CITY'S INTELLECTUAL CAPITAL FRAMEWORK: THE PERFORMANCE MEASUREMENT POINT OF VIEW

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Abstract

It has been widely recognized that urban competitiveness relies on the reasonable management of the intellectual resource. This is not possible without having the proper resource inventory framework in place. The main purpose of this research is to explore the core and structure of city's intellectual capital by constructing and thoroughly investigating the intellectual capital framework, which could serve as a starting point for the city's performance measurement.

In order to achieve this purpose the following tasks have been completed: (1) the importance of the intellectual resource in the context of urban competitiveness has been analyzed; (2) the city's intellectual capital concept variety by different authors has been explored; (3) the competitive city-specific characteristics have been investigated; (4) a detailed city's intellectual capital framework that would facilitate the inventory of this resource has been created; (5) city's intellectual resource performance measurement guidelines have been defined.

A possibility of applying the concept of organizational intellectual capital structure to perform city's intellectual resource inventory is investigated in this research. City's intellectual capital framework proposed here differs in a large number of composite components suggested and explained. Variety of internal components defined is useful for municipalities in the city's intellectual resource identification and, therefore, measuring its performance and making management decisions.

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1. Introduction

Intellectual, cultural, social or otherwise described intangible resource management solutions are being developed increasingly in knowledge literature. The rise of this new dimension concentrates on different levels of research: personal, organizational, urban or regional. Personal knowledge, organizational and regional intellectual capital assessments have been widely analyzed while the urban level has not been explored as much.

It has been recognized that urban competitiveness and social welfare relies on the reasonable management of the intellectual resource. Focusing on city's intellectual resources and creating proper social, cultural and economic environment for their development are particularly important for the city in order to attract and retain highly educated, culturally sophisticated, professional people and competitive organizations. Urban analysts argue that there is no one recipe, how and why the city becomes competitive and attractive to live and work in. Most of them (Ergazakis *et al.*, 2004; Carrillo, 2004; Florida, 2005; Edvinsson, 2005; Ergazakis *et al.*, 2006; Jucevicius, 2007; Lerro and Schiuma, 2009) discern particular success factors.

According to Tresman *et al.*, (2007), urban competitiveness as well as social and economic well-being depend on the networking intensity of individuals and organizations within the social, scientific and industrial networks as well as the direct investments in its development and infrastructure. Important roles in urban competitiveness are played by creative industries (Cabrita & Cabrita, 2010) and industrial clusters (Smedlund & Poyhonen, 2005), increasing business

productivity and stimulating innovation. High concentration of population and active scientific, industrial and technology parks create the diversity of values and capacitate purposive knowledge sharing process. This stimulates city's renewal and growth. According to Edvinsson (2006), talent attraction and innovation development are also influenced by public ethical and social orientation, strength of cultural, artistic and historical heritage as well as the success of the city's image strategy implementation.

It is interesting to point it out that competitive cities accumulate both intellectual and financial capital as a complement to each other, thus forming the economic breakthrough conditions. However, Angehrn (2005) supports that financial incentives and market success, which play a critical role in commercial organizations, are much less relevant in motivating members of urban communities, for whom other critical factors prevail, such as quality of life, level of participation, identity and vision.

Changing dimensions of urban competitiveness stimulate exploration of the reasons of urban success and search for effective management decisions, refusing the traditional industrial approach to urban development and regional planning.

Reasonable management of city's intellectual resource is not possible without having a proper resource inventory framework in place. In order to assess resource performance a clear understanding of its core and structure must be agreed upon. Comparison of different approaches to the city's intellectual capital is required to reveal the main components of its structure and their characteristics. And herewith the question is to be answered weather some principles used for intellectual capital research at organizational level, such as the idea of structure, can be applied at the city level as well.

Purpose. The main purpose of this research is to explore the core and structure of city's intellectual capital by constructing and thoroughly investigating intellectual capital framework, which could serve as a starting point for the city's performance measurement.

Comparison of different approaches to city's intellectual capital structure will reveal the variety of structural elements and determine which of them are employed most often. Investigation of competitive city-specific characteristics will highlight elements that are most relevant in recent practice. City's intellectual capital framework will show up the complexity of this resource and provide guidelines for further exploration. Framework development will solely be based on the constructivism as a prevailing epistemological approach in the intellectual capital research.

2. Framework development

City's intellectual capital conception

Intellectual capital theory (later IC theory) suggests different approaches towards city's intellectual resource conception. Some few authors (Edvinsson, Malone, 1997; Bontis, 2002; Pasher, Shachar, 2005; Viedma, 2005; etc.) propose application of the common organizational intellectual capital structure and management principles at the city's level.

From the Angehrn (2005) point of view, city's intellectual capital has much in common with organizations, but differs on a number of relevant dimensions. First of all, in urban communities we typically face a very heterogeneous population as well as a richer variety of relationship networks and governing mechanisms. Second dimension is related with knowledge creation and exchange dynamics. In urban communities, knowledge is often deeply anchored and affected by remote or recent history. Attempts to alter mechanisms related to knowledge creation and exchange, and to move people from 'knowing' to 'doing' in such contexts, therefore, have a stronger 'cultural' dimension. Third dimension is related with change dynamics. In urban communities, with the exception of 'revolutions', change is typically a slow, gradual process determined by powered relationships between community members, their representatives and key stakeholders.

Despite these differences, application of organizational intellectual capital structure at the city level is considered as reasonable in the IC theory. In the regional level research Bontis (2002), Pasher, Shachar (2005) and others relied on the most popular intellectual capital conception,

presented by L. Edvinsson and M'Malone in 1997 as Skandia Navigator. The main idea of Navigator is management decision making based on the monitoring indicators within the five perspectives of organizational resource: processes, people, customers, finance and renewal and development. When applying Navigator at the city level the role of customers goes to city's population, the role of employees is performed by commercial organizations attracting professionals, when educational institutions, public policy structures, municipal functions and other mechanisms serve as processes. Corresponding city level indicators instead of organizational ones are proposed here by L. Edvinsson and M'Malone.

The Cities' Intellectual Capital Benchmarking System (CICBS), proposed by Viedma (2005), is also based on the mentioned intellectual resource structure. Author fully adapts methodological principles of Skandia Navigator distinguishing the same four categories of city's intellectual resource: processes, people, market and renewal, and development. Management quality of these resources determines financial performance of the organization. While at the city level financial performance is transformed into the other value added factors, i.e. city's historical development, population welfare, various achievements or economic and social stability. A special role among the city's intellectual resources, according to J. M. Viedma, is played by human capital, which creates, organizes and employs other intellectual resources.

Carrillo (2004) proposed knowledge city intellectual resources measurement system, covering elements of human, relationship and structural capitals. However, different methodological approach was chosen here. F. J. Carrilo didn't use organizational prototype, but employed original titles of resource categories, such as meta-capital, human and instrumental. A more detailed specification of these categories, according to F. J. Carrilo, should be unique to each city. It should be each city's privilege and responsibility to build its own distinctive capital system.

According to Schiuma and Lerro (2008), city's competitiveness depends on its innovation capacity. Authors divided city's knowledge capital into the four categories: human, relational, structural and social. Developed human capital and investment in it lead to the higher productivity of region, what consequently leads to a greater human capital demand for new processes and innovation. Relationship capital development increases knowledge availability and sharing and thereby innovation development. In regions with more small closely cooperating organizations, innovation activities are more vigorous than in those with a few large players. Structural capital and technological infrastructure, according to the authors, act as necessary condition for the development of tangible and intangible resource. Number of organizations in a regional context plays an important role in enhancing competition and cooperation, which in turn stimulates innovation, diversification and entrepreneurship. Social capital effects productivity of regional networks, decreases transactional costs, changes attainability of knowledge and innovation process itself. Organizations in the regions with more developed social capital achieve competitive advantage because social capital reduces crimes, encourages employees share tacit knowledge, increases respect for agreements and facilitates negotiations. Schiuma and Lerro (2008), as Viedma (2005), argue, that city's innovative capacity depends on the all mentioned capital forms, however the main role here is played by human capital, which creates and employs other capital forms.

Cabrite and Cabrita (2010) found that one of the most important factors influencing cities intellectual capital is operation of creative industries. Authors proposed to divide creative industries resource into the four categories: human, institutional, organizational, physical and social. The economic and social impact of creative industries in cities life comes through creation of jobs, stimulation of innovation and productivity, sharing new ideas among community and so on. Creative industries in the city enrich and improve community life, attract investments, reinforce poor economic sectors. Operation of creative industries makes strong influence on human capital, especially on employee attraction. Cabrite and Cabrita (2010) treat human capital as the main factor of economic growth.

Despite the fact, that different authors use a distinctive approach to the city's intellectual capital structure, many of them use a relatively large number of the same categories and internal components. Different approaches are summarized in Table 1.

Competitive city-specific characteristics

In the city's competitiveness and development research authors (Ergazakis *et al.*, 2004; Jucevičius, 2007, etc.) emphasize characteristics, success factors and decisions, that create conditions for urban competitiveness, more than the expedience of intellectual resource structure investigation itself. However disclosure of competitive city-specific characteristics and success factors may serve for the development and internal exploration of such structure.

In the knowledge cities research Carrillo (2004) found that prosperous knowledge cities ("Knowledge city", "Ideopolis", "Brainport", "Technopole") distinguish for the following characteristics: creativeness, culture, entertainment, innovation, intelligence, learning, science, service, being smart and technology.

Cabrita and Cabrita (2010) support Viedma (2005) recommendations of the city's intellectual capital evaluation at the regional and micro-clusters levels, and points out that the following factors are important at both levels:

- Institutions and regional governance: includes norms, guides and principles set by public and private institutions;
- Technology: technological skills and capabilities;
- Living-environment-based resources: environmental quality of life, as determined by public services, cost of living, and other territorial endowments;
- Human capital and social capital: educated, skilled and values-nurtured human broad base with the aim of creating, sharing and using knowledge.

Table 1. Different approaches to city's intellectual capital structure

Resource title	**Internal components**				
Intellectual capital (Edvinsson & Malone, 1997)	**Human capital**	**Customer capital**	**Organizational capital**	**(Renewal & development focus)**	**(Financial focus)**
Knowledge city capital (Carrillo, 2004)	**Human capitals** - Individual base (ethnic diversity, health, education and learning, socio-economic) - Collective base (live culture(s), evolutive capacities)	**Meta-capitals** - Referential (identity; intelligence) - Articulation (relational; financial)	**Instrumental capitals** - Tangible (geographic, environmental, infrastructural) - Intangible (systems and procedures, information platform, etc.)		
Intellectual capital (Viedma, 2005)	**Human capital** (knowledge, wisdom, expertise, values of the culture, and philosophy of the city, etc.)	**Market capital** (national and international contacts, customer-city loyalty, value of brands, etc.)	**Process capital** (information systems, databases, laboratories, an organizational structure, management focus, etc.)	**Renewal and development capital** (investment in city's development and research, patents, trademarks, start-ups, etc.)	

Resource title	Internal components				
Knowledge –based capital (Schiuma & Lerro, 2008)	**Human capital** (tacit and explicit know-how owned individually or collectively by region's stakeholders)	**Relational capital** (knowledge resources linked to internal and external relationships, established and maintained by regional stakeholders)	**Structural capital** (infrastructural assets that are tangible in nature but play a fundamental role in the diffusion of knowledge; intellectual property)	**Social capital** (knowledge assets related to the soft infrastructure including values, culture, behaviours, networking, identity, etc.)	
Creative capital (Cabrita & Cabrita, 2010)	**Human assets** (talented individuals and creative professionals who work in a wide range of knowledge-intensive industries)	**Institutional assets** (cultural and government institutions that support the integration of culture-related industries into their development strategies)	**Organizational assets** (assets related to companies, economy and management)	**Social assets** (relationships established between the governors, individuals and institutions, related to different collaboration forms)	**(Physical assets)** (buildings, museums, gardens, etc.)

Ergazakis, Metaxiotis and Psarras (2004) in their analysis of the full range of cities success stories highlight modern developed city features:

- High quality of life;
- Provision of efficient, dependable and cost competitive access to infrastructure to transport of people, goods and information;
- An urban design and an architecture that incorporate the new technologies;
- Central educational strategy including all cultural facilities and services;
- Economy with enough "critical mass" to support world competitive specialization;
- Networks of commercial influence, in order to attract funds;
- Market access and awareness, that is to say high capacity in sustaining robust trading relationship with other markets;
- Collaborative and competitive business culture;
- Responsive and creative public services; and
- Open, tolerant and merit based culture and inclusive society.

Knowledge cities, according to Ergazakis, Metaxiotis & Psarras (2004), distinguish for additional features:

- Provision of access to the new communication technologies for all citizens;
- Research excellence which provides the platform for new knowledge-based goods and services;
- Provision of instruments to make knowledge accessible to citizens, in a systematic, efficient, and effective way;
- Ability to generate, attract and retain highly skilled citizens in different domains; and
- Existence of civic centers being open to diversity and fostering face-to-face relations.

In summary, above-mentioned authors distinguish the following groups of competitive city development factors:

- Political (political activities and legal regulation);

- Environmental (business environment, market specifics, activities of private sector and non-governmental organizations);
- Societal (standards of living, education, cultural values, human rights and freedom);
- Technological (level of technology, infrastructure and accessability);
- Strategic (city's vision, strategy and development plan);
- Financial (financial resource and investments).

Jucevičius (2007) in his innovative cities and regions development research argues that each city's success is determined coincidentally by complex of emerging favorable circumstances. And it is practically impossible to repeat and adopt it in other circumstances. Nevertheless, the author summarizes some of the common features of such cities:

- settled middle class;
- egalitarian (characterized by low level of hierarchy) community structure;
- broad-base community support for innovation process, the consensus on common objectives of innovation activities;
- environment, stimulating achievement, advancement, creativity and networking;
- presence of fundamental educational institutions and their relationship with business practice;
- existence of different activities with different competences in the same economic environment and their creative combinations;
- properly functioning market mechanism;
- innovative entrepreneurs;
- innovative activity, which took place in already existed activity areas;
- young, innovative capital, investment in promising areas; and
- constructive conflict between values and ideas.

Jucevičius (2007), while analyzing the prospects of city learning, pays high attention to the individual and collective learning. According to him, the result of individual learning is the human capital of the city. While the outcome of collective learning are structural and social capitals of the city.

In conclusion of the discussion presented above it can be argued that city's intellectual capital structure, as a subject of management research, receives rather less attention than competitive city-specific characteristics, success factors and innovative strategies of a city. Investigation of the large-scale intellectual capital categories is found most often in the IC theory. The more detailed study of internal elements is often left for each city's individual resource exploration. Nevertheless, the internal elements of the three main intellectual capital categories (human, structural, relational) or their combinations dominate among almost all the sets of success factors mentioned above.

City's intellectual capital framework

Based on the transformation of organizational level intellectual capital decomposition to the city level on the one hand and on the integration of competitive city-specific characteristics and necessary conditions for their development on the other hand, a more detailed framework of city's intellectual capital is proposed here (look at Figure 1). This framework extends view of a large-scale intellectual resource and thus makes investigation and employment of individual city's intellectual resource for innovative strategies easier.

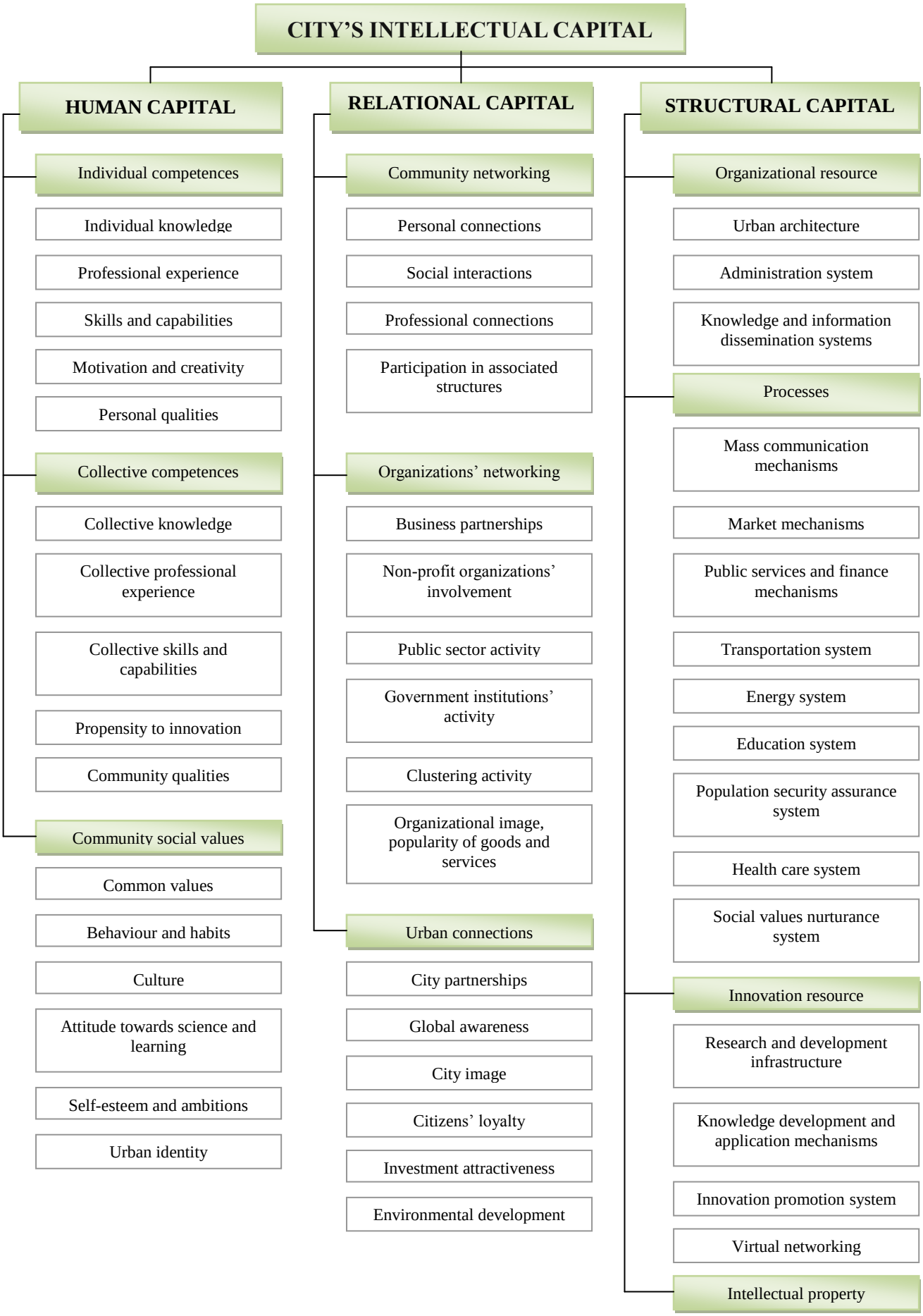

Figure 1. City's intellectual capital framework

In the framework proposed the three main resource categories are maintained: human, relational and structural. The most important role in the framework goes to human resource, which consists of different individual and collective competences as well as wide variety of the social values of community. Individual competencies include citizen's individual knowledge, different professional experience, skills and capabilities, like technology management, information processing and others, as well as motivation, creativity, entrepreneurship, overall sophistication and other personal features. Collective competences cover collective knowledge of community, encoded know-how and collective professional experience in different industries and service sectors, knowledge application skills, community's propensity to entrepreneurship, innovativeness, knowledge creation and other characteristics affecting application of collective competencies, such as age or hierarchical structure. Social values cover common values of community, such as healthcare, intelligence and tolerance, behavior and habits related to consumption, clothing, nutrition, communication, culture of conflicts and competition, different cultural values, such as historical heritage, entertainment, festivals, rituals, languages, religions, common attitudes towards science and learning, openness to innovation, self-esteem, ambitions, and city's identity.

Human resource of the city is considered as the most important in the context of city's strategic development and creation of relational and structural resource.

In the settled social values environment under the influence of both individual and collective competencies competitive businesses are developed, high level scientific research is performed, diverse innovations are implemented, information and communication technologies are effectively employed. This leads to the competitive city's economy, high-level culture and quality of life, and certainly shapes city's image and attractiveness of living in it.

Relational resource allows citizens, institutions and organizations to communicate, exchange information and knowledge, stimulates city's absorption features. This resource is divided into the three categories: networking of community, networking of organizations and urban connections. Such distinction allows analyze city's relational system from the three-level hierarchical perspective.

Community networking covers individual and group interactions among citizens. It includes individual communications and different social interactions, professional communications to exchange working information and knowledge, participation in various associated structures. Networking of organizations covers relationships between government, businesses and public sector. Clusters play a special role here, creating conditions for faster knowledge development and stimulating urban economic productivity and innovative capacity. Popularity of goods and services within commercial networks attracting funds is important here as well. City-level relationships cover partnerships with regional and international cities, city's image and global awareness, loyalty of local community, economic attractiveness and environmentally friendly development. Community, organizational and city-level networking creates conditions for entrepreneurial vitality of the city, ideas and information exchange, consequently, for innovation and economic prosperity of the city.

Structural capital is responsible for the development of environment ensuring activity of community, organizations and institutions. It acts as a necessary condition for the exchange of knowledge, information, goods and services between different interest groups. Structural resource in the framework is divided into the organizational, process and innovation resource as well as intellectual property.

Urban architecture and design, systems of functional and organizational administration, knowledge and information dissemination as well as databases refer to organizational resource. Process resource covers mechanisms of mass communication, market, public services and finance management. An important role among processes in community life is played by well-developed transportation system, which enables expedition and attainability of goods exchange. Energy system is important as enabling cost saving and environmental control. An exclusive role here is played by education system, ensuring the quality and renewal of human resource. Process resource also includes population security, health care and social values nurturance systems, enhancing loyalty of

citizens and image of the city. Innovation resource covers research and development infrastructure, knowledge development and application mechanisms, innovation promotion system and virtual networking.

Structural resource stimulates economic and social transactions, networking intensity, activity diversification. This resource along with the technological infrastructure and tangible resources enables city to function, grow, create economic, social and cultural value added, to improve quality of life and global awareness of the city.

Categories of human, relational and structural resource are not isolated from each other or from the other resource. These resources act complementary on the base of synergy intertwining in various resources. The framework proposed here should be viewed as a tool facilitating city's intellectual resource empirical research. It should be treated as a changing system, the main target of which is deep conceptualization of city's intellectual resource essence and value.

An excellent example illustrating synergy effect of this system is city's universities. Universities accumulate exceptionally abundant stock of human resource and distinguish for the high concentration of individual and collective competencies. At the same time they form, protect and increase various social values of community. With the help of relational resource universities communicate with various institutions, organizations, communities, participate in economic clusters, disseminate the results of scientific research and innovation, and at the same time increase city's image and attractiveness for investment. Structural resource of universities enables development and implementation of innovation in the daily city's life, increases city's competitiveness and quality of living.

Intellectual capital performance measurement guidelines

Based on the strategic management theory on the one hand and considering the regional management practice on another, a certain sequence of the city's intellectual resource performance management process can be observed.

In the Cities' Intellectual Capital Benchmarking System J.M.Viedma (2005) recommends the following stages:

- Creating the vision;
- Identifying the core activities needed to realize the vision;
- Identifying the core competencies needed to realize the core activities;
- Identifying indicators for each core activity and each core competence;
- Assembling the indicators into different IC categories.

Methodological approach for the development of knowledge cities proposed by Ergazakis, *et al.* (2006) consists of five phases:

- Diagnosis of current city's status based on the investigation of knowledge city characteristics;
- Definition of changes strategy;
- Creation of detailed action plan;
- Action plan implementation;
- Progress measurement and performance evaluation.

The sequence shows that both the beginning of city's intellectual resource management process and the assessment of its progress achieved appeal to the performance measurement. Like in the case of organizational management, a proper performance measurement is becoming essential for effective management of city's intellectual resource.

Based on the experience of Edvinsson (2005), Viedma (2005) and others, city's performance measurement is usually performed by thoroughly investigating intellectual resource framework, identifying the essential resource, selecting indicators for measurement and monitoring them on the regular basis.

From the strategic management point of view selection of city's intellectual resource performance measurement indicators could be based on the same criteria as those recommended at

organizational level. This means that indicators selected should be measurable, reliable, practical and as valid as possible.

For example, dimension of city's cultural development from the human capital perspective could be measured using such indicators as number of public cultural events or number of citizens involved in the city's art groups in comparison with all citizens. Citizens' loyalty from the relational capital point of view could be measured using indicator like number of students graduating city's universities and staying to live and work in the city in comparison with the leaving ones. The quality and service availability of healthcare system from the structural capital position could be measured using the number of health care professionals in comparison with all citizens and so on.

Selection of indicators often faces the problem pointed out by Edvinsson and Malone (1997) in their early discussions of Skandia Navigator. According to the authors, there are no and can't be clear separation of boundaries between different categories of intellectual resource. The same indicator often reveals several forms of intellectual resource actually reflecting their synergy effect. And, therefore, the most important issue is to select the really valid indicators that are most related with city's change strategy and allow monitor its implementation and achieve benchmarks. Selection of measurable indicators should follow the Pareto rule as well.

Before the start of performance measurement, understanding of the reasons, objectives and expected results of strategy implementation must be developed among municipal project managers and employees. The whole process of change strategy implementation must be oriented towards the resource that will have ultimate effect on city's performance in a long run. Environmental conditions during the strategy implementation change constantly, therefore, benchmarks must be revised constantly as well.

3. Conclusion

Synergetic effect and balanced management of city's intellectual capital, identified as human, relational and structural resource, provide the basis for the quality of citizens life, city's economic prosperity and image development. Reasoned employment of this resource for intelligent strategies stimulates innovative solutions of urban development, nurturance of cultural and social values, spread of the high-level scientific research results within the business, industry and daily citizen's life and thus leads to innovative society and competitive economy.

Well-known classification of organization's intellectual resource into three prevailing categories as well as the basic principles of the management of this resource can be successfully applied at the city's level.

Distinguished intellectual resource categories should not be treated as isolated from each other or from the other resource. They function complementary on the base of synergetic effect. However the framework of the whole picture of intellectual resource and its detailed decomposition facilitate further empirical research and resource inventory in practice.

The framework proposed is intended not because of the abundance of indicators possibly prompted for each element of intellectual resource within it, but because of it's creative application to revise city's resource management strategy, consider alternative management decisions and identify the most important resources and measurable indicators for them.

City's intellectual capital management strategy should be balanced. Some resource management decisions should not affect the performance of other resource negatively. A systematic approach to the whole resource framework helps to ensure the balance.

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