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## Article

# Fiscal capacities of large cities in Croatia: Financial support for smart cities

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# Fiscal Capacities of Large Cities in Croatia – Financial Support for Smart Cities

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## Abstract

In a dynamic market, the city has become a main source of competitiveness, along with financial and economic benefits. Due to the processes of digitalization, a new concept has been developed, namely smart cities. This concept delivers economic and financial potential, not only to cities, but also to urban and local economic development. Therefore, to ensure the establishment of this concept, local government units, i.e., cities, need to have enough financial resources. In addition, the fiscal capacity of their local budgets should be sufficient. The objective of this paper is to evaluate the fiscal capacity of large cities in Croatia over the 2016-2018 period, as well as to present the financial support through funding schemes for the establishment of smart cities. After calculating the level of fiscal capacity of large cities, the analysis revealed interesting results. Only four large cities (Split, Rijeka, Zadar and Pula) achieved positive fiscal capacity in the observed period. This provides evidence of fiscal performance and fiscal capacity for the establishment of smart cities. This concept will enhance the quality of life, stimulate economic growth, sustain local government budgets and create new value for both investors and the local population.

**Keywords:** local government, smart cities, fiscal capacity, local economic development

## Introduction

Cities around the world nowadays face many challenges in such areas as urban sustainable development, education, energy, environment, safety and public service among others. These challenges have a strong impact on issues of urban quality, including economic, financial, cultural, social and environmental conditions. As a result, the concept of smart cities has grown over the last 20 years. This concept has become an important determinant in urban development planning as a strategic means for solving cities' problems. To improve the quality of life in cities, to reduce the operating costs within budgets and to achieve the goals of sustainable development, all largely depend on the fiscal capacity of cities, in addition to advanced technologies. Therefore, local government is a very

important determinant in creating public policy that is in line with citizens' interests. The government of the Republic of Croatia has three levels of government: the central state government, regional government (consisting of counties and municipalities) and local government. For the establishment of a smart city concept, cities are vital as units of local government. This paper contributes to the existing literature on the smart city concept and the importance of local governments' fiscal capacities by examining the implementation of the smart city concept in Croatia.

The objective of this paper is to evaluate the fiscal capacity of large cities in Croatia over the 2016-2018 period as well as to present the funding schemes for smart cities. The paper is structured as follows: After a brief introduction, the literature review regarding the smart city concept is presented. In the third section, the analysis of funding schemes of smart cities is described. Section four presents the data and methodology for measurement of fiscal capacity, while section five presents the results. The last section includes conclusions and limitations, as well as providing recommendations for future research.

## Literature Review

In recent years, the smart city concept has attracted significant interest in scholarly literature. Therefore, the literature offers a broad scope of authors who have discussed the concept of smart cities (Mahizhnan, 1999; Giffinger et al., 2007; Caragliu, Del Bo & Nijkamp, 2011; Allwinkle & Cruickshank, 2011; Cretu, 2012; Angelidou, 2014; Söderström, Paasche & Klauser, 2014; Ferrara, 2015; Albino, Berardi & Dangelico, 2015; Marek, Campbell & Bui, 2017; Stanković et al., 2017; Sikora-Fernandez, 2018; Borsekova et al., 2018; Siegfried Ruhlandt, 2018; Maček, Ovin & Starc-Peceny, 2019).

In Table 1 the set of various definitions of the concept of a smart city are presented.

According to the definitions above, we can conclude that the concept of a smart city has a multidimensional approach, covering areas such as people, infrastructure, information and communications technology, government, mobility and others. A very important determinant is the innovation

**Table 1.** Definitions of the concept of a smart city

Definitions	References
A smart city that actively embraces new technologies to be a more open society where technology makes it easier for people to have their say, gain access to services and stay in touch with what is happening around them, in a simple and inexpensive manner.	Partridge (2004)
A smart city is a city that performs well in a forward-thinking way in six characteristics, built on 'smart' combination of endowments and activities of self-decisive, independent and aware citizens.	Griffinger et al. (2007)
A smart city is when investments in human and social capital and traditional and modern communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.	Caragliu, Del Bo & Nijkamp (2011)
A smart city is an ICT-enabled public sector innovation undertaken in urban settings. It supports long-standing practices for improving operational and managerial efficiency and quality of life by building on advances in ICTs and infrastructures.	Nam & Pardo (2011)
Smart cities should do everything related to governance and economy by using novel paradigms and networks of sensors, smart devices, real-time data and ICT integration in every aspect of human life.	Cretu (2012)
A smart city is a city that gives inspiration, shares culture, knowledge and life, a city that motivates its inhabitants to create and flourish in their own lives.	Rios (2012)
Smart cities are supposed to be supported by appropriate and trustworthy governance structures and by open-minded, creative people who through a joint effort are able to increase local productivity.	Kourtit & Nijkamp (2012)
Smart cities represent a conceptual urban development model based on the utilization of human, collective and technological capital for the enhancement of the development and prosperity in urban agglomerations.	Angelidou (2014)
Smart cities are, on the one hand, increasingly composed of and monitored by pervasive and ubiquitous computing and, on the other, their economy and governance is driven by innovation, creativity and entrepreneurship, enacted by smart people.	Kitchin (2014)
A smart city is a city that efficiently mobilizes and uses available resources (social, cultural, capital, financial capital, natural resources, information and technology) for efficiently improving the quality of life of its inhabitants, commuting workers and students and other people.	Bosch et al. (2017)

capacity in the local public sector, especially in cities. The barriers are inherent and external. According to OECD (2019, p. 23) inherent barriers include "political leaders who do not publicly promote innovation; lack of workplace incentives for employees to think creatively and take risks; fiscal austerity and limited budgets for experimental programmes and policies; fragmented approaches to complex challenges due to overly specialised workplace silos; red tape, inertia and a risk-averse culture in the public sector; inability to synthesise and process data holistically across administrative departments; limited institutional resources for citizens' engagement throughout the policy cycle; a culture that prioritises the expertise of professionals to the exclusion of other sources of insight, including research and residents themselves; challenges with procuring innovative solutions; fear of experimentation in the local public sector due to political and social scrutiny, and failure and lack of mechanisms and structures for facilitating learning and good practice exchange across the local public administration".

On the other hand, external barriers involve "lack of trust in the public sector and its leadership and apprehension to use public money to experiment; underfunding of core capacities within local government, including innovation capacities like data analysis, citizen engagement and project management; shortages in knowledge and skills in the wider workforce market; information asymmetries between private sector suppliers of new technology and municipalities; public resistance to change, in particular to the ways and types of public services that are delivered; lack of technological solutions for problems at hand; and national and regional government restrictions and mandates" (OECD, 2019, p. 24).

Therefore, a smart city investment is able to increase innovation and to make a city more attractive to people and businesses. Despite the growing number of scholars dealing with the smart city concept, the literature lacks a detailed analysis of financing funding schemes for smart cities as well as for the sustainability of local development.

### Analysis of Financing Funding Schemes of Smart Cities

The task of every regional and local economic development is to transform a city into a smart city due to dynamic trends. This requires a major effort from its political representatives, administrators, inhabitants, entrepreneurs and communities. According to Kumar and Dahiya (2016), there is a strong indication that the population size of a city matters, especially in terms of its urban economy and smart city development. Therefore, there are smart city dimensions and indicators (Table 2).

**Table 2.** Smart city dimensions and indicators

Smart economy	Innovative spirit Entrepreneurship Economic image and trademarks/city image Productivity Flexibility of labor market International integration
Smart people	Level of qualification/education Lifelong learning Ethnic diversity Open-mindedness
Smart governance	Participation in public life/political awareness Public and social services Transparent governance/ Efficient and transparent administration
Smart mobility	Local accessibility/local transport system International accessibility Availability of ICT infrastructure Sustainability of transport system
Smart environment	Environmental conditions Air quality (low pollution) Ecological awareness Sustainable resource management
Smart living	Cultural facilities Health conditions Individual security Housing quality Education facilities Tourism attractiveness Economic welfare/social cohesion

Source: Giffinger et al. 2007, p. 12.

In line with traditional regional and neoclassical theories of urban growth, these six main dimensions and indicators have served as background for many research studies. Using Croatia as a sample, this was the basis for research conducted by Jurlina Alibegović, Kordej-De Villa and Šagovac (2018). In their research, they identify the most important indicators for measuring the economic competitiveness of 25 large Croatian cities.

Besides the difficulties involved in implementing the concept of a smart city, the local government units also have the problem of funding. Therefore, overcoming the lack of public financial capacity requires efficient business models. Moreover, the financial system operates through two alternative financing channels, i.e., direct financing and indirect or intermediated financing. The first channel refers directly to savers by selling them securities for cash, and the second one refers to raising capital through financial intermediaries, such as commercial banks, insurance companies' pension funds and venture capital funds.

The smart city concept imposes a dynamic organizational model where five major types of stakeholders are essential (European Commission, 2013, p. 17):

- 1) "Promoter bodies – national authorities, administrative bodies, government agencies, large private investors, etc.

- 2) Achieving bodies – in charge of physically building infrastructures and smart services where entities can be businesses, construction companies, etc.
- 3) Financial institutions – task is to aggregate flows of investment by private capital, through public-private partnership mechanisms. These entities can be banks, foundations, capital management bodies, large private investors, etc.
- 4) Certification authorities – evaluate the effectiveness of smart initiatives and protect sensitive data and investors' information. These entities can be scientific institutes, consortium companies, financial certification companies, etc. and
- 5) Guarantor bodies – provide coverage of private investments made through public-private partnership mechanisms. These entities can be insurance agencies, national banks, international banks, capital management bodies, foundations, managers of programs and European investment funds, etc."

Due to the ongoing challenges related to the nature of financing, there is a need to diversify the financial sources and create innovative business models to find various resources for long-term financial incentives to facilitate their growth and prosperity. According to the European Commission (2013, p. 18), new funding mechanisms include:

- 1) "Models for early demonstration and deployment of innovative solutions using a grant, guarantee and loan blending mechanism
- 2) Project financing
- 3) Spread shareholding
- 4) Smart bonds
- 5) Crowd finance and
- 6) Energy performance contracting for energy efficiency"

For the smart city concept, the most interesting model of financing is smart bonds, where many small private investors are involved in contributing to the creation of infrastructure. Moreover, they produce an economic return for all the stakeholders, including the investors themselves. Therefore, for the establishment of a smart city concept to be viable, an efficient financial system is key. Bakici, Almirall and Wareham (2013) found that in Barcelona, financial development to attract new firms and start-ups was inadequate. To satisfy infrastructure needs and to make cities more conducive to innovation and growth, the smart city concept should incorporate both a capacity function and efficiency function. The efficiency function is present in urban development strategy reacting to challenges faced by cities. According to the EIB (2018, p. 9), in Central, Eastern and Southeastern European cities, "urban productivity can be boosted by increasing the quality of human capital, business environment quality, entrepreneurship, quality of institutions, market access and access to capital as well as research and innovation".

## Data and Methodology

In order to investigate the fiscal capacity of large cities in Croatia over the 2016-2018 period as a budget basis for the establishment of smart cities, all the data were collected from publicly available local budgets. The data from the local budgets are in line with the European system of National and Regional Accounts 2010. For the purpose of this analysis, we used data for each large city and for each year from local government unit budgets. In Croatia there are a total of 127 cities, of which 25 have the status of a large city; 17 cities (including the City of Zagreb) have more than 35,000 inhabitants; and eight cities are county capitals with fewer than 35,000 inhabitants. The average population of the 25 large cities is 84,000.

Since the measurement of fiscal capacity of local government units is a broad topic, there is no consensus in the scientific literature regarding such measurement. This is an important factor in determining the allocation of intergovernmental grants to equalize the amount of resources available to each of the local government units. Hence, the fiscal capacity of a local government units cannot be easily quantified. It is influenced by economic structure and by availability of taxable resources, or tax bases. Therefore, it presents the cost of delivering a standardized basket of goods and services within a specific local government unit. To calculate the fiscal capacity, we followed the methodological approach of Akin (1973), Chitiga-Mabugu and Monkam (2013) and Bajo et al. (2015). Following the proposed methodological approach, the Representative Revenue System (RRS) and the Representative Expenditure System (RES) have been applied in assessing the overall level of fiscal capacity of specific local government units, i.e. cities.

The first approach (RRS) estimates the revenue capacity, which measures the relative ability of a sub-national government to raise revenue. Therefore, it is necessary to define the revenue sources of local government units.

$$RRS = R_{bo} + R_{nmp} \quad (1)$$

Where:

$R_{bo}$  (total revenues from business operations) consists of tax revenues, grants from other general government units (capital and current grants), income from property, as well as revenues from fees, penalties, sales of goods and services and donations.

$R_{nmp}$  refers to revenues from non-material property.

On the other side, RES measures the expenditure side of the total local government budget. It estimates the amount of expenditures that must be spent by local governments in the

provision of a standard level of service for each representative bundle of local spending.

$$RES = E_{bo} + E_{nmp} \quad (2)$$

Where:

$E_{bo}$  (total expenditures from business operations) consists of employee, material and financial expenditures, along with subsidies, grants to foreign governments, grants to households, and other expenditures.

$E_{nmp}$  measures total expenditures for supply of non-material property.

In order to calculate fiscal capacity (FC), which gives a sense of local governments' ability to fund its expenditure needs through its own revenues, the following equation is applied:

$$FC = RRS - RES \quad (3)$$

Following this methodological approach, fiscal capacity is the difference between total revenues and expenditures of economic activity in certain local government units, i.e. cities. In addition, fiscal capacity represents the ability of governmental units to raise tax revenues for financing public services, given the tax sources available. A local government unit with low fiscal capacity has a relatively small revenue capacity, a relatively high need for expenditures, or a combination of both.

### Results of Measuring the Fiscal Capacity of Large Croatian Cities

As aforementioned, the fiscal capacity presents the cost of delivering a standardized basket of goods and services within specific local government units, i.e. cities.

In Table 3, the results of measuring the fiscal capacity of large cities are presented.

**Table 3.** Fiscal capacity of large cities over the 2016-2018 period

	2016		2017		2018	
	Fiscal position	%	Fiscal position	%	Fiscal position	%
Zagreb	-253202223.00	103.9	-377936168.00	105.8	-288677832.00	104.0
Split	41047577.00	94.5	128918784.00	83.7	34087867.00	95.9
Rijeka	41858364.00	93.8	16226916.00	97.6	21916874.00	97.0
Osijek	30904898.00	91.3	20492752.00	94.7	-5430028.00	101.3
Zadar	11067874.00	97.0	58181298.00	83.9	43002101.00	88.4
Velika Gorica	14834161.00	94.0	-21774877.00	106.7	-31585158.00	111.9
Slavonski Brod	-364993.00	100.3	1050401.00	99.3	26857655.00	85.2
Pula	21827220.00	92.9	16561788.00	95.3	2704031.00	99.1
Karlovac	9605358.00	95.9	-3275825.00	101.6	3546247.00	98.3
Sisak	-20708836.00	112.1	-31401386.00	117.7	6367384.00	96.6
Varaždin	22562124.00	90.1	24475794.00	88.9	-8650701.00	103.6
Šibenik	-542314.00	100.3	-186444.00	100.1	15167805.00	92.1
Dubrovnik	-12866177.00	103.3	33582161.00	91.6	-1027975.00	100.2
Bjelovar	3557465.00	96.9	378313.00	99.7	-1631955.00	101.3
Kaštela	18505281.00	84.7	-7930357.00	107.6	18941401.00	86.1
Samobor	-20597208.00	110.1	-511111.00	100.3	5981058.00	96.9
Vinkovci	3883402.00	96.7	1663373.00	98.1	-7042091.00	106.4
Koprivnica	2473472.00	97.9	-8612928.00	107.4	83691.00	99.9
Vukovar	6880921.00	95.5	23591748.00	84.7	-6790414.00	104.0
Čakovec	-14887146.00	114.0	9078980.00	92.0	3265406.00	97.1
Požega	-18539498.00	128.4	-14139229.00	121.2	-2491944.00	102.7
Virovitica	3837157.00	94.5	-5936848.00	109.3	-15144900.00	111.4
Gospić	-5085780.00	109.3	-291064.00	100.5	1364667.00	97.8
Krapina	2599470.00	92.8	-2992706.00	108.9	1583004.00	95.8
Pazin	1297463.00	97.4	-273661.00	100.5	1457844.00	97.4

Source: Authors' calculation.



Based on the results, we can conclude that the fiscal capacity of large Croatian cities varies over the years analyzed. The cities that had a negative fiscal capacity over the 2016-2018 period were Zagreb and Požega, while cities with positive values over the years analyzed were Split, Rijeka, Zadar and Pula. This means that, in those years, the cities had enough revenues to cover all their expenditures and to finance their own capital and current expenditures in order to stimulate the local economic development of the cities. It is worth noting that these cities are based in the coastal area of Croatia, which can be explained by higher investments in the tourism sector. The responsibilities covered by cities, according to the Act on Local and Regional Self-Government Units, include the organization of settlements and housing, spatial and urban planning, utility services, child care, social welfare, primary health protection, primary education, culture, consumer protection, traffic in the local area, and maintenance of public roads, as well as other tasks in accordance with special laws. Although the cities have responsibilities in public functions, they are trying to collect more revenues in order to establish local economic development and to implement the smart city concept. Moreover, this will lead to the effective and efficient local development of public functions within the local public sector. Jurlina Alibegović, Kordej-De Villa and Šagovac (2018) identified the most important indicators for measuring the economic competitiveness of 25 large Croatian cities by means of six dimensions of the smart city concept and then ranked the cities according to the smart urban development index. The results revealed that only eleven large Croatian cities can be considered smart cities for 2018: Pazin, Dubrovnik, Varaždin, Pula, Rijeka, Zadar, Čakovec, Split, Koprivnica, Samobor and Karlovac. Therefore, our research contributed to the previous research by identifying that large cities like Split, Rijeka, Zadar and Pula also have a fiscal capacity for local economic development.

## Conclusion

Nowadays, good quality local and regional government policies are a precondition for providing efficient and effective public functions and services to citizens. The bearers of responsibility for local development activities are cities. In addition, the population and economies of cities have been growing much faster than in less urban areas. Due to their attractiveness and economic structure, cities are faced with difficult challenges. These are social exclusion, fiscal and financial capacity, limited budget funds, migration and environmental quality, among others. One of the possible solutions to these challenges is innovation capacity. Moreover, due to the processes of globalization and digitalization, a new concept has been developed within cities, namely smart cities. This concept offers significant economic and financial potential for all local government units. To ensure sustainability in the future, the main obstacle to be overcome requires finding appropriate financial resources. Therefore, in our paper, we evaluated the fiscal capacity of large Croatian cities over the 2016-2018 period. The results of the measurement revealed that only four large cities (Split, Rijeka, Zadar and Pula) achieved positive fiscal capacity over the observed period. This provides evidence for the necessity of fiscal performance and fiscal capacity within local budgets as a precondition for the establishment of smart cities.

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## Fiskalne zmogljivosti velikih mest na Hrvaškem – finančna podpora za pametna mesta

### Izvelek

Na dinamičnem trgu je mesto postalo glavni vir konkurenčnosti, finančnih in gospodarskih koristi. Zaradi procesa digitalizacije mesta prinašajo nov koncept, imenovan pametna mesta. Ta koncept zagotavlja gospodarski in finančni potencial ne le za mesta sama, ampak tudi za urbani in lokalni gospodarski razvoj. Da bi lahko zagotovile vzpostavitev tega koncepta, morajo imeti lokalne upravne enote, tj. mesta, dovolj finančnih sredstev. Poleg tega mora biti fiskalna zmogljivost njihovih proračunov pozitivna. Cilj tega prispevka je oceniti fiskalno zmogljivost velikih mest na Hrvaškem za obdobje 2016–2018 ter predstaviti finančno podporo za ustanovitev pametnih mest prek shem financiranja. Po izračunu fiskalne zmogljivosti velikih mest je analiza pokazala zanimive rezultate. Samo štiri mesta (Split, Reka, Zadar in Pulj) so v opazovanem obdobju dosegla pozitivno fiskalno zmogljivost. To je dokaz fiskalne uspešnosti in fiskalne zmogljivosti, ki sta potrebni za ustanovitev pametnih mest. Ta koncept bo povečal kakovost življenja, spodbudil gospodarsko rast, vzdrževal proračune lokalnih uprav in ustvarjal novo vrednost tako za vlagatelje kot za lokalno prebivalstvo.

**Ključne besede:** lokalna uprava, pametna mesta, fiskalna zmogljivost, lokalni gospodarski razvoj