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Implementation of management innovation – a precondition for the development of local government effectiveness: evidence from Croatia

Mirjana GRČIĆ FABIĆ[1], Zdravko ZEKIĆ[2], Luka SAMARŽIJA[3]

Abstract: *The literature in the field of innovation is mainly focused on the different aspects of technological innovation. However, during the last fifteen years, there has been an increase in studies of other forms of innovation which are, according to their characteristics, non-technological. The purpose of this paper is to explain the concept of management innovation as a distinctive type of non-technological innovation and its impact on the implementation of other innovation types. The need to research management innovation in the public sector is gaining in importance due to the ongoing public administration reforms which are often, through the implementation of new methods and management concepts, aimed at increasing public service efficiency and effectiveness. The empirical research has been conducted on a sample of local government units in the Republic of Croatia. The results generally suggest that the implementation of management innovation has a positive effect on the implementation of other types of innovation (service innovation, process innovation and communication innovation) in the local government, i.e. management innovation has a positive effect on the innovation capacity and effectiveness of local government units. The obtained results carry implications for managers in local government units, as well as for those in other public bodies such as state administration.*

Keywords: *management innovation, service innovation, process innovation, communication innovation, technological innovation, local government.*

JEL*: *H70, O30, O310, O320.

Introduction

The majority of empirical studies on innovation are usually related to technological developments while little attention has been given to other forms of non-technological innovation. However, the scientific literature shows that the research of innovation is a complex process and that it should not be solely based

[1] Postdoctoral Research Assistant, Ph.D.; University of Rijeka; Faculty of Economics; Rijeka; Croatia; e-mail address: mirjana.grcic.fabic@efri.hr

[2] Full Professor, Ph.D.; University of Rijeka; Faculty of Economics; Rijeka; Croatia; e-mail address: zzekic@efri.hr

[3] Postdoctoral Research Assistant, Ph.D.; University of Rijeka, Faculty of Economics; Rijeka; Croatia; e-mail address: luka.samarzija@efri.hr

on its technological dimension. The dominant technological aspect of innovation has been facing some criticism as it ignores many important non-technological elements of innovative organizational activities.

The purpose of this paper is to study and establish new scientific ideas about the concept of management innovation as a distinctive type of non-technological innovation, representing relatively new and insufficiently empirically explored area of research on innovations.

Goals of this paper's research are to analyse and define technological versus non-technological types of innovations, the concept and typology of management innovations and determine the impact of implementing management innovation as a type of non-technological innovations on the implementation of other types of innovations that mainly represent technological group of innovations.

This interconnection between management and other types of innovation is observed and analyzed within the context of local government in the Republic of Croatia, which is currently undergoing public administration reforms aimed towards increasing management efficiency and effectiveness.

In this paper, the authors combine the rational perspective and institutional theory to explain the implementation of management innovation in local government. The assumption is that numerous legal and regulatory requirements, such as specific strategies and reform programs in public administration at both national and local level, in addition to institutional mechanisms arising from them, affect the introduction and implementation of innovation in local governments.

Therefore, it is necessary to interpret research results in this regard.

1. Theoretical background

1.1 Technological versus non-technological innovation

The most commonly used typology is that which classifies innovations into product and process innovations (Utterback & Abernathy, 1975; Abernathy & Utterback, 1978; Edquist et al. 2001; Damanpour & Aravind, 2006).

A key determinant in distinguishing product from process innovations is whether an innovation is the final product or service (product innovation), or it is related to the production or delivery of final products/services (process innovation). In any case, it refers to innovations in the sphere of primary/core organizational activities.

Product and process innovations are associated with the development or application of new technologies and are, as such, also called technological innovations (Schmidt & Rammer, 2007) which have until recently represented the most dominant focal point of research on innovation.

Several decades ago, the most common diversification of innovation was according to the technical/technological and administrative typology (Daft, 1978).

It distinguishes certain types of innovation according to the general distinction between technology and social structure.

The dual-core model of innovation (Daft, 1978) was actually a milestone in the understanding of technological and non-technological forms of innovation. It distinguishes between two cores: technology, which signifies the primary activity of the organization and administrative, which refers to changes in the processes that support the organization's core activity.

Non-technological innovations, at that time predominantly termed administrative innovations, are only indirectly related to an organization's primary business activity and often have an effect on its managerial system (Damanpour & Evan, 1984).

1.2 The concept of management innovation

The term management innovation has recently been finding greater use in the literature, and has gradually been displacing other terms such as organizational or administrative innovation. Management innovations are defined as the creation and implementation of new management practices, processes, structures and techniques that represent a significant departure from current practices and norms (Birkinshaw *et al.*, 2008).

This type of innovation includes innovation in organizational form, practices, processes or techniques, i.e. it represents new rules and routines by which activities are carried out in the organization (Birkinshaw *et al.*, 2008).

Birkinshaw et al. (2008) state three factors that distinguish management innovation from other types of innovation:

a) management innovation outputs are typically intangible and abstract in nature; they do not require special expertise and infrastructure (as is the case with technological innovation which often requires the establishment of a special R&D department, special expertise and sufficient funds) which may lead to a higher level of ambiguity and uncertainty than in other types of innovation;

b) management innovation has a greater scope than other forms of innovation;

c) the changes in practices, processes and / or structure within the organization are more comprehensive and affect the activities of the management and the way people work with each other. The social dimension is emphasized, primarily through the impact on the organizational culture, attitudes and norms of employees and through changes in the existing authority relations within the organization.

The above mentioned results in a more comprehensive and complex type of innovation which requires a systematic implementation and the coordination of a large number of organizational members.

Attempts to classify management innovations are rare, probably among other things due to the above mentioned reasons. In fact, the term *dimensions of*

managerial innovation has often been used in the literature. As such, the most commonly used, and which stem from the main definition of the term, have already been mentioned: practices, processes, structures and techniques. In the literature, there are also attempts at differentiating organizational innovations into structural organizational innovations and procedural organizational innovations (Armbruster *et al.*, 2008, p. 646).

In this context, organizational innovations actually correspond to the concept of management innovations. Structural organisational innovations imply the introduction of procedures which change and improve the organisational structure, i.e. division of labour in individual activities, forming of organisational units and establishment of coordination mechanisms.

These innovation types influence and change responsibilities, accountability, command lines and information flows as well as the number of hierarchical levels, division of organizational functions, etc.

Examples of such innovation could be the introduction of a new organizational unit, establishment of process- and/or project organizational structure. Procedural organisational innovations affect the routines, processes and operations (operating activities) of an organization.

These innovations change or implement new procedures and processes. They may affect the speed, flexibility or quality of business processes. Examples of such innovations may include implementation of quality circles, quality management systems according to ISO norms, implementation of benchmarking, etc.

1.3 The impact of management innovation on the implementation of other types of innovation

Non-technological innovations are often found in a causal relationship with the technological forms of innovation. New products/services often require new production processes, and new production processes impose the need for new organizational methods and structures.

This stems from the notion that changes in the technical system should be consistent with the changes in the social system of the organization in order to achieve the optimization of results in accordance with the socio-technical perspective (Damanpour & Evan, 1984).

According to Kirner et al. (2008), organizational innovations can be viewed as innovations which enable the implementation of other types of innovation (eg. product innovation, service or process, i.e. technological types of innovation), as a special type of innovations that directly influence and increase performance and as a prerequisite for faster development of knowledge in organizations, i.e. the development of creative capabilities and best use of competencies, skills and knowledge. In their work, Heij et al. (2013) discuss the multi-causality between management innovation and technological innovation.

The existing research suggests that management innovations are a predictor of technological innovation (Baranano, 2003; Mol & Birkinshaw, 2012; Černe 2013). Moreover, technological innovations foster the need for non-technological innovations. Staropoli (1998), in his research on the pharmaceutical industry, emphasized the importance of co-operative organizational rearrangements and coordination mechanisms in the implementation of higher levels of technological innovation. Polder (2010) established that product and process innovations achieve the greatest effect when they are implemented alongside management innovations, which leads to the conclusion that management innovations are good complements to other innovation types.

Heij et al. (2013) confirmed that management innovations and new technological knowledge produce interactional effects, affecting the success of the innovation in the form of the letter J. This implies that when there is a low level of management innovation, then management practices, processes, structures and techniques are not adequately harmonized with the new technological knowledge, i.e. in a way which enables success.

Higher levels of management innovation indicate that better mutual harmony can lead to greater innovation performance (Heij *et al.*, 2013). Research on the implementation level of other types of innovation that can be associated with innovations in management, i.e. innovations in the managerial and organizational sense, at an empirical level in the public sector is very scarce. One of them is that conducted by Damanpour et al. (1989). They found that in public libraries a higher level of administrative innovation leads to technological innovation.

While the existing empirical research in the public sector provides only partial confirmation of the above-mentioned claim since they mostly analyzed the correlation between management innovation and certain innovation types such as technological innovation, the research conducted on private organizations confirmed that management innovations and other types of innovation are positively correlated. In view of the above, the following hypotheses were set:

H1: Implementation of management innovations will have a positive impact on the implementation of service innovations in local government units.

H2: Implementation of management innovations will have a positive impact on the implementation of process innovations in local government units.

H3: Implementation of management innovations will have a positive impact on the implementation of communication innovations in local government units.

1.4 Rational and institutional perspectives of management innovation implementation

The existing literature on management innovation distinguishes four dominant distinct perspectives (Birkinshaw *et al.*, 2008): institutional, fashion,

cultural and rational perspective. The two perspectives used within this research for interpreting results are the rational and institutional perspectives.

The rational perspective is the prevailing perspective in research on innovations occurring in organizations. It is assumed that management innovations, similar to other types of innovation, are a means to achieve set goals, i.e. they are introduced in order to improve organizational performance (Arimavičiūtė, Giedrė Raišienė, 2015).

Since we are dealing with the implementation of management innovations in the public sector, the complementary approach is institutional theory. It is necessary to take into account the institutional requirements which are a part of the environment of local government units implementing management innovations, and which are numerous in view of the ongoing public administration reform.

Many scholars view institutional theory as an alternative view which argues that the primary objective of organizational change is not substantial improvement in performance but greater legitimacy. Greenwood et al. (2008) argue that institutional theory has been developed as a counterbalance to the dominant rational and technocratic perspective.

Organizations adapt their internal characteristics to adopt changes and innovations in order to conform to the expectations of the key stakeholders in their environment. This is rather relevant to subjects in the public sector since shifts in organizational characteristics are often pursued for political reasons in order to gain formal legitimacy. DiMaggio and Powell (1983) described the forces pressuring institutional isomorphism to enhance their legitimacy as mimetic, coercive, and normative forces (Abrahamson, 1996).

Generally, when taking a certain theoretical aspect in the research on all types of innovation, there is a need to balance between the tendency to achieve legitimacy and technical rationality. According to the fashion or institutional perspective, the balance is moved towards achieving legitimacy when adopting new management practices.

The reason for this probably lies in the fact that management innovations are perceived as relatively less useful, harder to measure, more complex and more intangible in relation to technological innovations. Difficulties in recognizing those management innovations that will be fully implemented among those being introduced primarily to satisfy certain requirements for legitimacy may very probably be the reason why new managerial techniques and practices are often called fashion fads, which is not the case with technological innovation types.

Furthermore, this may be why the adoption of new management innovations is often attributed to gaining external reputation and legitimacy, rather than achieving organizational growth and success (Damanpour & Aravind, 2012). Various authors (Berrone *et al.*, 2007; Ashworth *et al.*, 2009) combined these two fundamental approaches to interpret the process of adopting organizational changes and its impact on organizational performance.

Furthermore, they advocate the view that the shifts in organizational characteristics are pursued for political reasons and not just ´technical´ reasons and that public managers are seeking to achieve both formal legitimacy and better organizational performance.

During the past twenty years, intensive public sector reforms have been carried out in Croatia. It can therefore be concluded that the local government is pressured to introduce change and that such institutional requirements have an impact on the introduction and implementation of management innovations in cities and municipalities.

2. Methodology

Empirical research was carried out through a survey conducted in Croatian local government units during 2013.

2.1 Sample

There are 128 towns and cities and 428 municipalities in the Republic of Croatia making a total of 556 local government units. The questionnaire, i.e. online survey, was sent out to all towns and municipalities by e-mail. Due to difficulties in contacting some local government units, the total number of towns and municipalities which received the questionnaire was 450. The final response rate was 15%, representing a total of 70 local government units.

Tables 1 and 2 show sample characteristics, considering the number of towns and municipalities with regard to population. The comparison between sample structure and population structure has been carried out according to data available from Statistical Yearbook of the Republic of Croatia (2015). With regard to the number of towns, considering the number of inhabitants, it can be concluded that the structure of towns from the sample is in accordance with the structure of the population.

The greatest number of towns from the sample are towns with population between 5.000-10.000 and 10.001-15.000 inhabitants, which is identical in the population structure as well. The situation slightly varies when municipalities are observed. In this case there are population grades in municipalities population that are not included in the sample. However, there are just a few such municipalities in the population and they do not represent an average size of the municipality.

The greatest number of municipalities from the sample is concentrated in the grade 1.001-1.500, and in the population range 2.001-3.000, whereas, in the population, the greatest number of districts has the population range 1.501-3.000.

Table 1 Characteristics of the sample - towns by number of inhabitants

	Number of towns-population*	Share,%	**Number of towns-sample**	Share,%
Total	127	100	48	100
Up to 5 000 inhabitants	18	14,2	8	16,7
5 001 - 10 000	42	33,1	14	29,2
10 001 - 15 000	30	23,6	11	22,9
15 001 - 20 000	8	6,3	3	6,3
20 001 - 30 000	11	8,7	4	8,3
30 001 - 40 000	4	3,2	2	4,2
40 001 - 50 000	5	3,9	2	4,2
50 001 - 60 000	3	2,4	1	2,1
60 001 - 70 000	1	0,8		0,0
70 001 - 80 000	1	0,8	1	2,1
80 001 - 90 000	-	-		-
90 001 - 100 000	-	-		-
100 001 - 200 000	3	2,4	2	4,2
200 001 and more inhab.	1	0,8		0,0

*2011 Census

Table 2: Characteristics of the sample - municipalities by number of inhabitants

	Number of municipalities-population*	Share,%	**Number of municipalities-sample**	**Share,%**
Total	429	100	**22**	**100**
Up to 1 000 inhabitants	37	8,6	**2**	**9,1**
1 001 – 1 500	49	11,4	**3**	**13,6**
1 501 – 2 000	71	16,6	**1**	**4,5**
2 001 – 2 500	63	14,7	**3**	**13,6**
2 501 – 3 000	56	13,1	**4**	**18,2**
3 001 – 3 500	29	6,8	**2**	**9,1**
3 501 – 4 000	35	8,2	**1**	**4,5**
4 001 – 4 500	15	3,5		**0,0**
4 501 – 5 000	21	4,9	**2**	**9,1**
5 001 – 6 000	24	5,6	**1**	**4,5**
6 001 – 7 000	13	3,0	**2**	**9,1**
7 001 – 8 000	4	0,9	**1**	**4,5**
8 001 – 9 000	4	0,9		**0,0**
9 001 – 10 000	1	0,2		**0,0**
10 001 – 11 000	1	0,2		**0,0**
11 001 – 12 000	5	1,2		**0,0**
12 001 – 13 000	-	-		**0,0**
13 001 – 14 000	-	-		**0,0**
14 001 – 15 000	1	0,2		**0,0**

*2011 Census

Therefore, it can be generally stated that the structure of sample, considering the number of local government units as per number of inhabitants is aligned with the structure of the population. The questionnaire was intended for higher management. The questionnaire was sent by e-mail to officials heading administrative departments or similar organizational departments as they are best-acquainted with the subject matter cited in the questionnaire.

2.2 Measurement of variables

Authors (Schmidt & Rammer, 2006; Gunday *et al.*, 2011) commonly based their measurements of individual innovation types on the definitions and classification published in the Oslo Manual (2005). The OECD and Eurostat defined the generally-accepted innovation typology in the Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data from 2005, which serves as a base for measuring innovation in the private sector by means of a standardized methodology of innovation analysis called Community Innovation Surveys (CIS).

According to this classification, individual innovation types are product/service innovation, process innovation, marketing innovation and organizational innovation. In order to assess an individual innovation type, some authors often use their own statements supporting the specific properties of the analyzed constructs.

With regard to the proposed hypotheses and subject of this research, the measurement of different types of innovation in line with the Oslo Manual (2005) seems to be appropriate because it offers clear definitions of individual innovation types and is consistent with the set concept. The Oslo Manual actually provides the starting point, i.e. orientation definitions of individual innovation types. In this research, each innovation construct was measured by original measurement items.

The classification of innovation types may vary for the public sector due to differences in the role and functioning of the two sectors. This difference is even more noticeable when local government is concerned because its basic purpose is to provide services (Androniceanu, 2012).

Therefore, since product innovation is not an adequate construct, i.e. it is not applicable, service innovation is used instead. Furthermore, the marketing innovation construct is substituted with the communication innovation construct, as it corresponds better to the activities performed by public organisations (Annerstedt & Björkbacka, 2010; Bloch, 2010). The validity of each construct was verified by corresponding tests. A factor analysis of variables, i.e. statements which best describe management innovation, was conducted in order to establish the common characteristics of several variables and in order to gain a reliable measuring instrument of management innovation.

In the questionnaire, the respondents were asked to rate individual statements for all innovation measures on the Likert scale from 1 to 5, indicating the implementation level of individual innovations in their local self-government units.

The retrospective period of analysis for all innovation was 10 years, i.e. the respondents were asked to rate the level of implementation of individual innovations during the past 10 years. This length of period was chosen, because the three year periods set by previous research, actually showed those who lag behind in innovations as ‘innovative’, and those who adopted innovations earlier as ‘uninnovative’ (Armbruster *et al.*, 2008, p. 655).

Namely, an organization implementing the concepts of quality management or supply chain management may feel the benefits from their application for more three years after their initial deployment, in fact, for as long as these innovations can adequately respond to the circumstances in the environment. This also implies that management innovation does not 'age' as quickly as product innovation.

However, such a long period of observation may bring into question the accuracy of answers provided by respondents due to the excessive time lag since the introduction of certain concepts and methods of management in their local self-government unit. Therefore, possible restrictions, due to retrospective bias, should be taken into account in the interpretation of results. Table 4 gives the questionnaire statements measuring management innovation, the calculated means for each statement and standard deviations as measures of dispersion.

Table 4 Management innovation in local government – descriptive statistics

	Mean	SD
Cutting out various layers of management (e.g. level of offices, department, division…).	2,43	1,22
Changes to the structure of the city/municipal administration (e.g. renaming of departments, divisions, offices, heads of administrative departments, increasing the number of departments...).	2,35	1,16
Implementing a new system for measuring and evaluating employees.	2,84	1,35
Implementing a new system for measuring and evaluating management.	1,89	1,18
Implementing a new system of rewarding employees.	2,18	1,27
Implementation of a rewards system for management.	1,73	0,99
Establishing criteria for management promotion.	1,54	0,93
Establishing criteria for employees promotion.	2,09	1,20
In managing projects recognized methodology and techniques of project management has been used.	2,78	1,32
Heads of administrative bodies and other employees are using specialized software for project management in their work.	2,55	1,42
Teamwork forming is formally regulated.	2,33	1,50
A system of job rotation on other jobs for purpose of developing and promotion has been formally established.	1,78	1,10
Delegating the planning and decision making from higher levels to lower.	3,05	1,31
A new system of training employees has been formally established.	2,65	1,34
A quality management system according to ISO standards has been implemented.	1,96	1,45
Regular use of benchmarking (comparison of your own results with other local governments units in the country and abroad).	2,79	1,42
Regular exchange of experiences and advices with other local governments units about their best practices in dealing with certain issues.	3,88	1,01

As can be seen from Table 4, the highest implementation level mean (3.88) in Croatian local government units is realized during regular exchange of experience and advice with other local government units based on best practice examples in solving certain issues. Such practice may be the result of central government alignment.

However, the fact that such a regular practice has been only recently introduced for the first time in local government makes it a management innovation. This is in accordance with the theoretical assumptions of management innovation which encompass cooperation with other stakeholders, i.e. the communication among organization members and the communication between organization members and the environment (Edquist *et al.*, 2001; Armbruster *et al.*, 2008; Vaccaro *et al.*, 2012).

The Oslo Manual (2005) also highlights these activities and gives special emphasis to external relations. This marks the difference between technological and non-technological forms of innovation. Namely, what is specific for non-technological forms of innovation is that they generally do not arise from institutionalized research and development activities but primarily result from cooperation and active relationship with the environment.

The second ranked management innovation is delegation of planning and decision-making from higher to lower level, with a 3.05 implementation level mean. The establishment of criteria for management's advancement is the least present management area in towns and municipalities with a 1.54 implementation level mean. Table 5 shows the questionnaire statements describing other innovations in local government units, the calculated means for each statement and standard deviations.

Table 5 Other innovation types in local government, descriptive statistics and cronbach α

	Mean	SD	Cronbach α
Service Innovation			0,894
New ways of providing services due to information and communication technology.	3,18	1,25	
A completely new services for citizens has been introduced.	2,96	1,22	
A completely new services for economic entities has been introduced.	2,88	1,22	
Process Innovation			0,907
A great number of services has been computerized.	3,34	1,16	
New ways of providing services, in collaboration with external partners, e.g. other local governments units, companies, faculties, associations...	3,05	1,25	
Communication innovation			0,652
Website was created and is regularly maintained.	4,48	0,87	
On the website can be set queries, comments and requests of all interested parties to local government and they are regularly addressed.	3,82	1,50	
Facebook page has been for the first time developed and regularly maintained.	2,19	1,65	
A new slogan for the city/municipality has been introduced.	2,00	1,35	

The table shows that the highest implementation level mean (4.48) for other innovation types in Croatian towns and municipalities is realized in the field

of communication innovation, i.e. more specifically in the field of creating and maintaining own websites, whereas the lowest implementation level mean was realized in the area of launching a new town or municipality slogan. There is also a relatively higher level of implementation in the field of process innovation and the implementation of information-communication technologies (3.34 and 3.18, respectively).

The results of the analysis of measurement scales reliability (Cronbach α) for service innovation and process innovation indicate that the level of reliability of the measurement scales is satisfactory. The calculated Cronbach Alpha for communication innovation was 0.65, which is below the acceptable value of 0.7. Therefore, the reliability of this measure is somehow problematic, and poses a limitation in this study.

3. Analysis and results

The concept of management innovation is in its initial conceptual design and certification, and as such there are no prevailing standardized measures for measuring such variables. For this reason, the authors opted for factor analysis as it should result in valid and reliable measures of management innovation. Regression analysis was applied to confirm the positive impact of management innovation implementation on the implementation of other selected types of innovations. A factor analysis of management innovation statements was conducted with the objective to reduce the great number of original variables represent individual types of implemented innovations to a smaller number of variables grouped into common factors.

The factor analysis with oblique rotation based on seventeen original variables measuring management innovation extracted two actors. The eigenvalue value of the extracted factors was over one. Variable elimination of various layers of management, e.g. at office, department, division level, has approximately equal saturation in both factors, which disrupts the factor structure; therefore, this variable was eliminated from further analysis. After the elimination of that variable, the factor analysis was repeated, which resulted in two extracted factors and provided satisfactory results.

The results of the factor analysis are presented in Table 6. According to the characteristics of individual statements, i.e. individual implemented innovations, the first factor was named 'procedural management innovation' whereas the second 'structural management innovation'. The factors together explain 55.47% of the variance. Such differentiation of management innovation is in accordance with the classification of management innovation and was listed in the theoretical part (Armbruster *et al.*, 2008, p. 646). In this manner, it is possible to see which types of management innovations are more effective, i.e. which have proven to be more successful in this environment. Once the factors had been established, the reliability of the questionnaire was analysed in order to see whether the used

questionnaire is an adequate measuring instrument i.e. that the same measuring indicators will be obtained in repeated measuring.

The Cronbach α coefficient which measures the internal consistency of individual factors was applied. The Cronbach α coefficient was established for each factor separately. The higher the value of the Cronbach α coefficient, the higher the reliability of the analysed scale, i.e. it shows that variables of the same factor indeed measure the same phenomenon.

Table 6 Factor analysis for management innovation

Factors	Factor Loads	Eigenvalue	Cum. % variance explained	Cronbach α
Factor 1: Procedural Management Innovation		7,432	46,451	0,908
Implementing a new system of rewarding employees.	0,902			
Establishing criteria for management promotion.	0,894			
Implementation of a rewards system for management.	0,880			
Establishing criteria for employees promotion.	0,773			
Implementing a new system for measuring and evaluating management.	0,737			
Regular use of benchmarking (comparison of your own results with other local governments units in the country and abroad).	0,655			
A quality management system according to ISO standards has been implemented.	0,546			
Implementing a new system for measuring and evaluating employees.	0,527			
Regular exchange of experiences and advices with other local governments units about their best practices in dealing with certain issues.	0,476			
Factor 2: Structural Management Innovation		1,443	55,472	0,876
Heads of administrative bodies and other employees are using specialized software for project management in their work.	0,906			
Teamwork forming is formally regulated.	0,830			
Delegating the planning and decision making from higher levels to lower.	0,722			
A system of job rotation for purpose of developing and promotion has been formally established.	0,605			
In managing projects recognized methodology and techniques of project management has been used.	0,594			
Changes to the structure of the city/municipal administration (e.g. renaming of departments, divisions, offices, heads of administrative departments, increasing the number of departments...).	0,437			
A new system of training employees has been formally established.	0,420			

Table 6 shows that variables within the factors have a satisfactory level of correlation, thus verifying the reliability of the research, as the acceptable reliability level is determined if the value of the Cronbach α coefficient > 0.60 (Nunnally, 1978; Churchill, 1991). Since the data on all variables has been collected through the same questionnaire, during the same period of time with cross sectional research design, there is a potential for common method bias (CMB). The CMB is the variance is attributable to the general measurement method rather than to the measured variables themselves (Podsakoff *et al.*, 2003; Sharma *et al.*, 2010). We used the Harman's one-factor test to check for the presence of common method bias.

Five factors with eigenvalues over 1 are extracted, cumulatively explaining for 72.46% of the variance, with the first factor accounting for 44.39% of the variance. If all indicators are loaded onto a single factor and it explains more than 50% of the variance, the common method bias may be present. Since no single factor occurred and no factor accounted for most of the variance, the single method of data collection was an acceptable risk as common method bias did not present a large problem.

Once the factors were extracted, a correlation analysis between the obtained factors was conducted, i.e. between the variables of structural and procedural management innovation and the variables of service innovation, process innovation, and communication innovation.

The results of the correlation analysis are presented in Table 7. The correlation analysis resulted in statistically significant positive correlations among all of the analysed variables. Therefore, it can generally be concluded that a higher level of management innovation implementation is connected to a higher levels of service, process and communication innovation implementation in local self-government units.

Table 7 Correlation analysis

	Service Innovation	Process Innovation	Communication Innovation	Structural Men. Innovation	Procedural Men. Innovation
Service Innovation	1				
Process Innovation	,795**	1			
Communication Innovation	,622**	,484**	1		
Structural Men. Innovation	,618**	,750**	,654**	1	
Procedural Men. Innovation	,605**	,671**	,463**	,635**	1

**. Correlation is significant at the 0.01 level (2-tailed)

Favourable results of the correlation analysis were a good basis for further regression analysis conducted in order to establish the predictive validity of management innovation variables, i.e. the variables of structural management

innovation and procedural management innovation. The results of the regression analysis for individual criteria variables; service innovation, process innovation, and communication innovation are presented in Tables 8, 9, and 10 respectively.

Table 8 Results of the regression analysis for the service innovation variable

	Std. Error	Standardized Coefficient Beta	t	p	F	R	R^2
Structural Men. Innovation	0,080	0,404	2,739	0,009	16,432 (p=0,000)	0,663	0,439
Procedural Men. Innovation	0,060	0,332	2,251	0,030			

The regression analysis for the service innovation variable proved statistically significant (F= 16,432, p= 0,000). The set of management innovation predictors explains approximately 44% (R^2=0,439) of the dependent variable. Both independent variables are significant and positively related in the prediction of the service innovation variable. Table 9 shows that the regression analysis for the process innovation variable is statistically significant (F= 36,385, p= 0,000). As R^2=0,629, it may be concluded that 63% of variation of the dependent variable is explained by the predictors of structural and procedural management innovation.

The independent variables have again proven to be significantly and positively related to the prediction of the process innovation variable.

Table 9: Results of the regression analysis for the process innovation variable

	Std. Error	Standardized Coefficient Beta	t	p	F	R	R^2
Structural Men. Innovation	0,045	0,571	4,745	0,000	36,385 (p= 0,000)	0,793	0,629
Procedural Men. Innovation	0,034	0,297	2,467	0,018			

The regression results for the communication innovation variable (Table 10) also proved statistically significant (F= 13,706, p= 0,000). Approximately 41% (R2=0,407) of the dependent variable can be explained by management innovation predictors. In this case, the independent variable of procedural management innovation did not prove statistically significant.

Table 10: Results of the regression analysis for the communication innovation variable

	Std. Error	Standardized Coefficient Beta	t	p	F	R	R^2
Structural Men. Innovation	0,089	0,514	3,347	0,002	13,706 (p= 0,000)	0,638	0,407
Procedural Men. Innovation	0,069	0,177	1,154	0,255			

Table 11 presents the results of the calculation of collinearity between the predictor variables. The presence of a larger number of variables may cause problems of multicollinearity, which could imply that independent variables are related and that it is impossible to separate their impact on the dependent variable which may lead to errors in the interpretation and significance of the parameters.

Table 11: Collinearity of independent variables

	Service Innovation		Process Innovation		Communication Innovation	
	Collinearity analysis					
	Toleranc.	VIF	Toleranc.	VIF	Toleranc.	VIF
Structural Men. Innovation	0,615	1,626	0,597	1,675	0,629	1,590
Procedural Men. Innovation	0,615	1,626	0,597	1,675	0,629	1,590

According to the data presented in the table, the VIF indicator for all regression analyses is within acceptable limits in accordance with the recommended level (the VIF should not exceed 5). Moreover, the equivalent tolerance indicator is within the recommendations for acceptable levels of tolerance (TOL should not be smaller than 0.2). Therefore, it can be concluded that it is possible to split the impacts of each variable separately in all regression analyses.

4. Discussion and conclusion

4.1 Theoretical implications

The correlation analyses verified all set hypotheses **H1**, **H2,** and **H3.** Positive and statistically significant correlation was verified between management innovation and service innovation, process innovation and communication innovation. Moreover, the conducted regression analyses proved to be statistically significant for all criteria variables. It can generally be concluded that structural and procedural management innovation variables are a good predictor of service innovation, process innovation and communication innovation in the local government. Only the procedural management innovation variable proved to be statistically insignificant in the prediction of communication innovation. Structural and procedural management innovation explain the highest percentage in the process innovation variable (R2=0,629), which is logical, because management innovation effects are primarily reflected in increased efficiency, cost effectiveness, speed to provide services, higher productivity of employees, as well as in increased exchange of information, knowledge and experience. These results are consistent with similar empirical research but which have mainly been carried out in the private sector (Gunday *et al*., 2011, Hassan *et al*. 2013).

The research results speak in favour of applying the rational perspective in the implementation of management innovations in the public sector, which is based on the assumption that it is the individuals within the organization that are responsible for the introduction of management innovations in order to improve organizational performance (Androniceanu, 2013). In this case, it is a question of the impact on the implementation of other types of innovation.

However, if the characteristics of individual management innovations in towns and municipalities are further analyzed, it can be concluded that there is a certain similarity. Specifically, local government units have generally implemented the same new management methods and concepts which points to the influence of institutional pressure in Croatia. Institutional pressure stems mainly from the demands from the political and legal environments in the Republic of Croatia for the implementation of the public administration reform, with the aim of creating a more effective and efficient system of public administration.

The legal and regulatory requirements, such as specific strategies and programs of public administration reform at national level, and especially at local government level and the institutional mechanisms arising from them, certainly affect the introduction and implementation of innovation in local government units. For example, a new system of employee performance measurement and evaluation has been implemented in nearly all of the observed towns/cities and municipalities, while a new system for measuring and evaluating the management has been introduced in only a few towns and municipalities.

In its Public Administration Reform Strategy (2008-2011), the Croatian Government identified the need to provide a greater degree of decision-making decentralization, the need to provide objective and measurable criteria for performance appraisal and to introduce a system of efficiency remuneration. Thus, this could be a source of coercive isomorphism. It is believed that politicians and public managers tend to introduce innovations and changes in order to adjust to institutional norms and to achieve formal legitimacy in their sometimes short time period of management.

Moreover, it can be concluded that the average total level of management innovation implementation is low (average score 2.4). Such a result may indicate the influence of institutional pressure. Namely, although a positive impact on the implementation of other types of innovations was actually achieved it was expected that the adopted innovations should have had a greater level of success in their implementation. Presumably, with a rise in the implementation level of management innovations, its impact on the implementation of other innovation types would also be higher.

Based on the analysis of the Croatian local government units from the sample and by taking into account previous findings, it can be concluded that management innovations in public sector organizations also have a positive impact on the implementation of new or improved services e.g. the implementation of a higher level of information communication technologies or increased level of

quality of internal and external communication, i.e. they affect the creation of a higher level of innovation capacity. As stated previously in the text, non-technological innovations and thus management innovations as their distinctive type impact the efficiency of the implementation of technological innovations (Armbruster *et al.*, 2008) which can be associated with a higher degree of innovation capacity (Haned *et al.*, 2012).

Based on the previous discussion the most significant theoretical implications can be summarized. The research results confirm the theoretical hypothesis that non-technological innovations are causally related to technological innovation types. In particular, non-technological innovations can affect the effectiveness of the implementation of technological innovations, i.e. impact on the achievement of the highest possible degree of implementation of innovations such as service innovation, process innovation and communication innovation. This indicates that it is appropriate to observe management innovations as an independent variable, i.e. the variable that precedes the effectiveness of the implementation of technological innovation types. It can be concluded that management innovations are an important complement to technological innovations.

The area of management innovation is particularly under-researched in the public sector. This research is a contribution to the empirical research of management innovation in the public sector, because so far, there have only been a few studies on this type of innovation in the public sector. The research has shown that, based on a public sector sample, non-technological innovations, in this case management innovations, have a positive impact on the efficiency of the implementation of other, mainly technological innovation types.

The measurement of management innovations in this paper was carried out based on the original statements composing individual types of management innovation and other types of innovations. The factor analysis resulted in a reliable and valid measures, except for the communication innovation variable. In addition, the factor analysis extracted two factors of management innovations, which are in line with one of the theoretical classification of management innovation: structural management innovation and procedural management innovation. At the same time, the use of the original measures can be a limitation of this study.

4.2 Practical implications

The research results provide several implications for managers in local government but also for other public bodies, especially the state administration which, by means of legislation, may limit but also stimulate higher innovativeness and performance of local government units. The implementation of management innovation, as an approach in the improvement of management and innovation capacities, is a necessary precondition for efficient reorganization of the local government which is, in turn, a precondition for survival of the local government

units in Croatia. This is particularly important as the current system is non-rational, i.e. it is economically unjustified.

Namely, there is a large number of miniature municipalities and towns which are unable to cover with their revenue even the salaries of their employees. Continuous innovation in the methods and management practices through a strategic approach can result in higher and more efficient implementation of other innovations which are a precondition for easier introduction of changes and which lead towards the development of a higher degree of innovativeness, followed by effectiveness, and quality of services rendered by the local government.

Through functional decentralization and transferring of more and more tasks from state to local level management, these requirements and thus the need to implement management innovation is even more accentuated. This is, among all, the key role of the central government in encouraging the implementation of this type of innovation through institutional mechanisms. These may be, for example, financial incentives to those local government units that implement innovative and effective management methods.

The implementation of new methods and management concepts create the prerequisites for the successful implementation of other types of innovations, such as innovation in services, communication with citizens and other users of services or innovation of different services by using information and communication technologies (e-services).

For this very reason, public managers should regard management innovations as a factor and a precondition for easier and more successful implementation of changes which are inevitable in local government units in Croatia, i.e. as an instrument by which it is possible to create an environment in which the organization can more easily adopt and manage changes and be more focused on a set goal and strategy which will result in greater rationalization, efficiency and ultimately higher quality of rendered services.

Similarly, the implementation of new management concepts may result in more effective implementation of various e-services and thus public managers can contribute to the development of a modern public administration based on the contemporary application of information and communication technologies. Managers in local government should know that the implementation of management innovation does not require major financial resources unlike, for example, the implementation of process innovation. Namely, their emergence does not require special expertise and infrastructure as is the case with technological innovation which often requires the establishment of a special R&D department, expertise and/or significant financial resources.

4.3 Limitations and suggestions for future studies

Evaluating the effect of management innovations implementation on the implementation of other types of innovations requires longitudinal research to be

carried out because creation and implementation of innovations represent a continuous process, thus obstructing the measurement of management innovations effect. The need for such a longitudinal study is at the same time a limitation in this study and a guideline for future research within this area. The measurement of variable management innovations was carried out based on the original statements composing individual types of management innovation. At the same time, the use of the original measures can be a limitation of this study, as used measure have not yet been confirmed as valid in other empirical studies. Given the specific context of local self-government, the statements used to measure the variables of other types of innovations are also original. The conducted factor analysis resulted in reliable and valid measures, except for the communication innovation variable which Cronbach Alpha of 0.65 is somehow problematic, and represents a limitation in this study. In the questionnaire the respondents were asked to rate individual statements for all innovation measures in the retrospective period of 10 years. Such a period of observation is relatively long and may bring into question the accuracy of answers provided by respondents due to the excessive time lag since the introduction of certain concepts and methods of management in their local government unit. Therefore, possible restrictions, due to retrospective bias, should be taken into account in the interpretation of results. Furthermore, it is desirable to test the model in other countries as well, in different surroundings, which would enable other variables recognizing the context of management innovations implementation to be included in the model.

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