knowledge, i.e. knowledge, which has a rational root, and which can be transferred, explained, shared, accumulated and processed as it is (Nonaka and Takeuchi 1995). Such knowledge can be described as an object, and it is closer to such characteristics as physical, tangible and static.

According to the Japanese view, mind and body integrate into a coherent process of knowing. Knowledge description as an object is impossible as knowledge is inseparable from *ba* (Nonaka and Konno 1998). Thus knowledge can be obtained individually through a direct experience, or it can be obtained through a transfer process (Bratianu et al 2011). Polanyi (2009) defined the knowledge obtained through a direct experience of life as tacit knowledge. Nonaka and Takeuchi conceptualise knowledge predominantly as thoughts and feelings that are tacit but can be articulated. There is a strong emphasis on knowledge as a human process. This is in line with the constructionist (Marr et al., 2003) view on knowledge where knowledge is seen as socially constructed, and therefore objective observation is impossible.

#### IV. THE ANALYSIS OF THE CONCEPT OF NATIONAL INTELLECTUAL CAPITAL

In order to define the prevailing characteristics in the research of national intellectual capital textual analysis of works in the field of national intellectual is performed. Five works from the field of national intellectual capital done by different researchers were selected randomly:

- Nick Bontis (2004),
- Carol Yeh-Yun Lin and Leif Edvinsson (2011),
- Pirjo Stähle and Ahmed Bounfour (2008),
- Victor Raúl López Ruiz, Domingo Nevado Peña, and Jose Luis Alfaro Navarro (2010),
- Daniel Andriessen and Christiaan Stam (2004).

In the text the nouns of intellectual capital were highlighted, and the specifics of noun use were revealed by analysing the context in which these nouns were used. This included the analysis of adjectives used together with the concept of national intellectual capital and the analysis of the meaning of sentences, where the term intellectual capital was used. In total 101 uses of the concept intellectual capital were analysed.

The research allowed identifying eight characteristics of intellectual capital used most recently (Fig. 1).

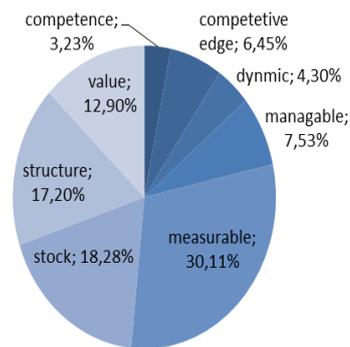


Figure 1. Distribution of the use of characteristics of intellectual capital

In 87% of cases the term of national intellectual capital was interpreted as an object. Three most recently used characteristics (measurability, structural representation and nature as a stock) show that these researches of national intellectual capital keep the symbolic school approach.

The characteristic of intellectual capital used most often was its measurability. This may be related to the fact that these texts analysed national intellectual capital measurement possibilities. In these texts intellectual capital was described as an identifiable, recognizable, accountable, measurable object, which can be reported. The value of national intellectual capital is reflected as a function of separate components (Lin and Edvinsson 2011) or of components and relations (Bontis 2004; Andriessen and Stam 2004). When analysing the scientists' approach to the availability of representative identification of national intellectual capital different approaches could be identified. Bontis (2004), Lin and Edvinsson (2011) state that national intellectual capital could be represented by reports. Stahle and Bounfor (2008) and Andriessen (2005) raise concerns about the possibility to gain an objective reflection of intellectual capital. They state that national intellectual capital is subjective, it acts differently in different environments, it cannot be compared objectively, and there are no objective phenomena waiting to be observed. The question of the representation of national intellectual capital is one of the most important ones. It is generally agreed that an improvement of measurement models is needed in order to increase the representativeness in this field.

Intellectual capital, having the nature of stock, summarizes such characteristics as being an intellectual material, an asset, a resource, which could be allocated, transferred and invested into. This approach provides intellectual capital with physical substance features.

Every text analysed in order to describe intellectual capital used structural classifications. Also it was agreed that national intellectual capital was related to value creation. The following descriptions were used: national intellectual capital is a hidden value, valuable, a factor of value creation, a factor of economic growth and future

development. National intellectual capital was also interpreted as a source of competitive advantage.

Analysed texts present the management perspective to national intellectual capital, where intellectual capital is described as a manageable resource. It is stated that national intellectual capital measurements help to manage these factors in order to increase benefits. At the national level intellectual capital could be influenced by government actions related to the formation of the education system, and the development of institutional and cultural factors.

The importance of dynamic capabilities of intellectual capital is also identified. In 13% of analysed cases intellectual capital has characteristics of a process. The characteristics of dynamic capabilities are more often mentioned when describing intellectual capital components (structural and relational capital) and not when talking about intellectual capital in general.

## V. CONCLUSIONS

Intellectual capital is a reflection of the intangible world; the central concept of this idea is knowledge. The theory of intellectual capital is limited by the analysis of economically useful knowledge, which generates value through innovations (Carlsson et al. 2009). Two extremes of understanding the concept of national intellectual capital were identified.

The first extreme uses static and physical characteristics for describing national intellectual capital as an object. This extreme reflects the ideas of the symbolic school perspective and the Cartesian approach to knowledge. National intellectual capital is described as an object, which could be represented as a generalization of its structural components. Such approach currently is prevailing in national intellectual capital research. The meaning of the concept of intellectual capital is explained by using metaphors of knowledge as a resource and knowledge as a capital. Resource based approach is applied, where national intellectual capital together with tangible capital forms the total wealth of a nation.

The second extreme uses dynamic and abstract characteristics for describing national intellectual capital as a process reflected by relations. This approach reflects the ideas of connectionism, the relational school, and the Japanese view on knowing. National intellectual capital could be described as a process of knowing, which is reflected in internal and external network relations. The separation of knowledge from the context is not possible as the meaning is generated only in a context. Identification and representation of national intellectual capital is subjective. National intellectual capital components of structural and relational capital reflect ideas of this approach, though process related characteristics are rarely referred to when using the term of intellectual capital.

National intellectual capital is economically useful knowledge (as an object) and knowing (as a process).

Current national intellectual capital research pays attention to the analysis of static factors reflecting knowledge; there is still a gap in understanding the relations of structural elements of national intellectual capital and how value is created in this structure.

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