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KAUNAS UNIVERSITY OF TECHNOLOGY

LAURA LIUGAILAITĖ-RADZVICKIENĖ

**PRECONDITIONS FOR THE DEVELOPMENT OF CITY'S
INTELLIGENCE**

Summary of Doctoral Dissertation
Social Sciences, Management (03S)

2015, Kaunas

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INTRODUCTION

Relevance of the dissertation research. The concept of intelligence at the social systems level is mostly analysed in the terms of intelligent city (Komninos, Sefertzi and Tsarchopoulos, 2006; Komninos, 2006a, 2006b, 2009, 2011; Rodrigues and Tomé, 2011; Santinha and De Castro, 2010). For a long time, the researchers saw and still see intelligence as closely related to the information communication technologies and creation of knowledge based on them (Bruhns, 1997; Komninos, 2002), and quite often the intelligence is considered to be some kind of synonym for smartness. It does not deny the fact that ICT play an important role, and the city cannot be considered intelligent if it has underdeveloped ICT infrastructure. In such a case, it would be difficult to develop intelligent internal environment by employing external competence networks and information databases and, in general, properly perform daily activities. However, the quality of intelligence is needed foremost to solve the issues requiring information, knowledge and insight.

The knowledge management theory offers enough knowledge creation and development mechanisms at the city level, but intelligence is not limited to the internal knowledge creation. It is impossible to act with foresight, if there is no knowledge about how the others are acting, what they know, what technologies they use, etc., because a city does not exist in a vacuum, it is always surrounded by other social systems, and it is a part of larger social systems. The creation of collective knowing in the city is not an easy task, because different stakeholders and social groups in the city have different goals, different competence, knowledge base, resources and culture. Development of such knowing demands an adequate capability to absorb the already existing knowledge and information from the external environment as well as the capability to develop new knowledge. Intelligence approach to city development requires looking back to the capability to know which is important for the successful development of any city.

Scientific problem. Intelligent cities in scientific literature are characterised by having different qualities such as the integration of information communication technologies into the city activities (Bruhns, 1997; Kingston, Babicki and Ravetz, 2005; Komninos, 2002), spatial design of the city with a particular infrastructure of ICT (Komninos et al., 2007; Komninos, 2006b, 2011), functioning innovation system (Komninos et al., 2006; Komninos, 2006a, 2009), acquirement of tools for knowledge management and development of various forms of city's capital system (Santinha and De Castro, 2010), integration of characteristics of knowledge and digital cities (Rodrigues and Tomé, 2011), some characteristics of digital cities (Komninos, 2011; Rodrigues and Tomé, 2011). However, there still exists the problem to find scientific publications analysing the development of these characteristics in order to become an intelligent city, only the statements of the existence of these characteristics are provided (Komninos, 2011; Santinha and De Castro, 2010). The poor exploration of the phenomenon

and the small number of researchers working in this field only gives a fragmented understanding about what is needed in order to become an intelligent city. Moreover, in the scientific literature, there is a lack of emphasized conceptual difference between the intelligent city and the other related concepts that were analysed, such as a digital city (Doukas et al., 2011; Shkabatur, 2011), learning city (Jordan, Longworth and Osborne, 2014; Reghenzani-Kearns and Kearns, 2012), knowledge city (Fachinelli, Carrillo and D'Arísbo, 2014; Yigitcanlar, 2014), innovative city (Seo, 2009; Shearmur, 2012;), creative city (Foord, 2013; O'Connor and Shaw, 2014), smart city (Caragliu, Del Bo and Nijkamp, 2011; Glasmeier and Christopherson, 2015), sustainable city (Yigitcanlar, Dur and Dizdaroglu, 2015; Rai, 2012). Aforementioned theoretical concepts emphasize the similar characteristics of successful city such as integration of ICT into the decision-making and daily life of the city, the importance of knowledge management, creation of products and services of high added value, networking, sustainability, optimal usage of resources, the importance of intellectual capital, innovativeness, appropriate city design, etc. However, not one of those concepts can deny the aspects emphasized by the other, and all the characteristics are important to any successful city. Why to distinguish those concepts, and what is the difference between the intelligent city and other theoretical approaches presented in the scientific literature? Moreover, it is not enough to identify the existence of those characteristics in the particular city in order to consider it intelligent. It is more important to know the basis what the development of city's intelligence depends on. The identification of preconditions for the development of city's intelligence would be quite a competent reason to evaluate the city's potential to become intelligent.

Thus, the scientific problem is reflected in the following questions: how the intelligence of the city can be conceptualised, and what is the difference between the intelligent city and the other theoretical approaches to successful cities? What are the preconditions for the development of city's intelligence?

The object of dissertation research is the preconditions for the development of city's intelligence.

The aim of dissertation research is to justify the preconditions for the development of city's intelligence.

The dissertation research objectives are as follows:

1. To theoretically argue the essence of social system's intelligence;
2. To theoretically justify the concept of intelligent city through the perspective of different theoretical approaches;
3. To justify the theoretical preconditions for the development of city's intelligence specific to the dimensions of the theoretical model for the development of city's intelligence;
4. To construct the methodology for the evaluation of preconditions for the development of city's intelligence;

5. To empirically identify the preconditions for the development of city's intelligence in two municipalities.

Research process and methods. The dissertation research was conducted in three stages. In the first stage, based on the analysis of scientific literature, the essence of intelligence as a separate quality of the social system was refined; the concept of intelligence was defined; the theoretical characteristics of intelligent city were identified; different theoretical approaches to intelligent city were analysed, and a viewpoint for integrating them was suggested; the theoretical preconditions for the development of city's intelligence specific to the dimensions of the theoretical model for the development of city's intelligence were justified. The second stage of dissertation research was devoted to preparing and justifying the methodology for the evaluation of preconditions for the development of city's intelligence. In the third stage, the empirical studies devoted to identifying the preconditions for the development of city's intelligence in Kaunas and Druskininkai municipalities were conducted. There was as well conducted the survey with foreign experts working in the field of intelligent cities. In the dissertation, the qualitative and quantitative research methods are applied. The following methods were applied in dissertation research for collecting data: the analysis of scientific literature, the analysis of web pages, the analysis of strategic documents, online survey and interviews with experts in focus groups and with separate experts. The methods for analysing the data are statistical data analysis (used to organize quantitative data) and the qualitative content analysis (used to organize qualitative data).

Scientific novelty of the dissertation research and theoretic significance of the dissertation results:

- Newly conceptualised approach to the intelligent city is based on critical analysis of related theoretical concepts of digital, learning, knowledge, innovative, creative, smart and sustainable cities by distinguishing qualities that supplement the perception of intelligent city;
- The model for the development of city's intelligence was supplemented with the fourth dimension of empowering infrastructure;
- The preconditions for the development of city's intelligence were theoretically justified and empirically examined;
- The integrated methodology for the evaluation of preconditions for the development of city's intelligence was created.

Practical significance of the dissertation research:

- The criteria for evaluating the preconditions for the development of city's intelligence reflect intelligent city-specific qualities; thus, it allows revealing the artefacts of city's intelligence and possibilities for its development in practice;

- The given concept of intelligent city and the theoretical model suggest new conceptual approach to preparing city's development strategies.

Scientific approbation of the results. The dissertation research results were published in 8 scientific publications and have been presented in 5 international conferences.

The structure and volume of the dissertation. The doctoral dissertation consists of lists of tables and figures presented in the dissertation, the glossary of used terms, introduction, three parts, conclusions, list of references and annexes. The volume of the work is 126 pages (without the list of references and annexes). The dissertation contains 9 tables, 10 figures and 9 annexes. The list of references consists of 386 sources.

CONTENT OF THE DISSERTATION

GLOSSARY OF USED TERMS

INTRODUCTION

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 - 1.1.2. The evolution of the concept of intelligent city
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 - 1.2.2. The concept of knowledge and learning cities
 - 1.2.3. The concept of innovative and creative cities
 - 1.2.4. The concept of smart city
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- 2.2.1. The criteria for the evaluation of preconditions concerning the understanding of external context
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 - 3.2.3. The preconditions concerning the empowering infrastructure and the creation of value in Druskininkai municipality
 - 3.3. Directions for the development of city's intelligence

CONCLUSIONS

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ANNEXES

OVERVIEW OF THE DISSERTATION CONTENT

1. THE THEORETICAL PRECONDITIONS FOR THE DEVELOPMENT OF CITY'S INTELLIGENCE

Section 1.1 is devoted to providing critical analysis of the concepts of intelligence and intelligent city.

Subsection 1.1.1 analyses the main definitions of intelligence at different levels (individual, collective, city's), overviews the translation problem of the term "intelligence" into Lithuanian language and provides the definition of social system's intelligence. *Intelligence of social system should be understood as the ability to create common knowledge about the external environment as a basis for the effective decisions by employing proper intellectual and other resources, in order to successfully adapt to the environment.*

Subsection 1.1.2 provides an overview of the different theoretical interpretations of the concept of intelligent city during different time periods in order to distinguish the key characteristics of the analysed concept. The scientific literature on intelligent cities is quite fragmented, and the intelligent city-specific characteristics are attributed to the other successful cities. Therefore, there is a need to discuss other scientific approaches to the successful cities in order to distinguish the intelligent city-specific characteristics.

Section 1.2 discusses the different theoretical approaches to the concept of intelligent city in order to address important scientific issue: if most of the concepts of successful cities analysed in the scientific literature have similar characteristics but are labelled differently, why they should be distinguished? Different theoretical approaches are discussed by trying to highlight the connection between them and find out what really distinguishes the intelligent city from the rest.

In Subsection 1.2.1, the concepts of digital and virtual cities are analysed. The following digital city-specific characteristics can be distinguished: the infrastructure of information communication technologies, without which further digitization of the city could not be possible; it, along with a properly set up city's design, helps to connect the real (physical) and virtual urban environments in order to ensure the adequate implementation of functions of the city in a virtual environment as well as the involvement of citizens in the decision-making. Digital city from the virtual city can be distinguished by having connections between the physical and virtual environments. The role of pervasive ICT is of crucial importance; thus, the city and its residents must be prepared to accept them in the daily life and activities. Scientific analysis as well showed the importance to develop community networks and support initiatives from the residents to move the urban aspects of life in the virtual space.

In Subsection 1.2.2, the concepts of knowledge city and learning city are analysed. The analysis revealed that it is worth to interpret the concept of the learning city as a separate strategically important direction of development of any

city because its' promoted lifelong learning is the basis for the creation and dissemination of knowledge. The concept of knowledge city is much wider than the concept of the learning city, and it is not enough to interpret it as a separate strategically important direction of urban development. The concept of knowledge city basically possesses some kind of result of the urban development. It focuses on the creation of internal knowledge but points less emphasis on the intellectual assets coming from the external environment. Thus, it is not enough just to be a knowledge city in order to reach successful development.

In Subsection 1.2.3, the concepts of innovative city and creative city are analysed. The analysis of scientific literature showed that the development of creative city is the precondition for the development of innovative city. However, the existence of the creative class fostering a culture of creativity and other characteristics typical of the creative city does not guarantee the becoming of successful innovative city. There is a need for the urban innovation system to function successfully with an emphasis on promoting the development of new technologies and bringing products to market, ensuring learning about how to use them as well as to develop creative excellence and increasing social inclusion.

In Subsection 1.2.4, the concept of smart city is analysed. This concept gets probably the most attention from the scholars and practitioners lately. The concept of the smart city involves the aspects of other theoretical concepts discussed in the dissertation. It should be stressed that a city becomes smart only if it is able to solve problems innovatively (creatively) and take successful strategic decisions. Thus, the result has been reached, and the way it was done distinguishes the smart city from the intelligent one.

In Subsection 1.2.5, the concept of sustainable city is analysed. This concept differs from the other theoretical approaches discussed in the dissertation and provides a rather new understanding of a successful cities. Due to its orientation to the sustainable development and quality of life, this concept should be interpreted as the main goal of development of any kind of city.

In Subsection 1.2.6, the integrity of different theoretical approaches to the concept of intelligent city is presented. It should be noted that the concepts of digital, learning, innovative and creative cities could be interpreted as separate strategically important directions of any city's development. They are closely related and could be realised in a particular city at the same time. The concepts of knowledge city, intelligent city and smart city provide more holistic view of the urban development. Therefore, it is worth to develop them hierarchically in any city: firstly, in order to become a knowledge city, then, by focusing on the development of city's intelligence, to become an intelligent city, and finally, by developing the ability to solve problems in a smart way and take successful strategic decisions, to become a smart city. The concept of sustainable city is parallel to the rest of the discussed above. Thus, whatever direction is the city developing, it may be sustainable in any case.

In the current subsection, the understanding of the concept of intelligent city was extended. It should be stated that *intelligent city is the city containing aspects of digital, learning, knowledge, innovative, creative and sustainable cities. Intelligent city is a complex social system which can be distinguished from the other social systems of the same level by focusing on the development of its intelligence.* The intelligent city has the potential to become a smart city if developing the ability to solve problems in a smart way and taking successful strategic decisions. Any city could become intelligent if developing intelligence. ***Intelligent city is a complex social system, the development of which is based on its essential intellectual capability to perceive emerging changes in the external environment, the potential impact related to them and to link that with its intellectual capital and empowering infrastructure in order to attain its goals.***

Section 1.3 is devoted to justifying the theoretical preconditions for the development of city's intelligence specific to the dimensions of the theoretical model for the development of city's intelligence. In this section, the issue of researching the preconditions for the development of city's intelligence as well as the model for the development of city's intelligence are presented, and the theoretical preconditions for the development of city's intelligence are justified.

Subsection 1.3.1 analyses the issue of researching the preconditions for the development of city's intelligence. There is a lack of scientific studies in the field of the development of city's intelligence, and most of the researches are concerned with the establishment of intelligent city specific characteristics instead of researching the development of intelligence in the city itself. Therefore, there is a need for an integrated approach to the development of city's intelligence combining the quantitative and qualitative aspects of such development in order to reveal not only the result of intelligent activity but also the mindset by which this result came.

In Subsection 1.3.2, the theoretical model for the development of city's intelligence is presented. The model for the development of city's intelligence consists of four dimensions. The dimensions of intelligence, productive knowledge creation and decision-making are fundamental to Jucevicius (2011) suggested model for the development of social system's intelligence. The dimension of intelligence is based on establishing the mechanisms for getting the right information and knowledge and developing the ability to combine it with the already existing knowledge in different contexts; the essence of productive knowledge creation is to provide the basis for the creation of necessary knowledge and develop competencies that in turn becomes a tool for creating innovations; the essence of the decision-making dimension is to connect internal knowledge with intelligence products in order to transform the knowledge into value (Ibid.). Jucevicius suggested model is based on *social intelligence*; however, the analysis of scientific literature showed the existence of *physical intelligence* at the city's

level as well. Thus, the model was supplemented with the fourth dimension of empowering infrastructure (see Figure 1).

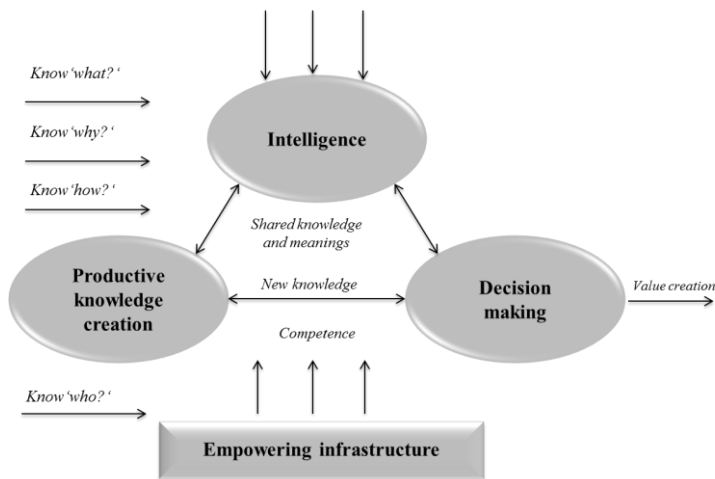


Figure 1. The model for the development of city's intelligence (based on Jucevicius, 2011)

The operation of the model for the development of city's intelligence should be understood as follows: the dimension of intelligence interact with the productive knowledge creation in order to get the impulse of new knowledge needed from the external environment. Empowering infrastructure offers a variety of supporting tools in order to operate more effectively. The dimension of decision-making provides the basis for connecting internal knowledge with intelligence products. It should be noted that those four dimensions provide four groups of preconditions for the development of city's intelligence based on the understanding of external context, having the mechanisms for the development and employing the capacity of the city, empowering infrastructure and the creation of value. Based on this logic, the preconditions for the development of city's intelligence are justified.

In Subsection 1.3.3, the theoretical preconditions for the development of city's intelligence specific to the dimensions of the theoretical model for the development of city's intelligence are justified. They are shown in Table 1.

Table 1. The theoretical preconditions for the development of city's intelligence

<i>Groups of preconditions for the development of city's intelligence</i>	<i>Theoretical preconditions for the development of city's intelligence</i>	<i>Main researches based on which the theoretical preconditions were justified</i>
Understanding of the external context	The ability to foresee future challenges for the development	Herring, 1988; Jucevičius, 1999; Sawka, 1996
	The ability to understand political, economic and social trends	Herring, 1988; Jucevičius, 1999; Thomas, 2007
	The ability to understand strategic differences between the competing cities	Bose, 2008; Calof and Wright, 2008; Huggins, 2010
	The ability to understand key factors of the prosperity of the city	de Villiers, 2009; Ergazakis, Metaxiotis and Psarras, 2004; Jacobson and Choi, 2008
	The ability to have an access to strategically important external organizations and individuals in order to have the possibility to use their intellectual capital and information	Castells, 2008; Feldman, Khademan, Ingram and Schneider, 2006
Mechanisms for development and employing the capacity of the city	Competence of strategic development of the city	Diefenbach, 2009; Osborne, 2006; Walker, Andrews, Boyne, Meier and O'Toole, 2010
	Possessing the tools for employing the competencies of internal experts and organisations for solving the developmental problems	Carrillo, 2004; Garcia, 2007; Sørensen and Torfing, 2009
	Capacity to attract private investors for the city's development	Fachinelli et al., 2014; Ovalle, Márquez and Salomón, 2004; Passerini and Wu, 2008
	Well-functioning urban innovation system	Komninos et al., 2007; Komninos, 2002, 2009
	Incentives for promoting lifelong learning, pursuit of knowledge and competence development	Yigitcanlar, 2008; Laszlo and Laszlo, 2007; Osborne, Kearns and Yang, 2013
	Incentives for promoting citizen participation and initiatives	Hollands, 2008; Lombardi, Giordano, Farouh and Yousef, 2012; Ovalle et al., 2004
Empowering infrastructure	Increasing the intellectual potential of the city through its spatial design	Deakin, 2012; Gruen, 2013; Komninos, 2011
	High level of pervasive information communication technologies	Bui, Sankaran and Sebastian, 2003; Naidoo and Klopper, 2005
	Simplification of bureaucracy in public administration of the city	Anttiroiko, Valkama and Bailey, 2014; Yigitcanlar, 2008; Santinha and De Castro, 2010

<i>Groups of preconditions for the development of city's intelligence</i>	<i>Theoretical preconditions for the development of city's intelligence</i>	<i>Main researches based on which the theoretical preconditions were justified</i>
Creation of value	High level of quality of life	Nam and Pardo, 2011; Prado-Lorenzo et al., 2012; Veenhoven, 2013
	Application of sustainable development strategies	Jepson and Edwards, 2010; Munier, 2011; Turcu, 2012

Thus, there are *four groups and 16 essential theoretical preconditions for the development of city's intelligence specific to the dimensions of the theoretical model for the development of city's intelligence. The investigation of empirical evidences based on those preconditions in the particular city allows to identify the artefacts of intelligence and determine the directions and opportunities for the development of city's intelligence.*

2. THE METHODOLOGY FOR THE EVALUATION OF PRECONDITIONS FOR THE DEVELOPMENT OF CITY'S INTELLIGENCE

In **Section 2.1**, the research methods used for collecting and analysing data are presented; the instruments for collecting data are justified, and the criteria for selection of respondents are described. The *aim of the empirical research* was to identify the preconditions for the development of city's intelligence in the municipalities of Kaunas city and Druskininkai. *The main research objectives* were:

1. By surveying foreign experts working in the field of intelligence and intelligent cities, to verify the applicability of proposed theoretical preconditions for the development of city's intelligence for assessing their existence in a particular city;
2. To analyse the case of the existence of preconditions for the development of intelligence in the municipality of Kaunas city;
3. To analyse the case of the existence of preconditions for the development of intelligence in the municipality of Druskininkai;
4. To propose the underlying directions for the development of city's intelligence.

The dissertation research was conducted in several stages. The design of dissertation research is shown in Figure 2.

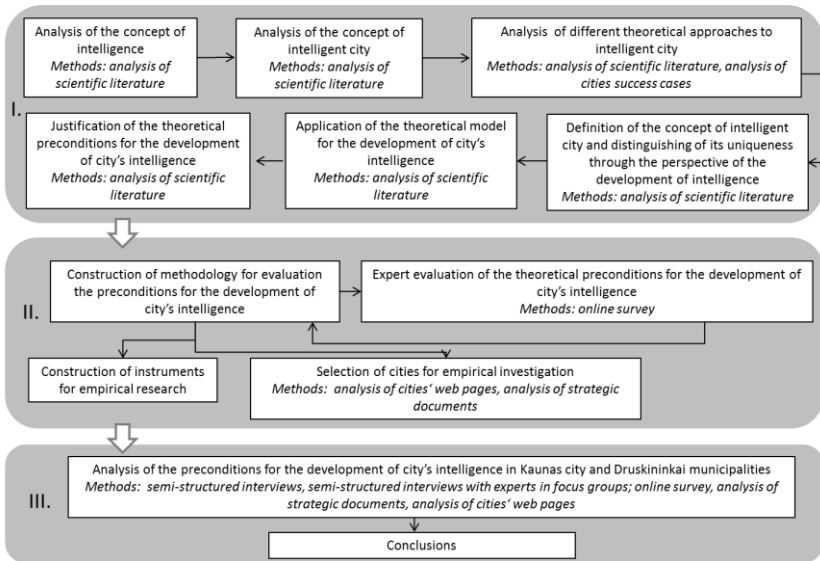


Figure 2. The Design of Dissertation Research

In **Section 2.2**, the methodology for evaluating the preconditions for the development of city's intelligence is presented.

Subsection 2.2.1 presents the criteria for the evaluation of preconditions concerning the understanding of external context. Favourable preconditions for the development of city's intelligence will emerge if the city will build a capacity in foreseeing future challenges for the development, understanding of political, economic and social trends, understanding of strategic differences between the competing cities, understanding of the key factors of the prosperity of the city and having access to the strategically important external organizations and individuals.

Subsection 2.2.2 presents the criteria for the evaluation of preconditions concerning the mechanisms for the development and employing the capacity of the city. Favourable preconditions for the development of city's intelligence will emerge if the city ensures its strategic development, the basis for well-functioning urban innovation system and develops mechanisms, tools for employing the competencies of internal experts and organisations for solving developmental problems, incentives to promote lifelong learning, pursuit of knowledge and competence development and incentives to promote citizen participation and initiatives.

Subsection 2.2.3 presents the criteria for the evaluation of preconditions concerning the empowering infrastructure. Favourable preconditions for the development of city's intelligence will emerge if the city will be able to increase its intellectual potential through urban spatial design described as having a high

level of pervasive information communication technologies and will be able to simplify the bureaucracy in the public administration.

Subsection 2.2.4 presents the criteria for the evaluation of preconditions concerning the creation of value. Favourable preconditions for ensuring sustainable development and high level of quality of life should exist in the intelligent city. However, in order to fully evaluate the sustainability of the city, the longitudinal and extended studies should be performed. It should be noted that this group of preconditions is specific not only to the intelligent cities; therefore, the most important thing is to evaluate the preconditions concerning the understanding of external context, the mechanisms for the development and employing the capacity of the city and the empowering infrastructure.

Subsection 2.2.5 provides the discussion on the findings of empirical research with foreign experts working in the field of intelligence and intelligent cities for many years. The most important results of this survey are two: experts approved the applicability of the proposed theoretical preconditions for the development of city's intelligence for assessing their existence in the particular city and proposed additional criteria for the evaluation of preconditions for the development of city's intelligence. The absolute majority of latter criteria is reflected in the methodology, and this is the reason why the methodology should be considered a proper way to evaluate the preconditions for the development of city's intelligence.

3. THE PRECONDITIONS FOR THE DEVELOPMENT OF CITY'S INTELLIGENCE: THE CASES OF KAUNAS CITY AND DRUSKININKAI MUNICIPALITIES

Section 3.1 provides the results of empirical research of the preconditions for the development of city's intelligence in Kaunas city municipality. In Subsection 3.1.1, the preconditions concerning the understanding of external context in Kaunas city municipality are presented. The empirical research showed that there are some issues preventing the emergence of favourable preconditions for the development of city's intelligence: underdeveloped ability to foresee the future challenges, notional understanding of environmental trends, the lack of abilities to make the information on competitive environment useful, concentration on internal administrative problems without seeing development opportunities in the external environment and underdeveloped ability to have access to the strategically important external organizations and individuals.

In Subsection 3.1.2, the preconditions concerning the mechanisms for the development and employing the capacity of the city in Kaunas city municipality are presented. The empirical research showed that in Kaunas city municipality exists the basis for the strategic thinking; the importance of being innovative can as well be noticed, very favourable preconditions for learning, seeking of knowledge and developing personal competencies. However, the unsolved

internal administrative issues and some negative personal feelings about the public and private partnerships do not allow attaining goals.

In Subsection 3.1.3, the preconditions concerning the empowering infrastructure in Kaunas city municipality are presented. The research showed that there are a number of favourable preconditions for empowering the infrastructure in Kaunas city municipality due to the favourable spatial urban design and adequate readiness for using ICT in the public administration. However, Kaunas city municipality cannot be described ready for the simplification of bureaucracy in public administration of the city.

In Subsection 3.1.4, the preconditions concerning the creation of value in Kaunas city municipality are presented. The research showed that there are favourable preconditions for the application of sustainable development strategies in Kaunas city municipality, though there is no evidence about seeking a higher level of quality of life.

By summarising the case of the existence of preconditions for the development of intelligence in the municipality of Kaunas city, the following insights can be made: favourable preconditions for the development of city's intelligence are met through empowering infrastructure, value creation and partially the mechanisms for the development and employing the capacity of the city. However, the latter preconditions are not brought into account due to the internal problems of administration. The most important thing is that there is a big lack of capability to empower the function of intelligence. Therefore, Kaunas city municipality could be described rather as the knowledge city than the intelligent city.

Section 3.2 provides the results of empirical research of the preconditions for the development of city's intelligence in Druskininkai municipality. In Subsection 3.2.1, the preconditions concerning the understanding of external context in Druskininkai municipality are presented. It should be stressed that there are favourable preconditions for understanding the external context in Druskininkai municipality due to the sufficient capability to analyse the external environment and the prevailing attitude that daily tasks could not be realised without analysing the environment.

In Subsection 3.2.2, the preconditions concerning the mechanisms for the development and employing the capacity of the city in Druskininkai municipality are presented. The research showed that this municipality can be characterised as highly strategically oriented, as capable to attain its goals and by the business approach to the public administration which demonstrates its ability to be a proactive and entrepreneur.

In Subsection 3.2.3, the preconditions concerning the empowering infrastructure and the creation of value in Druskininkai municipality are presented. Spatial design of Druskininkai municipality is the most important issue preventing the favourable preconditions for the empowering infrastructure to emerge in the

city. However, there is an adequate readiness for using ICT in public administration and some abilities to simplify the bureaucracy in public administration. There are very few evidences about the existence of favourable preconditions for the creation of value in Druskininkai municipality. Only the declaration on the application of sustainable development strategies and seeking of higher quality of life in strategic documents can be found.

By summarising the case of the existence of preconditions for the development of intelligence in the municipality of Druskininkai, the following insights can be made: favourable preconditions for the development of city's intelligence are met through the function of intelligence, productive knowledge creation and some aspects of empowering infrastructure. Following the logic of the model for the development of city's intelligence, Druskininkai municipality with some exceptions could be described as having intelligent direction. There are some evidences as well that Druskininkai municipality is linked to develop into a smart city.

Section 3.3 provides the underlying directions for the development of city's intelligence. The main directions points to the need for the developing intelligence at all levels of the social system, enhance the interaction and strengthen the relationships between all the levels of social system and develop intelligence depending on the set of existing favourable and unfavourable preconditions of a particular city.

CONCLUSIONS

According to the dissertation research objectives, the following conclusions were formulated:

- 1. Critical analysis of the theoretical concept of intelligence and other related concepts revealed that there exist various forms of intelligence at the city's level, which can be divided conditionally into social and physical intelligence.** Physical intelligence is related to the infrastructure of ICT and urban design; social intelligence involves individual, collective, organisational intelligence and intelligence emerging from their interaction. *The development of physical intelligence at city's level is determined by the city's social intelligence.*

Intelligence at city's level includes all intelligence of individuals, all collective intelligence, all intelligence of organisations and intelligence emerging from their interaction similar to the knowing of the *organisation*. Such kind of intelligence evolves by itself. In this dissertation, the intelligence equivalent to *organisational* knowing is analysed. Such kind of intelligence is the one what may be purposefully developed. By decision makers, it is perceived as an important quality that needs to be developed.

2. **The intelligence of social system should be understood as the ability to create collective knowing about the external context of its development by the proper usage of intellectual and other kinds of resources in order to make effective decisions and successfully adapt to the external environment.** This adaptation to the environment may be a regular process in the city; during it, a complex social system is able to actively respond to the arising changes from the external environment, foresee them and tilt in its favour in order to attain its goals.
3. **Even if intelligence is the main quality of an intelligent city distinguishing it from the other approaches to successful cities and ensuring the right understanding of both internal and external developmental contexts, the intelligent city may as well be characterised by having qualities specific to the digital, learning, innovative, creative, knowledge and sustainable cities.**

The intelligence of the city is determined by:

- the characteristics typical of the digital city such as pervasive ICT and their infrastructure, strategies for digital development and technological innovation, proper urban design, helping to combine physical and virtual urban environments and involving citizens in the decision-making;
- the culture of lifelong learning typical for the learning city, which encourages the sharing of knowledge, educating of competent individuals able to apply creative solutions of problems, generate innovative ideas and not to be afraid of applying non-traditional solutions and in that way able to support the mechanism of knowledge creation;
- the qualities of knowledge city providing mechanisms for the adequate perception of important processes emerging in the external environment, mechanisms for the development of various forms of the city's capital and the basis for the urban innovation system to function properly;
- innovative and creative city specific innovativeness as an outcome of the regular integration of internal and external knowledge in the intelligent city in order to achieve effective decisions as well as creative and smart individuals as the essence of the development of intellectual capital in the intelligent city;
- sustainability as providing the orientation to some kind of values and demarcating intelligence from the potential negative links to the collection of information;
- some aspects of smart cities. Intelligent city is concerned mostly about the scanning the external environment, whereas the smart city is concerned about its achievements by searching for its own specific direction to develop. Developing smart city-specific characteristics is the precondition for the intelligent city to become smart.

- 4. Intelligent city is a complex social system, the development of which is based on its essential intellectual capability to perceive emerging changes in the external environment, the potential impact related to them and link that with its intellectual capital and empowering infrastructure in order to attain its goals.**

In the intelligent city, individuals, organisations and local authorities operate intelligently by learning, sharing knowledge, networking, developing creativeness and encouraging innovativeness, proper using of available intellectual and physical resources in order to attain their goals.

- 5. Due to the different forms of intelligence existing in the city, the theoretical model for the development of city's intelligence should integrate four dimensions: the dimension of intelligence, productive knowledge creation, empowering infrastructure and decision-making.** The theoretical model for the development of social system's intelligence suggested by Jucevičius (2011) is based on the perception of intelligence as social intelligence. The dissertation research shows that the intelligence of the city may be physical as well. Thus, the model has been complemented by the fourth dimension of the empowering infrastructure allowing to look at the preconditions for the development of city's intelligence tangibly.
- 6. Based on the theoretical dissertation research and the essence of the dimensions of a theoretical model for the development of city's intelligence, there can be distinguished four main groups of preconditions including 16 conceptual preconditions for the development of city's intelligence, which reflect the understanding of external context of the development, mechanisms for the development and employing the capacity of the city, empowering infrastructure and value creation.**
 - The understanding of external context of the development: favourable preconditions for the development of city's intelligence will emerge if the city will *build capacity in foreseeing future challenges for the development, understanding of political, economic and social trends, understanding of strategic differences between the competing cities, understanding of key factors of the prosperity of the city and having an access to the strategically important external organizations and individuals.*
 - Mechanisms for the development and employing the capacity of the city: favourable preconditions for the development of city's intelligence will emerge if the city *could ensure its strategic development, the basis for well-functioning urban innovation system and develop mechanisms, tools for employing the competencies of internal experts and organisations for solving the developmental problems, incentives to promote lifelong learning, pursuit of knowledge and competence development and incentives to promote citizen participation and initiatives.*

- Empowering infrastructure: favourable preconditions for the development of city's intelligence will emerge if the city will *be able to increase its intellectual potential through urban spatial design, be described as having a high level of pervasive information communication technologies and be able to simplify bureaucracy in the public administration.*
 - Value creation: favourable preconditions for the development of city's intelligence will emerge if the city will *be able to ensure sustainable development and high level of quality of life.*
 - Due to the specificity of the dimension of decision-making and the group of preconditions concerning it, the focus should be pointed to the other three groups of preconditions emerging from the other dimensions of the model for the development of city's intelligence. The existence of favourable preconditions for the development of city's intelligence depending of the latter *three dimensions is the condition of the city to become intelligent.*
- 7. Even if the preconditions for the development of city's intelligence can be investigated by employing quantitative research methods, the complexity of category of intelligence determines the research methodology to be focused on qualitative research methods which allow to perceive the context of decision-making not only the result of intelligent activities.**
- The system of parameters for the evaluation of preconditions for the development of city's intelligence includes 16 criteria (theoretical preconditions for the development of city's intelligence) and 93 indicators (defining aspects). In order to investigate the existence of the preconditions for the development of city's intelligence, it should be focused on using qualitative research methods. Some aspects can be investigated by using quantitative research methods.
 - The methodology does not aim to establish the manifestation of particular concepts of successful cities analysed in the dissertation, because those concepts are broader than the set of qualities important to the intelligent city as well as not to establish the sustainability and quality of life in the city, because such research should be permanent and comprehensive; therefore, the suggested indicators allow to identify preconditions for sustainability and quality of life but do not evaluate the status.
- 8. Empirical research of the preconditions for the development of city's intelligence in Kaunas and Druskininkai municipalities revealed that there exists a set of favourable and unfavourable preconditions and the intensity of their emergence specific to the particular city.**
- The most favourable preconditions in Kaunas municipality open through the empowering infrastructure and value creation. Even if the city has a huge intellectual potential, it is not employed, and the function of intelligence is prevented from empowering it due to the issues of internal

administration and the lack of capabilities to scan external environment. Based on the logic of the model for the development of city's intelligence, in Kaunas municipality, the focus is on the empowering infrastructure, value creation and some aspects of productive knowledge creation. Therefore, Kaunas city is more likely to be knowledge than intelligent city.

- In Druskininkai municipality, there does not exist favourable spatial design for enhancing intellectual potential; however, there are enough favourable preconditions to empower the function of intelligence, and the expressed competence of strategic development and business approach to operational tasks reveals sufficient preconditions for knowing the internal context. Based on the logic of the model for the development of city's intelligence, in Druskininkai municipality, there exist favourable preconditions for empowering the function of intelligence, productive knowledge creation and some aspects of empowering infrastructure. As those three dimensions are the conditions for the city to become intelligent, Druskininkai, with certain exceptions, could be described as an intelligently acting municipality.

THE LIST OF THE PUBLICATIONS ON THE TOPIC OF DISSERTATION

Articles published in reviewed scientific journals from the list of the International databases

1. Liugailaitė-Radzvickienė, Laura; Jucevičius, Robertas. An Intelligence Approach to City Development // Business and Management 2012: the 7th International Scientific Conference, May 10-11, 2012, Vilnius, Lithuania: selected papers / Vilnius Gediminas Technical University, Riga Technical University, Tallinn University of Technology, International North German Academy of Informatology, Stralsund, Brno University of Technology, Technical University-Sofia, Cracow University of Economics. Vilnius: Technika. ISSN 2029-4441. 2012, pp. 849-855. [Conference Proceedings Citation Index- Social Science and Humanities]. [0,500]
2. Liugailaitė-Radzvickienė, Laura. Miesto inteligentiškumas: žinojimo link // Acta Humanitarica Universitatis Saulensis: mokslo darbai / Šiaulių universitetas. Šiauliai: Šiaulių universiteto leidykla. ISSN 1822-7309. 2012, T. 14: Regionas: laikas, erdvė, žmonės, p. 358-369. [Index Copernicus; MLA]. [1,000]
3. Liugailaitė-Radzvickienė, Laura; Jucevičius, Robertas. Going to Be an Intelligent City // Procedia Social and Behavioral Sciences: 19th International Scientific Conference Economics and Management 2014, ICEM-2014, 23-25 April 2014, Riga, Latvia. Amsterdam: Elsevier. ISSN 1877-0428. 2014, vol.

- 156, pp. 116-120. DOI: 10.1016/j.sbspro.2014.11.131. [Science Direct]. [0,500]
4. Jucevičius, Robertas; Liugailaitė-Radzvickienė, Laura. Miesto inteligentiškumo vertinimas // Viešojo politika ir administravimas = Public Policy and Administration / Kauno technologijos universitetas, Mykolo Romerio universitetas. Kaunas: KTU. ISSN 1648-2603. 2014, T. 13, nr. 3, p. 442-453. DOI: 10.5755/j01.ppaa.13.3.8297. [Index Copernicus; Academic Search Complete; Central and Eastern European Academic Source; Scopus]. [0,500]
 5. Liugailaitė-Radzvickienė, Laura; Jucevičius, Robertas. Miesto inteligentiškumo vertinimo metodologija // Viešojo politika ir administravimas = Public Policy and Administration / Kauno technologijos universitetas, Mykolo Romerio universitetas. Kaunas: KTU. ISSN 1648-2603. 2015, t. 14, Nr. 1, p. 115-128. [Index Copernicus; Academic Search Complete; Central and Eastern European Academic Source; Scopus]. [0,500]

Other reviewed scientific editions
Conference proceedings

1. Jucevičius, Robertas; Liugailaitė-Radzvickienė, Laura. Smart Development: A Conceptual Framework // Proceedings of the 10th International Conference on Intellectual Capital, Knowledge Management and Organisational Learning, ICICKM-2013: The George Washington University, Washington, DC, USA, 24-25 October 2013 / Edited by Annie Green. Reading: Academic Publishing Ltd, 2013, ISBN 9781909507777. pp. 212-219. [0,500]
2. Sinkienė, Jolita; Grumadaitė, Kristina; Liugailaitė-Radzvickienė, Laura. Diversity of Theoretical Approaches to the Concept Of Smart City // Business and Management 2014: the 8th International Scientific Conference, May 15-16, 2014, Vilnius, Lithuania: selected papers, Vol. 2 / Vilnius Gediminas Technical University, Riga Technical University, Tallinn University of Technology, Brno University of Technology, Cracow University of Economics. Vilnius: Technika. ISSN 2029-4441. 2014, pp. 933-940. [0,333]
3. Jucevičius, Robertas; Liugailaitė-Radzvickienė, Laura. Framework for Development of City's Intelligence // Business and Management 2014: the 8th International Scientific Conference, May 15-16, 2014, Vilnius, Lithuania: selected papers, Vol. 2 / Vilnius Gediminas Technical University, Riga Technical University, Tallinn University of Technology, Brno University of Technology, Cracow University of Economics. Vilnius: Technika. ISSN 2029-4441. 2014, pp. 926-932. [0,500]

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REZIUOMÉ

Disertacinio tyrimo aktualumas. Intelligentiškumas (angl. *intelligence*) socialinių sistemų lygmeniu daugiausia analizuojamas per inteligentiško miesto (angl. *intelligent city*) perspektyvą (Nicos Komninos, Sefertzi, ir Tsarchopoulos, 2006; Nicos Komninos, 2006a, 2006b, 2009, 2011; Rodrigues ir Tomé, 2011; Santinha, ir De Castro, 2010). Ilgą laiką mokslininkai (Bruhns, 1997; Komninos, 2002) siejo ir vis dar sieja inteligentiškumą su informacinių komunikacinių technologijų (angl. ICT, toliau IKT) naudojimu ir jomis grįstu žinių kūrimu, neretai tapatindami jį su išmanumu. Negalima paneigti to, kad IKT vaidina svarbų vaidmenį inteligentiškų miestų vystyme ir vystymesi: neturint išvystytos IKT infrastruktūros, virtualių aplinkų ir tam pritaikyto miesto plano, būtų sunku išvystyti vidinę inteligentišką aplinką, įveikinti išorės kompetencijų tinklus ir apskritai vykdyti kasdieninę veiklą. Vis dėlto gebėjimui spręsti informacijos, žinių ir įžvalgos reikalaujančias problemas to neužtenka.

Žinių valdymo teorija siūlo ganėtinai daug žinių kūrimo ir vystymo mechanizmų miesto lygmeniu, tačiau inteligentiškumas neapsiriboja vien tik vidinių žinių kūrimu. Neįmanoma veikti įžvalgiai, jei nėra žinių apie tai, kaip

veikia kiti, ką jie žino, kokias technologijas taiko ir pan., nes miestas, kaip kompleksinė socialinė sistema, neegzistuoja vakuume, ji visada yra apsupta kitų sistemų ir yra didesnių sistemų dalis. Kurti bendrą (kolektyvinį) žinojimą mieste nėra lengva užduotis, nes skirtingos suinteresuotosios šalys ir socialinės grupės mieste turi skirtingus tikslus, skirtingą kompetenciją, žinių bazę, resursus, kultūrą. Šio žinojimo kūrimas reikalauja gebėjimo absorbuoti jau esančias žinias ir informaciją iš išorinės aplinkos bei gebėjimo plėtoti naujas žinias. Požiūris į miesto vystymąsi per inteligentiškumo prizmę reikalauja atsigręžti būtent į gebėjimą pažinti, kuris yra svarbus sėkmingo bet kokio miesto vystymosi pagrindas.

Mokslinės problemos pagrindimas. Mokslinėje literatūroje inteligentiški miestai apibūdinami išskiriant ir akcentuojant skirtingas jų charakteristikas, tokias kaip informacinių komunikacinių technologijų integravimas į miesto veiklą (Bruhns, 1997; Kingston, Babicki, ir Ravetz, 2005; Nicos Komninos, 2002), erdvinis miesto išsidėstymas su atitinkama IKT infrastruktūra (N. Komninos et al., 2007; Nicos Komninos, 2006b, 2011), inovacijų sistemos funkcionavimas (Nicos Komninos et al., 2006; Nicos Komninos, 2006a, 2009), žinių valdymo įrankių turėjimas ir įvairių miesto kapitalo formų vystymas (Santinha ir De Castro, 2010), žinių ir skaitmeninio miesto charakteristikų integravimas (Rodrigues ir Tomé, 2011), tam tikros skaitmeninio miesto charakteristikos (Nicos Komninos, 2011; Rodrigues ir Tomé, 2011), tačiau sunku rasti mokslinių šaltinių, kuriuose gilinamasi į tai, kaip šios charakteristikos turėtų būti vystomos ir ko reikia, kad miestas taptų inteligentiškas; dažniausiai apsiribojama šių charakteristikų išskyrimu (Nicos Komninos, 2011; Santinha ir De Castro, 2010). Menkas fenomeno ištirtumas, nedidelis mokslininkų, dirbančių šioje srityje, skaičius ir negausios mokslinės diskusijos leidžia susidaryti tik fragmentinį supratimą apie tai, kas yra inteligentiškas miestas. Kita problemos pusė – mokslinėje literatūroje nėra pakankamai argumentuotai išryškintas conceptualus inteligentiško miesto skirtumas nuo kitų su juo susijusių mokslinių koncepcijų, tokių kaip skaitmeninis miestas (Doukas et al., 2011; Shkabatur, 2011), besimokantis miestas (Jordan, Longworth ir Osborne, 2014; Reghenzani-Kearns ir Kearns, 2012), žinių miestas (Fachinelli, Carrillo ir D’Arisbo, 2014; Yigitcanlar, 2014), novatoriškas miestas (Seo, 2009; Shearmur, 2012), kūrybiškas miestas (Foord, 2013; O’Connor ir Shaw, 2014;), sumanus miestas (Caragliu, Del Bo ir Nijkamp, 2011; Glasmeier ir Christopherson, 2015), darnus miestas (Yigitcanlar, Dur ir Dizdaroglu, 2015; Rai, 2012). Minėtos teorinės priegijos per skirtingas sėkmingai besivystančio miesto interpretavimo perspektyvas akcentuoja tokius dalykus, kaip informacinių komunikacinių technologijų integravimas į sprendimų priėmimą ir kasdienį miesto gyvenimą; žinių valdymo svarba; aukštos pridėtinės vertės produktų ir paslaugų kūrimas ir vystymas; tinklaveika; darnumas; optimalus išteklių naudojimas; intelektualinio kapitalo svarba; novatoriškumo skatinimas; tinkamas miesto erdvinis išdėstymas ir dauguma kitų. Nė viena minėta koncepcija

nepaneigia kitose koncepcijose akcentuojamų aspektų svarbos miesto vystymuisi, o visi aukščiau išvardinti dalykai yra svarbūs turbūt bet kokiam sėkmingai besivystančiam miestui. Kokia tuomet yra šių koncepcijų atskyrimo prasmė ir kuo inteligentiškas miestas skiriasi nuo kitų mokslinėje literatūroje pateikiamų teorinių prieigų? Vien minėtų miesto charakteristikų, jei nesigilinama į jų vystymo galimybes, egzistavimo patikrinimo nepakanka, kad miestas galėtų būti laikomas inteligentišku. Svarbu yra pažinti tą platformą (konkretų socialinį ekonominį kontekstą, esant atitinkamoms sąlygoms, ištekliams ir pajėgumams), nuo kurios priklauso inteligentiškumo vystymas mieste. Prielaidų inteligentiškumui vystyti nustatymas leistų įvertinti miesto potencialą tapti inteligentišku miestu. Todėl galima iškelti tokius *disertacinio tyrimo probleminius klausimus*: kaip turėtų būti konceptualizuojamas miesto inteligentiškumas ir koks inteligentiško miesto ryšys su kitomis sėkmingai besivystančių miestų apibūdinančiomis kategorijomis? kokios yra miesto inteligentiškumo vystymo prielaidos?

Disertacinio tyrimo objektas. Miesto inteligentiškumo vystymo prielaidos.

Disertacinio tyrimo tikslas. Pagrįsti miesto inteligentiškumo vystymo prielaidas.

Disertacinio tyrimo uždaviniai.

1. Teoriškai argumentuoti socialinės sistemos inteligentiškumo reiškinio esmę;
2. Skirtingų teorinių prieigų aspektu pagrįsti inteligentiško miesto koncepciją;
3. Pagrįsti miesto inteligentiškumo vystymo teorinio modelio struktūrinių dalių turinį nusakančias tokio vystymo prielaidas;
4. Parengti miesto inteligentiškumo vystymo prielaidų tyrimo metodologiją;
5. Empiriškai nustatyti miesto inteligentiškumo vystymo prielaidų raišką dviejuose miestuose.

Disertacinio tyrimo eiga ir metodai. Disertacinis tyrimas buvo atliktas trimis etapais. Pirmajame etape, remiantis mokslinės literatūros analize, buvo išgryninta inteligentiškumo kaip atskiros socialinių sistemų kategorijos esmė, apibrėžta jo samprata, identifikuotos esminės teorinės inteligentiško miesto charakteristikos, išanalizuotos skirtingos su inteligentiško miesto koncepcija susijusios teorinės prieigos, pasiūlytas jas integruojantis požiūris ir pagrįstos miesto inteligentiškumo vystymo teorinio modelio struktūrinių dalių turinį nusakančios tokio vystymo prielaidos. Antrasis disertacijos rengimo etapas buvo skirtas miesto inteligentiškumo vystymo prielaidų tyrimo metodologijai parengti. Trečiajame disertacijos rengimo etape buvo atlikti empiriniai inteligentiškumo vystymo prielaidų raiškos Kauno miesto, Druskininkų ir keliose kitose savivaldybėse tyrimai.

Disertacijoje taikoma mišri tyrimo prieiga derinant tiek kiekybinius, tiek kokybinius tyrimo metodus. Disertacijoje taikyti duomenų rinkimo metodai:

mokslinės literatūros analizė, internetinių (miestų, miestų atvejus analizuojančių projektų / organizacijų) svetainių duomenų analizė, dokumentų (strateginių planų, vykdomų programų aprašų ir kt.) analizė, apklausa raštu, fokusuota ekspertų grupių diskusija (fokusuotų ekspertų grupių interviu) ir pusiau struktūruotas ekspertų interviu. Duomenų analizės metodai: statistinė duomenų analizė (kiekybiniais empirinio tyrimo duomenims susisteminti) ir kokybinė turinio analizė (kokybiniais empirinio tyrimo duomenims susisteminti).

Disertacinio tyrimo mokslinis naujumas ir teorinis reikšmingumas.

- Pateiktas naujas konceptualus požiūris į inteligentišką miestą, grindžiamas susijusių teorinių koncepcijų, tokių kaip skaitmeninio, besimokančio, žinių, novatoriško, kūrybiško, sumanaus ir darnaus miesto lyginamąja analize, iš jų išskiriant inteligentiško miesto sampratą praturtinančias charakteristikas;
- Teorinis miesto inteligentiškumo vystymo modelis papildytas įgalinančios infrastruktūros dedamąja;
- Teoriškai pagrįstos ir empiriškai patikrintos miesto inteligentiškumo vystymo prielaidos;
- Sukurta integrali inteligentiškumo vystymo prielaidų vertinimo parametrų sistema.

Disertacinio tyrimo praktinė reikšmė.

- Miesto inteligentiškumo vystymo prielaidų vertinimo kriterijų ir indikatorių sistema atspindi inteligentiškam miestui būdingas charakteristikas, todėl leidžia praktiškai vertinti miesto inteligentiškumo artefaktus ir jo vystymo galimybes;
- Pateikta inteligentiško miesto koncepcija ir teorinis modelis gali būti nauja konceptuali prieiga rengiant miesto vystymo strategijas.

Tyrimo rezultatų mokslinė aprobacija ir sklaida. Disertacinio tyrimo rezultatai paskelbti 8 mokslinėse publikacijose ir 5 tarptautinėse konferencijose.

Darbo struktūra. Disertaciją sudaro turinys, lentelių, paveikslų ir priedų sąrašai, pagrindinių sąvokų sąvadas, įvadas, trys dalys, apimančios 8 poskyrius, suskirstytus į subposkyrius, išvados, literatūros sąrašas ir priedai. Disertacijoje pateikiamos 9 lentelės, 10 paveikslų ir 9 priedai. Darbas, be literatūros sąrašo ir priedų, apima 126 puslapius, literatūros sąrašą sudaro 386 pozicijos.

IŠVADOS

Remiantis išsikeltais disertacinio tyrimo uždaviniais, galima daryti tokias išvadas:

- 1. Teorinė inteligentiškumo ir susijusių koncepcijų analizė atskleidė, kad miesto lygmeniu egzistuoja įvairios inteligentiškumo formos, kurias sąlyginai galima išskirti į socialinį ir fizinį miesto inteligentiškumą.** Fizinis miesto inteligentiškumas yra susijęs su informacinių komunikacinių technologijų infrastruktūra ir miesto erdvinio planu; socialinis miesto

inteligentiškumas apima individų, jų grupių, organizacijų ir jų tarpusavio sąveikos metu atsirandantį inteligentiškumą. Būtent *socialinis inteligentiškumas lemia fizinio inteligentiškumo vystymo galimybes mieste. Intelligentiškumas mieste, panašiai kaip ir žinių valdymo teoretikų nagrinėjamas organizacijos žinojimas, apima visų atskirų miesto individų, jų grupių, organizacijų visą galimą inteligentiškumą ir inteligentiškumą, atsiradusį mieste egzistuojančių subjektų tarpusavio sąveikos metu. Šis inteligentiškumas mieste ir atskirai visais lygmenimis vystosi savaime. Disertacijoje nagrinėjamas organizaciniam žinojimui ekvivalentus inteligentiškumas – tas inteligentiškumas, kurio vystymąsi galima kryptingai paveikti (kurį galima vystyti). Šis inteligentiškumas yra lengviau apčiuopiamas ir sprendimų priėmėjų suvoktas kaip vystyti svarbi miesto charakteristika.*

2. **Socialinės sistemos inteligentiškumas turėtų būti suprantamas kaip gebėjimas sukurti bendrą žinojimą apie išorinį konkrečios socialinės sistemos vystymosi kontekstą tinkamai panaudojant intelektualinius ir kitokius išteklius, turint tikslą priimti efektyvius sprendimus, leidžiančius sėkmingai prisitaikyti prie išorinės aplinkos.** Miesto, kaip kompleksinės socialinės sistemos, egzistuojančios kitų sistemų apsuptyje, prisitaikymas prie aplinkos turėtų būti nuolatinis procesas, kurio metu, įgalinus inteligentiškumo funkciją, *aktyviai reaguojama į aplinkoje kylančius pokyčius, sugebama juos numatyti ir pakreipti savo naudai, siekiant užsibrėžtų tikslų.*
3. **Nors inteligentiškumas yra pagrindinė inteligentišką miestą iš kitų mokslinėje literatūroje sėkmingais laikomų miestų skirianti charakteristika, užtikrinanti adekvatų miesto vidinio ir išorinio vystymosi konteksto interpretavimą, inteligentiškam miestui būdingi ir skaitmeninio, besimokančio, novatoriško, kūrybiško, žinių bei darnaus miesto bruožai.**

Miesto inteligentiškumo lygį lemia:

- skaitmeniniam miestui būdingos besiskverbiančios informacinės komunikacinės technologijos ir jų infrastruktūra, skaitmeninio vystymosi ir technologinių inovacijų skatinimo strategijos, tinkamai sukurtas miesto erdvinis išsidėstymas, padedantis suderinti realią (fizinę) ir virtualią miesto aplinkas siekiant užtikrinti adekvatų miesto funkcijų įgyvendinimą virtualioje aplinkoje ir gyventojų įtraukimą į sprendimų priėmimą;
- besimokančiam miestui būdinga mokymosi visą gyvenimą kultūra, skatinanti dalijimąsi žiniomis, kompetentingų individų, gebančių kūrybiškai spręsti problemas, generuoti novatoriškas idėjas ir nebijoti priimti netradicinių sprendimų, ugdymą, skatinanti jų kūrybiškumą ir

novatoriškumą ir taip padedanti išlaikyti žinių kūrimo mieste mechanizmą;

- žinių miestui būdingos charakteristikos, parodančios gebėjimą aprūpinti miestą svarbių žinių apie išorinėje aplinkoje vykstančius procesus atpažinimo ir supratimo įrankiais ir įvairių miesto kapitalo formų vystymo mechanizmais, taip pat inovacijų sistemai funkcionuoti reikiama baze;
- novatoriškam ir kūrybiškam miestui būdingas novatoriškumas kaip pasekmė to, kad inteligentiškame mieste nuolat vyksta vidinių ir išorinių žinių integracija siekiant priimti efektyvesnius sprendimus; taip pat mieste esantys kūrybiški ir išradingi individai, kaip būtina sąlyga miesto intelektualiam potencialui didinti;
- siekis tapti darniu miestu, inteligentiškumui suteikiantis vertybinę orientaciją ir tam tikra prasme atribojantis nuo galimų neigiamų sąsajų su informacijos rinkimu ir žvalgyba;
- tam tikri sumanus miesto bruožai. Inteligentiškas miestas daugiausia koncentruojasi į išorinės aplinkos stebėjimą ir vertinimą, sumanus – į sprendimus siekti reikšmingų rezultatų, surandant tik jam būdingas vystymosi kryptis ir išteklių derinius. Stiprindamas šias charakteristikas, inteligentiškas miestas gali evoliucionuoti į sumanų miestą.

4. Inteligentiškas miestas yra kompleksinė socialinė sistema, savo vystymąsi prioritetiškai grindžianti intelektiniu gebėjimu išvėlgti išorinėje aplinkoje vykstančius ir vykšiančius pokyčius, jų galimą poveikį ir susieti juos su turimu intelektiniu kapitalu bei įgalinančia infrastruktūra, kad pasiektų savo užsibrėžtų tikslų. Inteligentiškame mieste, siekdami savo užsibrėžtų tikslų, inteligentiškai veikia jo gyventojai, organizacijos ir savivaldos institucijos, nuolat mokydami, tarpusavyje keisdamiesi žiniomis, stiprindami bendradarbiavo kultūrą, ugdydami kūrybiškumą ir skatindami novatoriškumą, gebėdami tinkamai pasinaudoti turimais fiziniais ir intelektualiais ištekliais.

5. Dėl skirtingų miesto inteligentiškumo formų egzistavimo jo vystymo teorinis modelis turi sujungti keturias dedamąsias – inteligentiškumo (funkcine prasme), produktyvių žinių kūrimo, įgalinančios infrastruktūros ir sprendimų priėmimo. Disertacijoje taikomas Jucevičiaus socialinės sistemos inteligentiškumo vystymo modelis grindžiamas *socialinio* inteligentiškumo samprata, tačiau disertacijoje atlikti teoriniai tyrimai parodė, kad miesto inteligentiškumas gali būti ir *fizinis*, todėl šis modelis buvo papildytas ketvirta dedamąja – įgalinančios infrastruktūros, leidžiančios apčiuopti fizinio inteligentiškumo vystymo mieste prielaidas.

6. Remiantis disertacijoje atliktais teoriniais tyrimais ir miesto inteligentiškumo vystymo teorinio modelio struktūrinių dalių turinį nusakančiais požymiais, galima išskirti keturias esmines inteligentiškumui vystyti palankių prielaidų grupes, apimančias 16 esminių konceptualių miesto inteligentiškumo vystymo prielaidų, atspindinčių išorinio vystymosi konteksto supratimą, miesto potencialo panaudojimo ir vystymo mechanizmų turėjimą, inteligentiškumą įgalinančią infrastruktūrą bei naudą kuriančių rezultatų siekimą.

- Išoriniam miesto vystymosi kontekstui suprasti palankios prielaidos susiformuos, jei miestas ugdys penkis esminius savo gebėjimus: *gebėjimą numatyti aplinkoje vykšančius pokyčius, supratimą apie išorinės aplinkos politines, ekonomines ir socialines tendencijas, supratimą apie konkurencinę miesto aplinką, supratimą apie miesto vystymosi sėkmę lemiančius kriterijus ir gebėjimą priėti prie išorinių miestui strategiškai svarbių subjektų ir reikiamos informacijos šaltinių.*
- Miesto potencialo panaudojimo ir vystymo mechanizmų turėjimui palankios prielaidos susiformuos, jei mieste bus *užtikrintas jo vystymo strategiškumas, funkcionuos inovacijų sistema ir veiks šie mechanizmai: miesto vystymo klausimams spręsti reikiamų kompetencijų pritraukimo, finansinės paramos panaudojimo ir investicijų pritraukimo, gyventojų skatinimo mokytis visą gyvenimą, siekti žinių ir vystyti kompetencijas bei gyventojų įsitraukimo ir iniciatyvų skatinimo.*
- Inteligentiškumą įgalinančiai infrastruktūrai palankios prielaidos susiformuos tada, kai *miesto erdvinis išsidėstymas bus palankus jo intelektualiam potencialui didinti, kai savivaldybės administracijoje bus matomas aukštas pasiruošimo besiskverbiančioms informacinėms komunikacinėms technologijoms lygis ir vyraus biurokratinių procedūrų neapsunkintas vidaus administravimas.*
- Naudą kuriantiems rezultatams siekti palankios prielaidos susiformuos *užtikrinus darnų miesto vystymąsi ir aukštą gyvenimo kokybės lygį.*
- Dėl disertacijoje taikomo miesto inteligentiškumo vystymo teorinio modelio sprendimų priėmimo dedamąją atspindinčių prielaidų grupės specifiškumo vertinant inteligentiškumo vystymo prielaidas didžiausias dėmesys skirtinas kitas tris dedamąsias atspindinčių prielaidų egzistavimui: išorinio miesto vystymosi konteksto supratimui, miesto potencialo panaudojimo ir vystymo mechanizmų turėjimui ir inteligentiškumą įgalinančiai infrastruktūrai. *Palankių prielaidų šiose srityse egzistavimas yra būtinas inteligentiškumo funkcijai mieste įgalinti ir yra miesto tapimo inteligentišku sąlyga.*

7. Nors miesto inteligentiškumo vystymo prielaidos gali būti tiriamos kiekybiniais tyrimo metodais, šios kategorijos kompleksiskumas lemia, kad jo vystymo prielaidų tyrimo metodologija prioritetiškai turėtų būti grindžiama kokybiniais tyrimo metodais, leidžiančiais ne tik pamatyti inteligentiškos veiklos rezultatą, bet ir suprasti sprendimų priėmimo kontekstą.

- Miesto inteligentiškumo vystymo prielaidų raiškai tirti siūloma parametru sistema apima 16 kriterijų (teorinių miesto inteligentiškumo vystymo prielaidų) ir 93 juos atspindinčius indikatorius (miesto inteligentiškumo vystymo prielaidas nusakančius aspektus). Miesto inteligentiškumo vystymo prielaidų raiškai pagal siūlomą parametru sistemą tirti yra būtina naudoti ne tik kiekybinius tyrimo metodus, parodančius inteligentiškos veiklos rezultatą, bet ir kokybinius tyrimo metodus, atskleidžiančius, kaip iki minimo rezultato buvo prieita.
- Disertacijoje siūloma metodologija nesiekia nustatyti konkrečių koncepcijų pasireiškimo inteligentiškame mieste, kadangi jos yra platesnės nei iš jų išplaukiančios inteligentiškam miestui svarbios charakteristikos. Metodologija taip pat nėra skirta miesto darnumui ir gyvenimo kokybei vertinti, kadangi šie tyrimai turi būti ilgalaikiai ir išsamūs; todėl siūlomi parametrai leidžia spręsti tik apie prielaidų darnumui ir gyvenimo kokybei siekti egzistavimą, o paties fakto nevertina.

8. Empirinis inteligentiškumo vystymo prielaidų raiškos atvejų Kauno miesto ir Druskininkų savivaldybėse tyrimas atskleidė, kad konkrečiame mieste egzistuoja tik jam būdingas palankių ir nepalankių inteligentiškumo vystymo prielaidų ir jų pasireiškimo intensyvumo derinys.

- Kauno miesto savivaldybėje palankiausios prielaidos inteligentiškumui vystyti matomos per įgalinančią infrastruktūrą ir siekiant naudą kuriančių rezultatų. Nors miestas turi didelį intelektinį potencialą, jis nėra išnaudojamas; inteligentiškumo funkcijai įgalinti Kauno mieste trukdo vidinės problemos bei su išorinės aplinkos stebėjimu susijusių gebėjimų trūkumas. Pagal disertacijoje taikomo modelio logiką, Kauno miesto savivaldybėje labiau koncentruojamasi į įgalinančios infrastruktūros, naudą kuriančių rezultatų ir iš dalies į produktyvių žinių kūrimo dedamąsias, todėl su tam tikromis išlygomis *Kauno miestas panašesnis į žinių nei inteligentišką miestą.*
- Druskininkų savivaldybėje nesama intelektiniam potencialui didinti palankaus erdvinio išsidėstymo, tačiau matomos pakankamos prielaidos inteligentiškumui per išorinio konteksto supratimą vystyti, o aiškiai išreikštas savivaldybės vystymo strategiškumas ir verslo požiūris į veiklos vykdymą sukuria pakankamas prielaidas vidiniam

kontekstui pažinti. Remiantis disertacijoje taikomo modelio logika, Druskininkų savivaldybėje yra užtektinai prielaidų, kad galėtų veikti inteligentiškumo funkcija, produktyvių žinių kūrimas ir tam tikri įgalinančios infrastruktūros elementai. Kadangi būtent šias tris dedamąsias atspindinčių prielaidų egzistavimas yra sąlyga miestą vadinti inteligentišku, *Druskininkų savivaldybė su tam tikromis išlygomis galėtų būti laikoma inteligentiška.*

REFERENCES / LITERATŪRA

1. Anttiroiko, A. V., Valkama, P., and Bailey, S. J. (2014). Smart Cities in the New Service Economy: Building Platforms for Smart Services. *AI and Society*, 29(3), 323–334. doi:10.1007/s00146-013-0464-0
2. Bose, R. (2008). Competitive Intelligence Process and Tools for Intelligence Analysis. *Industrial Management and Data Systems*. doi:10.1108/02635570810868362
3. Bruhns, H. (1997). Intelligence about Our Environment. In P. Droege (Ed.), *Intelligent Environments Spatial Aspects of the Information Revolution* (pp. 260–294). Amsterdam: Elsevier B.V. doi:10.1016/B978-044482332-8/50019-6
4. Bui, T. X., Sankaran, S., and Sebastian, I. M. (2003). A Framework for Measuring National E-Readiness. *International Journal of Electronic Business*. doi:10.1504/IJEB.2003.002162
5. Calof, J. L., and Wright, S. (2008). Competitive Intelligence: A Practitioner, Academic and Inter-Disciplinary Perspective. *European Journal of Marketing*, 42(7/8), 717–730. doi:10.1108/03090560810877114
6. Caragliu, A., Del Bo, C., and Nijkamp, P. (2011). Smart Cities in Europe. *Journal of Urban Technology*, 18(2), 65–82. doi:10.1080/10630732.2011.601117
7. Carrillo, F. J. (2004). Capital Cities: A Taxonomy of Capital Accounts for Knowledge Cities. *Journal of Knowledge Management*, 8(5), 28–46. doi:10.1108/13673270410558738
8. Castells, M. (2008). The New Public Sphere: Global Civil Society, Communication Networks, and Global Governance. *The ANNALS of the American Academy of Political and Social Science*, 616(1), 78–93. doi:10.1177/0002716207311877
9. De Villiers, J. C. (2009). Success Factors and the City-To-City Partnership Management Process - from Strategy to Alliance Capability. *Habitat International*, 33(2), 149–156. doi:10.1016/j.habitatint.2008.10.018
10. Deakin, M. (2012). Intelligent Cities as Smart Providers: Cops as Organizations for Developing Integrated Models of Egovernment Services. *Innovation - The European Journal of Social Science Research*, 25(2), 115–135. doi:10.1080/13511610.2012.660324
11. Diefenbach, T. (2009). New Public Management in Public Sector Organizations: The Dark Sides of Managerialistic "Enlightenment." *Public Administration*, 87(4), 892–909. doi:10.1111/j.1467-9299.2009.01766.x
12. Doukas, C., Metsis, V., Becker, E., Le, Z., Makedon, F., and Maglogiannis, I. (2011). Digital Cities of the Future: Extending @Home Assistive Technologies for the Elderly and the Disabled. *Telematics and Informatics*, 28(3), 176–190. doi:10.1016/j.tele.2010.08.001
13. Ergazakis, K., Metaxiotis, K., and Psarras, J. (2004). Towards Knowledge Cities: Conceptual Analysis and Success Stories. *Journal of Knowledge Management*, 8(5), 5–15. doi:10.1108/13673270410558747
14. Fachinelli, A. C., Carrillo, F. J., and D'Arísbo, A. (2014). Capital System, Creative Economy and Knowledge City Transformation: Insights from Bento Gonçalves, Brazil. *Expert Systems with Applications*, 41(12), 5614–5624. doi:10.1016/j.eswa.2014.02.012

15. Feldman, M. S., Khademan, A. M., Ingram, H., and Schneider, A. S. (2006). Ways of Knowing and Inclusive Management Practices. *Public Administration Review*. doi:10.1111/j.1540-6210.2006.00669.x
16. Foord, J. (2013). The New Boomtown? Creative City to Tech City in East London. *Cities*, 33, 51–60. doi:10.1016/j.cities.2012.08.009
17. Garcia, B. C. (2007). Working and Learning in a Knowledge City: A Multilevel Development Framework for Knowledge Workers. *Journal of Knowledge Management*, 11(5), 18–30. doi:10.1108/13673270710819771
18. Glasmeier, A., and Christopherson, S. (2015). Thinking about Smart Cities. *Cambridge Journal of Regions, Economy and Society*, 8(1), 3–12. doi:10.1093/cjres/rsu034
19. Gruen, A. (2013). SMART Cities: The Need for Spatial Intelligence. *Geo-Spatial Information Science*, 16(1), 3–6. doi:10.1080/10095020.2013.772802
20. Hamilton, R., and Jordan, L. (2010). Learning cities: The United Kingdom Experience. In *International Conference "Heritage, Regional Development and Social Cohesion"* (pp. 1–12). Östersund, Sweden. Retrieved from <http://eprints.gla.ac.uk/53980/>
21. Herring, J. P. (1988). Building a Business Intelligence System. *Journal of Business Strategy*, 9(3), 4–9. doi:<http://www.emeraldinsight.com/doi/abs/10.1108/eb039219>
22. Hollands, R. G. (2008). Will the Real Smart City Please Stand Up? *City*, 12(3), 303–320. doi:10.1080/13604810802479126
23. Huggins, R. (2010). Regional Competitive Intelligence: Benchmarking and Policy-Making. *Regional Studies*, 44(5), 639–658. doi:10.1080/00343400802331312
24. Ishida, T. (2005). Activities and Technologies in Digital City Kyoto. In *Lecture Notes in Computer Science* (Vol. 3081, pp. 166–187). doi:10.1007/11407546_8
25. Yigitcanlar, T. (2008). Urban Management Revolution: Intelligent Management Systems for Ubiquitous Cities. In *The International Symposium on Land, Transport and Marine Technology* (pp. 5–6). Seoul. Retrieved from <http://eprints.qut.edu.au/26212/1/c26212.pdf>
26. Yigitcanlar, T. (2014). Position Paper: Benchmarking the Performance of Global and Emerging Knowledge Cities. *Expert Systems with Applications*, 41(12), 5549–5559. doi:10.1016/j.eswa.2014.03.032
27. Yigitcanlar, T., Dur, F., and Dizdaroglu, D. (2015). Towards Prosperous Sustainable Cities: A Multiscalar Urban Sustainability Assessment Approach. *Habitat International*, pp. 36–46. Elsevier Ltd. doi:10.1016/j.habitatint.2014.06.033
28. Jacobson, C., and Choi, S. O. (2008). Success Factors: Public Works and Public-Private Partnerships. *International Journal of Public Sector Management*. doi:10.1108/09513550810896514
29. Jepson, E. J., and Edwards, M. M. (2010). How Possible is Sustainable Urban Development? An Analysis of Planners' Perceptions about New Urbanism, Smart Growth and the Ecological City. *Planning Practice and Research*, 25(4), 417–437. doi:10.1080/02697459.2010.511016
30. Jordan, L., Longworth, N., and Osborne, M. (2014). The Rise and Fall and Rise Again of Learning Cities. In G. K. Zarifis and M. N. Gravani (Eds.), *Challenging the "European Area of Lifelong Learning": A Critical Response* (pp. 273–284). Dordrecht, Heidelberg, New York, London. doi:10.1007/978-94-007-7299-1
31. Jucevicius, R. (2011). Sourcing Knowledge for the Cluster or Business System. In *Conference on Intellectual Capital, Knowledge Management and Organisational Learning* (pp. 284–291). Bangkok: Academic publishing Ltd. Retrieved from <http://connection.ebscohost.com/c/articles/69713408/sourcing-knowledge-cluster-business-system>
32. Jucevičius, R. (1999). An intelligent Approach to Management. *Organizacijų Vadyba: Sisteminiai Tyrimai*, 11, 122–134.
33. Kingston, R., Babicki, D., and Ravetz, J. (2005). Urban Regeneration in the Intelligent City. In *Proceedings of the 9th International Conference on Computers in Urban Planning and Urban Management* (pp. 1–17). London. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.148.5587&rep=rep1&type=pdf>

34. Komninos, N. (2002). *Intelligent Cities*. London, New York: Routledge.
35. Komninos, N. (2006a). Intelligent by Design: Technology and Intelligent City Strategies in Saudi Arabia. *Think: Global Issues in Perspective*, 9, 6–13.
36. Komninos, N. (2006b). The Architecture of Intelligent Cities: Integrating Human, Collective and Artificial Intelligence to Enhance Knowledge and Innovation. In *2nd International Conference on Intelligent Environments, Institution of Engineering and Technology* (Vol. 2006, pp. 13–20). Athens, Greece: IEE. doi:10.1049/cp:20060620
37. Komninos, N. (2009). Intelligent Cities: Towards Interactive and Global Innovation Environments. *International Journal of Innovation and Regional Development*, 1(4), 337–355. doi:10.1504/IJIRD.2009.022726
38. Komninos, N. (2011). Intelligent Cities: Variable Geometries of Spatial Intelligence. *Intelligent Buildings International*, 3(3), 172–188. doi:10.1080/17508975.2011.579339
39. Komninos, N., Sefertzi, E., and Tsarhopoulos, P. (2006). Virtual Innovation Environment for The Exploitation of R&D. In *2nd International Conference on Intelligent Environments (IE 06)* (Vol. 2, pp. 95–104). Athens, Greece. doi:10.1049/cp:20060683
40. Laszlo, K. C., and Laszlo, A. (2007). Fostering a Sustainable Learning Society Through Knowledge-Based Development. *Systems Research and Behavioral Science*, 24(5), 493–503. doi:10.1002/sres.850
41. Lombardi, P., Giordano, S., Farouh, H., and Yousef, W. (2012). Modelling the Smart City Performance. *Innovation: The European Journal of Social Science Research*. doi:10.1080/13511610.2012.660325
42. Middleton, C. A., and Bryne, A. (2011). An Exploration of User-Generated Wireless Broadband Infrastructures in Digital Cities. *Telematics and Informatics*, 28(3), 163–175. doi:10.1016/j.tele.2010.08.003
43. Munier, N. (2011). Methodology to Select a Set of Urban Sustainability Indicators to Measure the State of the City, and Performance Assessment. *Ecological Indicators*, 11(5), 1020–1026. doi:10.1016/j.ecolind.2011.01.006
44. Naidoo, D. E., and Klopper, R. (2005). A Framework of Factors for Determining e-Readiness in Emerging Societies. *Alternation*, 12(2), 132–158.
45. Nam, T., and Pardo, T. A. (2011). Conceptualizing Smart City with Dimensions of Technology, People, and Institutions. In *Proceedings of the 12th Annual International Conference on Digital Government Research* (pp. 282–291). doi:10.1145/2037556.2037602
46. O'Connor, J., and Shaw, K. (2014). What Next for the Creative City? *City, Culture and Society*, 5, 165–170. doi:10.1016/j.ccs.2014.05.010
47. Osborne, M., Kearns, P., and Yang, J. (2013). Learning Cities: Developing Inclusive, Prosperous and Sustainable Urban Communities. *International Review of Education*, 59(4), 409–423. doi:10.1007/s11159-013-9384-y
48. Osborne, S. P. (2006). The New Public Governance? *Public Management Review*, 8(3), 377–387. doi:10.1080/14719030600853022
49. Ovalle, M. D. R. G., Márquez, J. A. A., and Salomón, S. D. M. (2004). A Compilation of Resources on Knowledge Cities and Knowledge-Based Development. *Journal of Knowledge Management*, 8(5), 107–127. doi:10.1108/13673270410558819
50. Passerini, K., and Wu, D. (2008). The New Dimensions of Collaboration: Mega and Intelligent Communities, ICT and Wellbeing. *Journal of Knowledge Management*. doi:10.1108/13673270810902957
51. Prado-Lorenzo, J. M., García-Sánchez, I. M., Cuadrado-Ballesteros, B., García-Sánchez, I. M., and Cuadrado-Ballesteros, B. (2012). Sustainable Cities: Do Political Factors Determine the Quality of Life? In *Journal of Cleaner Production* (Vol. 21, pp. 34–44). Elsevier Ltd. doi:10.1016/j.jclepro.2011.08.021
52. Rai, P. T. (2012). Townships for Sustainable Cities. *Procedia - Social and Behavioral Sciences*. doi:10.1016/j.sbspro.2012.03.307
53. Reghenzani-Kearns, D., and Kearns, P. (2012). Lifelong Learning in German Learning Cities/Regions. *Australian Journal of Adult Learning*, 52(2), 336–367.

54. Rodrigues, K., and Tomé, E. (2011). Knowledge Cities: A Portuguese Case. In T. Geoff and M. Clemente (Eds.), *Proceedings of the European Conference on Intellectual Capital* (pp. 350–358). Cyprus. Retrieved from <http://academic-conferences.org/ecic/ecic2011/ecic11-home.htm>
55. Santinha, G., and De Castro, E. A. (2010). Creating More Intelligent Cities: The Role of ICT in Promoting Territorial Governance. *Journal of Urban Technology*, 17(2), 77–98. doi:10.1080/10630732.2010.515088
56. Sawka, K. A. (1996). Demystifying Business Intelligence. *Management Review*, October. Retrieved from <http://search.proquest.com/openview/fa86765083eeace4ee38f6ea1f17571e1?pq-origsite=gscholar>
57. Seo, J. K. (2009). Balanced National Development Strategies: The Construction of Innovation Cities in Korea. *Land Use Policy*, 26(3), 649–661. doi:10.1016/j.landusepol.2008.08.014
58. Shearmur, R. (2012). Are Cities the Font of Innovation? A Critical Review of the Literature on Cities and Innovation. *Cities*, 29(SUPPL.2), S9–S18. doi:10.1016/j.cities.2012.06.008
59. Shkabatur, J. (2011). Cities @ Crossroads. *Brooklyn Law Review*, 76(4), 1413–1486.
60. Sørensen, E., and Torfing, J. (2009). Making Governance Networks Effective and Democratic Through Metagovernance. *Public Administration*, 87(2), 234–258. doi:10.1111/j.1467-9299.2009.01753.x
61. Thomas, H. (2007). An Analysis of the Environment and Competitive Dynamics of Management Education. *Journal of Management Development*. doi:10.1108/02621710710720040
62. Turcu, C. (2012). Re-thinking Sustainability Indicators: Local Perspectives of Urban Sustainability. *Journal of Environmental Planning and Management*, 56(5), 695–719. doi:10.1080/09640568.2012.698984
63. Veenhoven, R. (2013). The Four Qualities of Life Ordering Concepts and Measures of the Good Life. In A. Delle Fave (Ed.), *The Exploration of Happiness* (pp. 195–226). Dordrecht: Springer Netherlands. doi:10.1007/978-94-007-5702-8
64. Walker, R. M., Andrews, R., Boyne, G. A., Meier, K. J., and O’Toole, L. J. (2010). Wakeup Call: Strategic Management, Network Alarms, and Performance. *Public Administration Review*, 70(5), 731–741. doi:10.1111/j.1540-6210.2010.02201.x

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