Innovation in the public services at the local and regional level

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Innovation in the public services at the local and regional level

Abstract:
Awareness of the importance of innovation in the public sector is increasing. It should create added public value to the citizens and the society. Public sector innovation is a challenge, but it is also increasingly recognized as a solution to growing budgetary pressures. The paper explores the implementation of innovation in public services at the local level in Croatia. Most of the research conducted so far explores the role of the private sector in the implementation of innovation in the public sector. The objective of this paper is to analyse results of a survey that has been conducted on a sample of representatives of local and regional government in Croatia (big cities and counties) and representatives of local action groups (LAGs) and local/regional development agencies (LRDAs) to examine the ability of Croatian local and regional public sector to innovate and identify the barriers that may hinder the process of introduction and implementation of this innovation. It, thus, explores the main barriers for the implementation of innovative activities at the local level from the perspective of different local actors. The results show that three factors that hinder the process of introducing innovation into the Croatian public sector are competence-related obstacles, bureaucratic barriers, and funding difficulties.

Keywords: innovations, public sector, post-transition, local and regional government
JEL classification: H83, H75, O3

Inovacije u javnom sektoru na lokalnoj i regionalnoj razini

Sažetak:
U posljednje vrijeme sve više raste svijest o važnosti inovacija u javnom sektoru. Inovacije u javnom sektoru izvor su dodane vrijednosti građanima i društvu, s jedne se strane prepoznaju kao izazov, a s druge strane kao rješenje za rastuće proračunske pritiske. Dok većina dosad objavljenih radova ispituje ulogu privatnog sektora u provedbi inovacija u javnom sektoru, u ovom se radu istražuje provedba inovacija u javnom sektoru na lokalnoj i regionalnoj razini u Hrvatskoj. Cilj rada je ispitati sposobnost hrvatskog lokalnog i regionalnog javnog sektora za uvođenje i provedbu inovacija te utvrditi prepreke koje mogu ometati taj proces iz perspektive različitih lokalnih aktera. Analiza se temelji na rezultatima anketnog ispitivanja provedenog na uzorku predstavnika lokalne i regionalne samouprave u Hrvatskoj (veliki gradovi i županije), predstavnika lokalnih akcijskih grupa (LAG) i lokalnih/regionalnih razvojnih agencija. Rezultati ukazuju na tri čimbenika koja ometaju proces uvođenja i provedbe inovacija u hrvatskom javnom sektoru: prepreke vezane uz kompetencije, birokratske prepreke te poteškoće vezane uz financiranje procesa uvođenja i provedbe inovacija.

Ključne riječi: inovacije, javni sektor, post-tranzicija, lokalna i regionalna uprava
JEL klasifikacija: H83, H75, O3

1 Introduction

Innovation can contribute to efficiency of the public sector through cost reduction and improved quality of services. Although it is commonly believed that the public sector has far less innovation than the private sector, some authors argue that there are many cases of innovations in the public sector, but that most of them are triggered by a crisis or by one or a small group of employees, and that there is no consistent approach (Eggers and Singh, 2009). Usually, public sector innovation is observed as a response to growing budgetary pressures and new demands of the society (European Commission, 2012). The European Commission has been constantly searching for the ways to improve the delivery of public services across EU member states and candidate countries in the most efficient and transparent way.

The goal of this paper it to explore the main barriers for the implementation of innovative activities at the local level from the perspective of different local actors. The paper is based on the data collected with the use of a survey.

Most of the studies on innovation in the public sector conducted so far focus on public administration (Bugge et al., 2011; European Commission (EU Innobarometer); Hughes et al., 2011; Arundel, 2014). The contribution of this paper is that it explores barriers to public sector innovation for local and regional self-government units, but from the perspective of representatives of local and regional government (big cities and counties), local development agencies and local action groups, which should contribute to networking of local stakeholders in implementing projects relevant for local development. In addition, this paper aims to offer new insights about public sector innovation in post-transitions countries. Thus, the paper focuses on public sector innovation in Croatia. Despite being a small country, Croatia, as a member of the European Union, can use EU funds to carry out public sector innovation projects. However, Croatia is one of the European countries on which the 2008 financial crisis had a very long impact, especially on the state of local finances, which may be a limitation but also an impetus for implementing innovation. In this paper we investigate if there is heterogeneity between local and regional government units and local development agencies and local action groups at the level of innovations and if so, what barriers they face.

The paper is structured as follows: after introductory remarks, section 2 presents literature review on public sector innovations and provides data about expenses for this purpose across Europe. Section 3 describes methodology and data sources. The empirical results are presented in section 4, which is followed by a conclusion in the last section.

2 Innovation in the public sector

In the last half of century, innovation-related research has become increasingly prevalent in literature. However, it is still mostly related to innovative activities of private sector enterprises, while only in recent years has the number of research related to innovation in the public sector increased. In many cases, public sector innovation is viewed through the prism of the private sector (Bugge and Bloch, 2016), but even though the use of technologies and novelties developed by the private sector is an important part of public sector innovation, it is also important that the public sector drives its own innovation process (Koch and Hauknes, 2005). However, many public sectors made only sporadic efforts to stimulate innovations (Eggers and Singh, 2009).

Public sector innovation is a challenge, but it is increasingly being recognized as a solution to growing budgetary pressures (European Commission, 2012). Beside lower resources, political motivation and increased public demand have been the main drivers of the public sector innovations, while rewards for innovators are also, to some extent, contributing to innovations (European Commission, 2012). The interest in innovation in the public sector is growing due to the expected benefits in the form of increased efficiency and provision of better, quicker, and cheaper services to citizens (Koch and Hauknes, 2005, European Commission, 2012). The public sector supports private sector innovation, either through co-financing or through investment in research in areas where there is no private sector interest, due to the high risk and uncertainty in the result (Bason, 2013). Usually, there is a difference in understanding what innovation is - is it politically driven reform or should the term public sector innovations be understood more narrowly (European Commission, 2012). According to Bason (2013: 5) public sector innovation can be defined as "(…) the process of generating new ideas and implementing them to create value for society, covering new or improved processes (…)" and services. OECD/Eurostat (2018: 20) defines innovation as "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)." Innovation can mean the development of new technologies, products and services or the development and change in the management and processes.

Innovation in the public sector has been analysed in Spain (Rangel and Galende, 2010), Australia (Demircioglu and Audretsch, 2017; Arundel and Huber, 2013, Arundel et al., 2016), the UK (Mulgan, 2007), Sweden (Knutsson and Tomasson, 2014), and comparatively in several European countries (European Commission, 2011; Rivera León et al., 2012; Bugge and Bloch, 2016; Abramovsky et al., 2009; Arundel et al., 2015; Vigoda-Gadot et al., 2008). Analysis of innovative activities of the public sector in six countries (Denmark, Finland, Iceland, Norway, Sweden, and the UK) observed by Bugge and Bloch (2016) shows that public sector organizations consider incremental changes as an

important part of innovative activities in the public sector. The same is confirmed by Mulgan and Albury (2003) for the UK. Abramovsky et al. (2009) investigated public financial support for innovative activities in France, Germany, Spain, and the UK and showed that public financial support is positively related to undertaking collaborative innovation, particularly co-operation with universities and public sector research institutions. Knutsson and Tomasson (2014) at the example of innovation in public procurement process in Sweden showed that size of the local authorities is not a limitation for innovation. Vigoda-Gadot et al. (2008) investigated managers' perceptions towards public sector innovation in eight European countries during the 2003-2005 period and showed that there was a positive link among the level of innovation and responsiveness, leadership and vision, and citizens' satisfaction represented by healthcare and social services. Arundel et al. (2015) used factor and cluster analysis to identify different innovation methods used by public sector agencies in Europe in 2010 and concluded that around one third of agencies in Europe had active management support for innovation and development of innovative ideas, 35 percent of them tried to overcome innovation barriers by drawing on external sources for good ideas and 30 percent of them were policy dependent agencies which innovate only as a political response to new laws and regulations and the like.

3 Methodology, data, and results

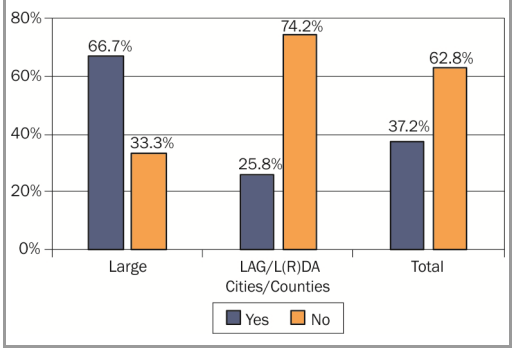
3.1 Sample description

This paper presents an overview of public sector innovation implementation and barriers to public sector innovation at the local and regional government levels in Croatia, as revealed by an online survey carried out from July until September 2019. The study aimed at gathering perceptions of public officials (employed in big cities and counties) and representatives of local and regional development agencies (LRDAs), as well as of local action groups (LAGs), regarding the implementation of public innovations and barriers which may hinder that process. The research is based on the entire population of large Croatian cities, 21 counties, and local and regional development agencies, and local action groups.

Frame 1. LAG is an original and important element of the LEADER approach with the task of creating and implementing local development strategies, making decisions on the allocation of available funds, and management of the funds. One of the important tasks performed by LAG is preparation of a local development strategy and operating the local development plan. Most commonly, LAG stakeholders include representatives of local self-government and public institutions, trade/professional organisations, and unions (agriculturists, small enterprises and other activities), associations (environmental protection, cultural service provision, community development, women, youth etc.), development agencies, etc. LAG area – a rural area with the population between 5,000 and 150,000, including small towns and those with less than 25,000 inhabitants.

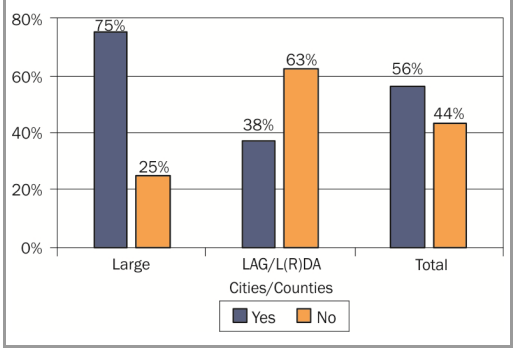
The survey data were analysed using SPSS 19.0 statistical application software. The largest percentage of the respondents were representatives of LAGs and LRDAs (76.6%), followed by representatives of local government units (LGUs) and regional government (counties) (23.4%). More than a third of respondents said that their county/LGU/LAG/LRDA had introduced some innovations during the last three years, though nearly two-thirds (62.8%) said their institution had not done that. Local and regional government units (cities and counties) are more than twice as likely to have introduced some innovations as an LAG or an LRDA. Ten out of 16 respondents (62.5%) whose institution had introduced innovations said that their organization introduced some internal innovations during the last three years. Nine out of 16 respondents (56.3%) whose institution had introduced innovations said that their organization had introduced some innovations in the public sector (a new or significantly improved public service).

Figure 1 **Introduction of innovations in LGU/county/LAG or LRDA in the last three years**



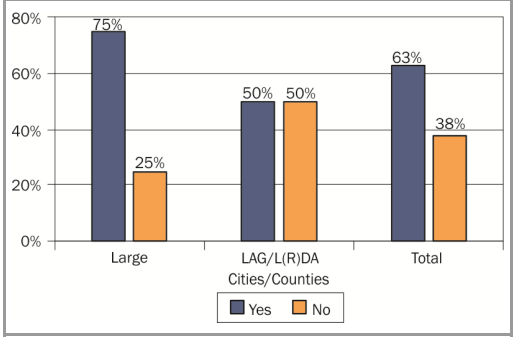
Source: Authors' calculation based on survey results.

Figure 2 **Introduction of internal innovations (a new or significantly improved organizational structure or process) in LGU/county/LAG or LRDA in the last three years**



Source: Authors' calculation based on survey results.

Figure 3 **Introduction of any innovations in the public sector (a new or significantly improved public service) in LGU/county/LAG or LRDA introduced in the last three years**



Source: Authors' calculation based on survey results.

The largest share of respondents who reported that their LGU/county/LAG/LRDA had introduced some innovations (62.5%) indicated that their LGU/ county/LAG received financial support from the European Union to implement innovations in the public sector. Around one third, i.e., 31.3% of them reported that they received financial support from the local government and 43.8% from state authorities (ministries, state agencies). However, according to the majority of respondents, in all three cases, the amount of support received was usually low and insufficient to finance the overall process of introduction and implementation of innovation.

3.2 Barriers to innovation: Data analyses, results, and discussion

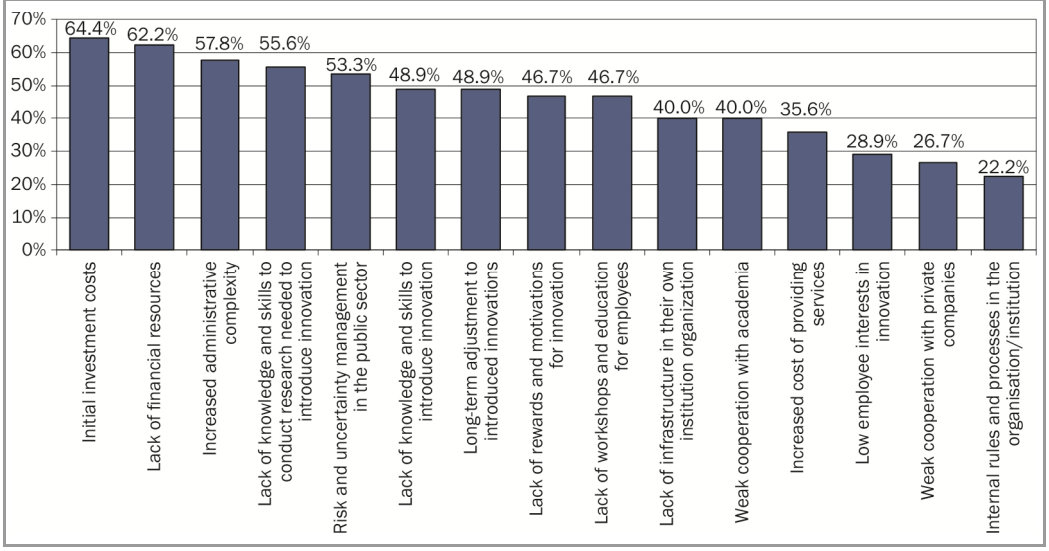
To get a better understanding of the main internal barriers to innovation in the public sector, respondents were asked to assess 15 claims regarding potential barriers on a 5-point Likert scale ranging from "not a barrier" to "an extremely strong barrier". The selection of the barriers to be used in the survey was made after a review of literature, so the considered barriers included:

1. *lack of financial resources;*
2. *internal rules and processes in the organisation/institution;*
3. *lack of knowledge and skills to introduce innovation;*
4. *lack of knowledge and skills to conduct research needed to introduce innovation;*
5. *lack of workshops and education for employees;*
6. *low employee interests in innovation;*
7. *lack of infrastructure in their own institution/organization;*
8. *weak cooperation with private companies;*
9. *weak cooperation with the academia;*

10. *risk and uncertainty management in the public sector;*
11. *lack of rewards and motivations for innovation;*
12. *initial investment costs;*
13. *increased administrative complexity;*
14. *long-term adjustment to introduced innovations;*
15. *increased cost of providing services.*

Methodologies used to perform the analysis were as follows: first, descriptive statistics - percentage frequency analysis to estimate the most relevant barriers to public innovation; second, Chi-squared tests to estimate differences in perception of barriers to innovation according to the type of institution of respondents, and third, factor analysis (principal component analysis) to identify main groups of barriers to innovation. Going into somewhat more detail on internal barriers to public innovation, Figure 4 shows how the variables *initial investment costs, lack of financial resources* and *increased administrative complexity* are emphasized as the three strongest barriers to innovation in the public sector. On the other hand, variables *internal rules and processes in the organisation/institution*, *weak cooperation with private companies* and *low employee interests in innovation* are regarded as being of less importance as barriers to public innovation (no barrier or weak barrier).

Figure 4 **Percentage of the respondents who cite the barrier as strong and extremely strong barrier, n = 45**

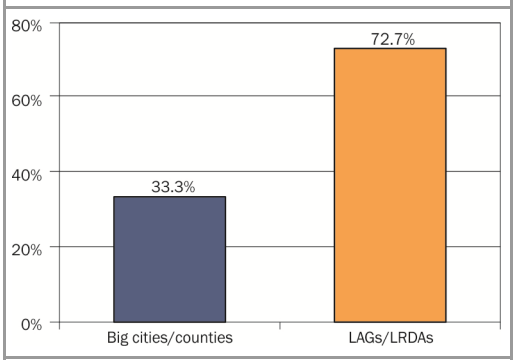


Source: Authors' calculation based on survey results.

It is interesting to analyse whether there are differences in the perception of the importance of given barriers between the respondents coming from big cities and counties (representatives of local and regional self-government) and respondents coming from LAGs and LRDAs. For this purpose, the chi-square test was applied. Statistically significant differences between two groups of respondents were found in the rating of the importance

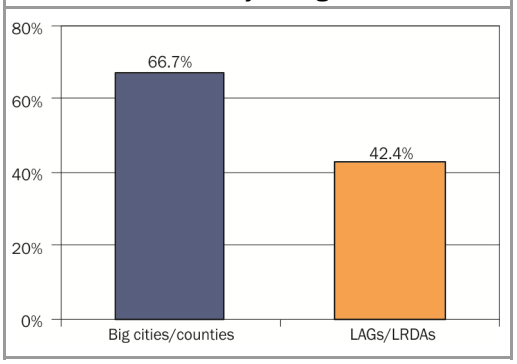
of the five barriers. Those are: *lack of financial resources* (p<0.05), *lack of knowledge and skills to introduce innovation* (p<0.05), *low employee interests in innovation* (p<0.05), *initial investment costs* (p<0.01) and *increased costs of providing services* (p<0.06), (see Figures 5 – 9). The test and details as shown in Table 5 in the Appendix yielded significant similarity or common responses by both groups of respondents for the remaining 10 barriers.

Figure 5 **Lack of financial resources – very strong and extremely strong barrier**



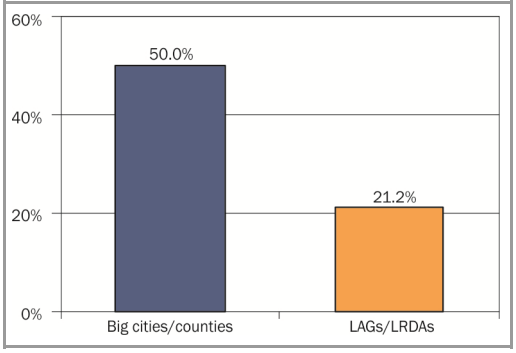
χ^2=7.958
p=0.0469
Source: Authors' calculation based on survey results.

Figure 6 **Lack of knowledge and skills to introduce innovation – very strong and extremely strong barrier**



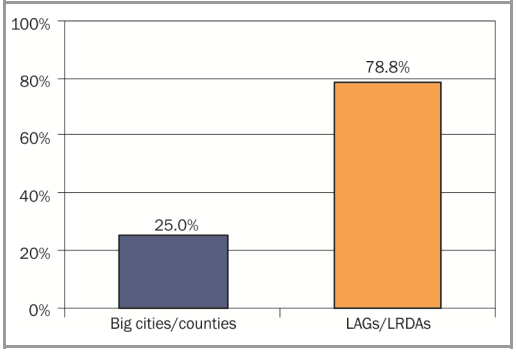
χ^2=11.399
p=0.0224
Source: Authors' calculation based on survey results.

Figure 7 **Low employee interests in innovation – very strong and extremely strong barrier**



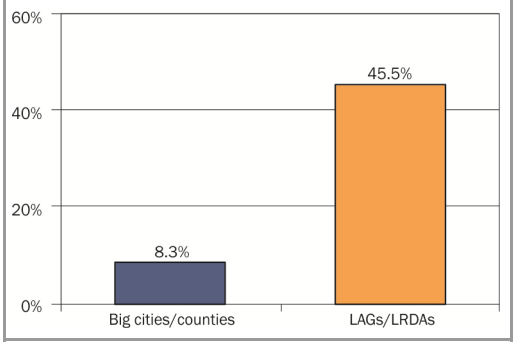
χ^2=12.151
p=0.0163
Source: Authors' calculation based on survey results.

Figure 8 **Initial investment costs – very strong and extremely strong barrier**



χ^2=15.257
p=0.0042
Source: Authors' calculation based on survey results.

Figure 9 **Increased cost of providing services – very strong and extremely strong barrier**



χ^2=7.771
p=0.0510
Source: Authors' calculation based on survey results.

The respondents coming from LAGs and LRDAs most often indicate *lack of financial resources* and *initial investment costs* as very strong or extremely strong barrier to public sector innovations. They also consider *increased cost of providing services* to be a stronger barrier than the respondents coming from LGUs (big cities) and counties. The *lack of financial resources* is a major and extremely important barrier to innovation for as many as 72.7% of LAG respondents. By contrast, only one third (33.3%) of respondents from local and regional self-government units cite this barrier as important and extremely important. As shown in Figure 5, 78.8% of the respondents from LAGs and LRDAs consider *initial investment costs* as a very and extremely strong barrier, while only 25% of respondents coming from big cities and counties perceive the same. Research has shown that shortage of financial resources or budget constraints that make it difficult for public institutions to carry out innovative activities is also a problem in Belgium, France, Lithuania, Romania, and Slovakia (European Commission, 2012). This problem is particularly pronounced in times of a financial crisis.

Increased cost of providing services is rated as a very strong barrier by 45.5% of respondents coming from LAGs versus only 8.3% of respondents coming from LGUs and counties. On the other hand, the *lack of knowledge and skills to introduce innovation* and *low employee interests in innovation* were rated significantly stronger by the respondents coming from big cities and counties. As many as 66.7% of them cited *lack of knowledge and skills to introduce innovation* as a very strong and extremely strong barrier compared to 42.4% of the respondents coming from LAGs and LRDAs. Research shows that some other countries are also facing this problem. Research investigating the likelihood of innovative activities in Australia showed that motivation to improve performance and providing opportunities for experiments were important for achieving innovation in the public sector (Demircioglu and Audretsch, 2017). Education and training proved to be as important internal drivers of

public sector innovation in Belgium, Bulgaria, France, Italy, the Netherlands, Romania, and Slovakia as well (European Commission, 2012).

50% of the respondents from big cities and counties mentioned *low employee interests in innovation* as a very and extremely important barrier by, while only 21.2% of the respondents from LAGs think the same. This indicates that there is a significantly greater interest of LAG and LRDA employees in introducing and implementing innovation than of employees in bigger cities and counties.

In the next step, factor analysis was conducted to identify main groups of barriers to public innovation. 12 items were used as input variables (three barriers that are considered as less important were excluded from the analysis). Before using the items from the questionnaire, it was necessary to test the validity and reliability of the questionnaire. The questionnaire is stated reliable if the value of Cronbach's alpha is larger than 0.6 (Griethuijsen et al., 2014). The result of validity and reliability analysis is shown in Table 1.

Table 1 **Validity and Reliability Test of Questionnaire**

Cronbach's Alpha	No. of items
0.859	12

Source: Authors' calculation based on survey results.

Since no prior hypothesis is made about the number and name of factors, explorative factor analysis is used. A suitability for using the factor analysis was examined by The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and by Bartlett's test of sphericity. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.678, above the commonly recommended value of 0.600 (Hair et al., 2010). Bartlett's test of sphericity (test of at least one significant correlation between two of the studied items) was also significant ($\chi 2$ (36) = 197.433, $p < .01$), so it is considered that the correlation matrix is not an identity matrix (Hair et al., 2010). Given these overall indicators, factor analysis was regarded as suitable with all 12 items/questions.

Table 2 **KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.715**
Bartlett's Test of Sphericity	Approx. Chi-Square	267.016
	Df	66
	p-value	0.000

Source: Authors' calculation based on survey results.

The following step in factor analysis is factor extraction. The method used as factor extraction in this research is principal component analysis (PCA). There are 12 initial

components/factors or input variables. For selecting the number of factors, the eigenvalue criterion was used according to which the number of factors selected is the number of factors that have eigenvalue equal or larger than 1. According to the first unrotated solution, almost all variables have the highest loading factor in component 1. For this reason, it was desirable to perform factor rotation. Factor rotation allows the variance to be redistributed from the factors that are first in order to those that come later. Factor rotation method used in this research is orthogonal rotation, which is *varimax*. Three items were eliminated (Q9, Q10 and Q15) because they did not meet the minimum criterion of having a primary factor loading (how much a factor explains a variable) of 0.6 or above.

Table 3 **Rotated Component Matrix**

	Component		
	F1	**F2**	**F3**
Q5.5	**0.862**	-0.022	0.296
Q5.4	**0.807**	0.431	-0.142
Q5.3	**0.768**	0.391	-0.280
Q5.7	**0.753**	0.177	0.200
Q5.13	0.005	**0.877**	0.090
Q5.14	0.318	**0.795**	0.016
Q5.11	0.366	0.583	0.113
Q5.12	0.068	0.145	**0.914**
Q5.1	0.061	0.011	**0.880**
% of variance	31.052	23.693	20.635

Source: Authors' calculation based on survey results.

The factor loading matrix for this final solution is presented in Table 3. The factor analysis showed that the surveyed barriers to innovation can be clustered into three barrier factors (Table 3). Factor 1 ("problems in the areas of organisation, knowledge and skills") combines competence-related obstacles: lack of infrastructure, lack of relevant knowledge and skills, lack of educational programmes for employees. Factor 2 ("bureaucratic barriers") comprises barriers to innovation, due to administrative complexity, long process of adaptation to innovation, lack of rewards and motivations for innovation. Factor 3 clusters the barriers to innovation into "funding difficulties and high innovation costs" and internal or external funding difficulties. Here, the high innovation costs are associated with high commercial risk and lack of relevant information. The proportion of variance in the sample explained by the factor analysis was 75.4%.

4 Conclusion

This research aimed to identify the barriers to innovation that influence the innovative process in Croatian LGUs (i.e., big cities) and counties, as well as in local action groups and local and regional development agencies. The identification of barriers to innovation is

essential to understand the process of innovation in the public sector and to be able to overcome these barriers (D'Este et al, 2012), and it is therefore crucial to study the factors that hinder the innovation process. The analysis suggests that the most important barriers to innovation in the public sector perceived in the study are *increased administrative complexity*, *initial investment costs* and *lack of financial resources*. Different barriers to innovation predominate in two observed groups, with financing problems affecting primarily LAGs and LRDAs, and lack of human capacities affecting primarily LGUs (bigger cities) and counties. According to the conducted analysis, it is concluded that there are three factors that hinder the process of innovation introduction in the Croatian public sector (local and regional level). The three factors are: problems in the areas of organisation, knowledge, and skills; bureaucratic barriers, and funding difficulties and high innovation costs.

During the last 15 to 20 years, a lot of investment in increasing administrative capacities of the Croatian administration has already been made predominantly through EU sources of funding to respond to the EU requirements, and further supplemented by often limited national, regional, and local financial support. Investing in administrative capacities is a process that commonly results in expected effects/impacts in rather medium to long-run term and produces multiplier effects in performance of the administration at various levels and in various sectors of operation. In other words, e.g., one capacity building measure may add value to public administration service, horizontally and/or vertically. The cost of investing in human capacities is usually much lower than investing in hard infrastructure, so closing the financial gap could be more easily overcome.

Introducing innovations in public services is a part of the EU Next Generation package for the period 2021 – 2027. The European Commission has been constantly searching for the ways to improve the delivery of public services across the EU member states and candidate countries, in the most efficient and transparent way. The EU Next Generation is focused on two key areas: how to make Europe greener, and how to make Europe more digitalised? In that sense, both areas are interesting for promoting and endorsing public sector innovations. Modernisation of the public sector is expected to be achieved through investments in the area Research and Innovation that will be financed via Horizon Europe, while Fair Climate and Digital Transitions will be financed via the Just Transition Fund and the Digital Europe Programme. This represents an opportunity for Croatian units of local (regional) self-government to prepare, in cooperation with the scientific-research community, project proposals addressing innovations in the public sector and to search for funding opportunities within the mentioned EU programmes. In addition to them, the Recovery and Resilience Plan would address the needs of various levels of the public administration, as a response to the crisis caused by COVID-19 pandemic. It may be assumed that innovative public administration units would be in a better position when it comes to prioritising allocation of the EU funding.

Younger generations and youth in general proved to be technologically agile and more inclined to innovations as they in general welcome innovative solutions easier than adults. Having this in mind, the government authorities should seek to better include youth in the public sector domain through various projects and programmes and to open themselves to their ideas and initiatives which sometimes cross conventional approaches to problem solutions. This may represent an additional opportunity to increase their interests in research and innovation in general, and in the public sector functioning in particular.

Public sector innovations in Croatia have been recognised in the draft of the Croatian National Development Strategy[1] (NDS), which is also relevant for its future. One of the development paths determined in the NDS is Green and Digital Transition, which is further elaborated into strategic goals. Digital Transition of Society and Economy is one of the strategic goals within which, among others, the following priority areas of public policies are identified: Digital Transition of Economy, Digitalisation of Public Administration and Justice and Development of Digital Competences and Digital Working Places. The NDS provides a framework in which innovations/digitalisation are recognized as highly important fields of investment and implementation of measures (activities, programmes, projects) would lead to the improvement of the current state of the art.

The results of this research show that there is a significant room for improvement in the public sector innovation domain. The mechanisms and tools that will soon be at Croatia's disposal represent a unique opportunity to address these challenges and transform the Croatian public administration into a more efficient, credible, and innovation driven provider of public services.

[1] https://hrvatska2030.hr/ (accessed on 20 December, 2020).

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Appendix

Table 4 **Descriptive statistics, 15 items - barriers**

	N	Mean	Mode	Percentage of respondents		
				No barrier/ weak barrier	Medium barrier	Very/extremely strong barrier
Increased administrative complexity	45	3.7	4	4.4	37.8	57.8
Initial investment costs	45	3.6	4	13.3	22.2	64.4
Lack of financial resources	45	3.5	4	15.6	22.2	62.2
Lack of knowledge and skills to conduct research needed to introduce innovation	45	3.5	4	13.3	31.1	55.6
Lack of rewards and motivations for innovation	45	3.4	3	13.3	40.0	46.7
Long-term adjustment to introduced innovations	45	3.4	4	11.1	40.0	48.9
Lack of workshops and education for employees	45	3.3	4	17.8	35.6	46.7
Shortages in relevant knowledge and skills for the support of innovation	45	3.2	4	24.4	26.7	48.9
Risk and uncertainty management in the public sector	45	3.2	4	26.7	20.0	53.3
Lack of infrastructure in their own institution/organization	45	3.1	3.4	22.2	37.8	40.0
Increased cost of providing services	45	3.1	3	17.8	46.7	35.6
Weak cooperation with academia	45	2.9	4	28.9	31.1	40.0
Low employee interest in innovation	45	2.8	3	35.6	35.6	28.9
Weak cooperation with private companies	45	2.8	3	26.7	46.7	26.7
Internal rules and processes in the organisation/institution	45	2.5	1	53.3	24.4	22.2

Source: Authors' calculation based on survey data.

Table 5 **Chi-square test, 15 barriers**

	Chi-square	df	p -value
Lack of financial resources	*7,958*	*3*	*0.0469***
Internal rules and processes in the organisation/institution	6,111	4	0.1910
Lack of knowledge and skills to introduce innovation	*11,399*	*4*	*0.0224***
Lack of knowledge and skills to conduct research needed to introduce innovation	5,251	4	0.2625
Lack of workshops and education for employees	7,393	4	0.1165
Low employee interest in innovation	*12,151*	*4*	*0.0163***
Lack of infrastructure in their own institution/organization	4,843	4	0.3038
Weak cooperation with private companies	3,482	3	0.3231
Weak cooperation with academia	4,688	4	0.3209
Risk and uncertainty management in the public sector	6,769	4	0.1486
Lack of rewards and motivations for innovation	3,920	4	0.4169
Initial investment costs	*15,257*	*4*	*0.0042**
Increase administrative complexity	3,489	4	0.4795
Long-term adjustment to introduced innovations	3,568	4	0.4677
Increased cost of providing services	*7,771*	*3*	*0.0510****

Source: Authors' calculation based on survey data.

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