Organizational maturity for co-creation: Towards a multi-attribute decision support model for public organizations

Tina Jukić a,*, Irene Pluchinotta b,†, Rok Hržica a, Sanja Vrbek a

a Faculty of Public Administration, University of Ljubljana, Gosarjeva 5, 1000 Ljubljana, Slovenia
b King’s Business School, King’s College London - Bush House, 30 Aldwych, London WC2B 4BG, United Kingdom
c Institute for Environmental Design and Engineering, The Bartlett Faculty of The Built Environment, University College London – Central House, 14 Upper Woburn Pl, London WC1H 0NN, United Kingdom

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A B S T R A C T
The paper conceptualizes a multi-attribute decision support model for the assessment of organizational maturity for co-creation, specifically for public organizations. This is achieved on the basis of a systematic literature review (i.e. content analysis) and analysis of two European case studies of promising collaborative practices (from UK and Slovenia). The co-creation drivers and barriers elicited from these two sources are integrated in a decision support model, thus setting the layout of a multi-attribute decision support model for the assessment of organizational maturity for co-creation. The final model conceptualized here consists of 25 attributes or criteria grouped into three categories: organization capacity, staff capacity, and a wider political and normative context in which public organizations act.

1. Introduction
The paper aims to conceptualize a multi-attribute decision support model for the assessment of organizational maturity for co-creation, specifically for public organizations. The need for such a model emerges in a context where co-creation is recognized as the most promising approach capable of solving the main political and economic challenges of today. Co-creation has been promoted by both academics (Jukić, Pevcin, Bencina, Decman, & Vrbek, 2019; Voorberg, Bekkers, & Tummers, 2015) and international actors – the Organization for Economic Co-operation and Development (OECD) and the European Union (EU) – as the most successful strategy for tackling the problems of the public sector in the aftermath of the 2008 economic crisis (EU Commission, 2012, 2013; OECD, 2011, 2019). Moreover, the latest COVID-19 crisis has put additional pressure on governments to turn to co-creation as the best way of getting closer to citizens, better understanding complex challenges, and build broad-based support for their solution (Ansell, Sorensen, & Torfing, 2020).

The main advantage of co-creation is that its effects are multidimensional – addressing economic problems resulting from stringent austerity measures, political challenges manifested as a lack of legitimacy and alienation of citizens, and provision of public services that satisfy citizens’ needs. By mobilization of resources, knowledge and skills of different actors, co-creation leads to the improvement of the effectiveness and quality of public services while lowering costs (Pestoff, 2014; Williams, Kang, & Johnson, 2016). As such, co-creation not only provides an answer to the austerity and fiscal pressures on the public sector, but also ensures higher satisfaction with public services, general improvement of the well-being of citizens, and fulfilment of their needs (Osborne, Radnor, & Strokosch, 2016). Moreover, the active inclusion and contribution of external actors provides an antidote to the problem of democratic deficit (Osborne et al., 2016), by strengthening legitimacy (Williams et al., 2016), social cohesion, and democratization in general (Voorberg et al., 2015). The potential and multifaceted dimensions of co-creation are most comprehensively captured by the definition of Torfing, Reiseland, & Sorensen, 2016, which refers to co-creation:

“as a process through which two or more public and private actors attempt to solve a shared problem, challenge, or task through a constructive exchange of different kinds of knowledge, resources, competences, and ideas that enhance the production of public value in terms of visions, plans, policies, strategies, regulatory frameworks, or services, either through a continuous improvement of outputs or outcomes or through innovative step-changes that transform the understanding of the problem or task at hand and lead to new ways of solving it”.

* Corresponding author at: Faculty of Public Administration, University of Ljubljana, Gosarjeva 5, 1000 Ljubljana, Slovenia.
E-mail addresses: tina.jukic@fu.uni-lj.si (T. Jukić), i.pluchinotta@uel.ac.uk (I. Pluchinotta), rok.hrzica@fu.uni-lj.si (R. Hržica), sanja.vrbek@fu.uni-lj.si (S. Vrbek).
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By now, the academic and political interest in this concept has manifested itself mainly as a theoretical discussion of the conceptual properties of co-creation, as an empirical research of co-creation sites (Jukic et al., 2019; Voorberg et al., 2015) and handbooks of practical guidelines for practitioners (e.g. Demos Helsinki, 2018; Open Government Partnership, 2019). Although this debate has contributed to better understanding and further development of the concept, it has, however, overlooked an important aspect, i.e. maturity (or readiness) of public organizations to apply co-creation in their everyday work. As a result, not only we lack a clear idea as to what exactly constitutes favorable organizational features and structure for co-creation, but we also miss practical guidelines for public managers to make informed decisions as to what needs to be changed within their organizations to be more mature (i.e. ready and capable) to successfully implement co-creation.

The concept of maturity is not new and has been applied in a number of disciplines (e.g. software development, strategic management, innovation management, etc. - see Gued, 2020). In general, it implies an assessment of the state of completeness, readiness, and development of a certain approach (Rosenman & De Bruin, 2005). The main idea behind the development of a maturity model is to identify strengths and weaknesses of particular organizational designs (Mettler & Rohner, 2009) and provide support for overcoming the limitations noted (Lee, Lee, & Kang, 2009). This implies that the concept of maturity is ‘poly-semantic’, requiring each maturity model to clearly indicate (and adapt to) the discipline in which it operates (Sliz, 2018).

Specifically regarding co-creation, maturity models have been developed and discussed mainly in the context of the private sector. Co-creation maturity models emerged as a response to the recognition of co-creation as a new business strategy (Zainuddin & Gonzalez, 2011) able to improve the competitive advantage of firms, inter alia by building brand image (Cambra-Fierro, Melero-Polo, & Sese, 2018). Hence, a co-creating offerings maturity model has been developed with the purpose of addressing potential negative outcomes of co-creation – e.g. due to higher uncertainty, decreased efficiency etc. (Oertzen, 2018). This model represents a five-staged co-creation maturity model that aims to assess maturity stage within firms and thus support practitioners in determining the expected co-creation outcomes. Another maturity model linked explicitly to co-creation is the SaaS maturity model, which examines the maturity of SaaS (software owned and managed by the vendor, and delivered as a service over the Internet) through the prism of value co-creation (Zainuddin & Gonzalez, 2011). Eventually, Allen, Baletti, & Tanev, 2009 identify four levels of value co-creation between firms and end customers, which can serve as stages of a ‘value co-creation maturity model’.

The common denominator of these co-creation maturity models is that as a key unit of measurement they take processes/practices/services performed by firms, thus largely failing to capture the ‘hardware’, i.e. the organizational properties crucial for the successful implementation of co-creation. Moreover, the existing co-creation maturity models are designed specifically for the private sector, raising doubts about their suitability in the context of public organizations due to the substantially different assumptions and principles on which the latter rests. Namely, if the key motivation and driver for private companies is profit maximization and competition, public organizations (are expected to) give priority to the public interest and general welfare (Almeida Prado Cestari, de Loures, Santos, & Panetto, 2020). This difference implies a different type of factors (i.e. drivers and barriers) that need to be taken into consideration to assess the co-creation maturity of public organizations.

Unfortunately, only limited efforts have been made towards the development of a model for the assessment of co-creation maturity of public organizations. Instead, the concept of maturity in the public sector has been predominantly applied in the contexts of e-government (Fath-Allah, Cheikhi, Al-Qutaish, & Idrì, 2014; Saha, 2012) and strategic management (Demir, 2017; Demir, 2018), whereas a specific link to co-creation is noted only in the areas of health (KPMG Global healthcare, 2014) and connected government (Saha, 2012).

Regarding e-government, Layne and Lee (2001) developed the first fully functional e-government maturity model – a four-staged model outlining the main structural transformations of governments to come closer to the ideal of “electronically-enabled government” (Layne & Lee, 2001, 123). Their model was, however, criticized for its narrow focus placed primarily on operational and technical interfacing (completely ignoring the use of IT by external users – e.g. citizens, businesses etc.), which made Andersen and Henriksen (2006, 246) propose the Public Sector Process Rebuilding (PPR) maturity model. Although the latter introduces a user-centric perspective, by shifting the interest from what is technology feasible to ‘how end-users can benefit from it’, its exclusive focus on benefits for end-users (ignoring their contribution) does not fully reflect co-creation ideas. In addition, Valdes et al. (2011) developed the eGovernment Maturity Model (capturing technological, organizational, operational, and human capital capabilities) enabling the evaluation of public organizations against international best practices, while other authors (e.g. Joshi & Islam, 2018), aware of the importance of the local context, proposed an eGovernment maturity model for developing countries. As a related model, mention needs to be made of the Capability Model for Public Administration Interoperability (Almeida Prado Cestari et al., 2020), which takes interoperability as a critical factor for the performance of public organizations that operate in collaborative/cooperative environments. Although assessments by these (e-government and interoperability) maturity models can serve as an indication of un/favorable (digital) environment for co-creation, they cannot capture all relevant aspects and requirements for public organizations to co-create successfully.

In addition, models measuring general strategic maturity (Demir, 2017), strategic maturity specifically for innovation (Demir, 2018), or continuous improvement maturity (Fryer & Ogden, 2014) of public organizations seem too internally centered (ignoring/narrowly approaching issues relevant for external collaboration) and featuring a too ‘corporate’, i.e. New Public Management language. Moreover, some maturity models, such as Business Process Maturity, even explicitly refer to the experience of the private sector as the right path to modernization of public administrations (Zwicker, Fettk, & Loos, 2010). Although these models tackle organizational aspects of public organizations with the purpose of improving their standing (maturity) to better answer specific challenges, none of them (not even indirectly) can be used to support successful implementation of co-creation at the organizational level.

There are nevertheless two maturity models that embed the idea of co-creation – Connected Government Maturity (Saha, 2012) and KPMG Maturity Index in the Health Sector (KPMG Global healthcare, 2014). According to the former, higher level of maturity implies active engagement of all relevant citizens and business (within and across national borders), as well as a government serving as a platform of collaboration (Saha, 2012, 12). Unfortunately, the focus of Connected Government Maturity is placed high beyond the organizational level – at the national and even global level of policymaking – making it impossible for this model to offer useful support to specific public organizations interested in the implementation of co-creation in their work. Differently, the KPMG Maturity Index seems to make the greatest step forward towards the creation of a model for the assessment of co-creation maturity. However, its main limitation is that it cannot be universally applied, as it is designed specifically for the health sector (focusing on attributes found according to specific characteristics and position of patients as external co-creators). An additional limitation is its focus on procedures and channels of inclusion of patients, which overlooks the bigger picture in terms of organizational properties, resources, and capacities required for the successful implementation of co-creation.

Hence, the paper aims to fill this gap, i.e. the absence of a model for the assessment of co-creation maturity of public organizations providing practical guidelines to identify what exactly needs to be changed (e.g.
Organizational maturity is understood as maturity (i.e. readiness) of a public organization for (successful) implementation of co-creation. Thus, in contrast to the models discussed above (focused mainly on processes), the main unit of assessment here are organizations, i.e. their ‘properties’ (e.g. structure, culture, resources, staff knowledge and skills, attitudes, etc.) deemed crucial for (successful) implementation of co-creation.

Moreover, differently from existing maturity models (Giulli, 2020; Mettler & Rohner, 2009; Oertzen, 2018; Rosemann & De Bruin, 2005), which as a point of departure take the widely established Capability Maturity Model (Paulk, Curtis, Chrissis, & Weber, 1993), our model supporting the assessment of organizational maturity for co-creation is conceptualized as a multi-attribute decision support model. This decision stems from the observation that complex problems do not have a single recipe for solution (i.e. they cannot be assessed by a single measure). Instead of a one-size-fit-all measure for improvement of the organizational standing (inherently implied by ‘traditional frameworks’ addressing single-objective problems), Multiple Criteria Decision Methods (MCDM) provide both ‘prescriptive’ and ‘constructive’ support (Doumpos, Figueira, Greco, & Zopounidis, 2019). The former implies providing an answer to a problem, while the latter implies the improvement of actors’ understanding of the problem and their preferences (Doumpos et al., 2019).

The multi-attribute model developed in this paper is based on the DEX method (one of the various MCDM methods available), which has proven useful in assessments in various fields, such as innovation capability of SMEs (Grillo, Ferreira, Marques, & Ferreira, 2018), implementation of ICT in schools (Campelj, Karmet, Brednik, Jereb, & Rajković, 2019), accident management in nuclear power plants (Bohanecc, Vrbačić, Basić, Debelač, & Strubelj, 2020), Parkinson’s disease management (Boshkoska et al., 2020), assessment of e-government projects (Jukić, Bencina, & Vintar, 2012), assessment of public administration e-portals (Leben, Kunstelj, Bohanecc, & Vintar, 2006), assessment of electric energy production technologies (Bohanecc, Trdin, & Kontič, 2017), and several others (Bohanecc, Znidarič, Rajković, Braško, & Zupan, 2013). The main reason for selecting the DEX in the context of this paper is that it uses symbolic (qualitative) attributes in contrast with the majority of MCDM methods, which use numeric attributes. Namely, co-creation maturity cannot be assessed with quantitative measures (such as, for example, investment projects); thus, symbolic attributes had to be defined in order to develop a model supporting the assessment of organizational maturity for co-creation.

To provide the conceptual design of an organizational maturity model for co-creation, this paper is guided by the following research questions:

1. Which co-creation drivers and barriers are relevant in terms of the organizational structure of a public organization?
2. How could co-creation drivers and barriers related to the organizational structure of public organizations be used for designing a multi-attribute decision support model supporting the assessment of organizational maturity for co-creation?

By answering these questions, the paper endeavors to bridge theory and practice – on the one hand, to consolidate our knowledge about organizational co-creation drivers and barriers and, on the other hand, to provide a conceptual design of a model that will assess co-creation maturity and thus support public managers to renew public organizations in the spirit of co-creation principles. The answers to these questions are sought with the help of two sources of data: 1) a systematic analysis of co-creation drivers and barriers identified in the literature, and 2) an in-depth analysis of drivers and barriers from two case studies of promising collaborative innovative practices placed in different administrative settings (Anglo-Saxon and Central European). This methodological approach not only provides a list of the model attributes, but also a preliminary understanding of the potentially different impact of the attributes in different contexts.

With the purpose of providing as clear as possible elaboration of the conceptual design of our model, we have structured the paper in five sections. In the next section, we present the methodological framework building on three methods: 1) content analysis of Web of Science (WoS) records; 2) analysis of two case studies; and 3) decision expert method (DEX). In addition, in the third section, we present the results of the content analysis of WoS records and the case studies in relation to co-creation drivers and barriers. Based on these findings, in section four, we set a list of ‘organizational’ drivers and barriers, which is used for the structure of the organizational maturity model for co-creation. Finally, in the last section, we discuss the limitations of the model and reflect on potential problems, as well as open questions that need to be taken into consideration by future research.

2. Methodological framework

In the search for an answer to the research questions, and following the paper’s objective, a four-step methodological framework was used (Fig. 1). Firstly, a content analysis of the Web of Science (WoS) records was conducted in order to identify co-creation drivers and barriers. Secondly, co-creation drivers and barriers were elicited from two case studies conducted in two European countries. Thirdly, with the co-creation drivers and barriers identified in the previous steps, a multi-attribute decision support model, supporting public administration organizations to assess their maturity/readiness for implementing co-creation in their work, was developed. Lastly, the model was tested on 10 synthetic cases and modified based on the sensitivity analysis. In the following subsections, the methodological steps are described in detail.

2.1. Content analysis of the web of science papers

In order to extract co-creation drivers and barriers from the literature, we conducted a content analysis of the WoS records. The selection of records was performed with the following criteria:

- Time-span of the records: 10 years, between 2009 and 2018,
- Including the terms ‘co-creation’ or ‘co-production’,
- Type: article,
- WoS category: Public Administration,
- Written in English language.

The content analysis focused on both co-creation and co-production which, despite being different concepts, are often used as synonyms (Jukić et al., 2019). By limiting the analysis only to records that refer specifically to co-creation and/or explicitly distinguish these two
Step 1: Content analysis of WoS records

Analysis of co-creation drivers and barriers from the literature

Step 2: Case studies among 2 Europ. countries

Analysis of co-creation drivers and barriers from the case studies

Step 3: Development of the decision support model

Multi-attribute decision support model supporting the assessment of organizational maturity for co-creation of public services (in DEXi)

Step 4: Evaluation of the decision support model

Maturity assessment with 10 synthetic cases, sensitivity analysis and modification of the model

Fig. 1. Methodological framework of the research.

2.2. Case studies from two European countries

The elicitation and analysis of co-creation barriers and drivers in the context of promising practices from two European countries – the Welsh Water (WW) case study from the United Kingdom and the Slovenian case study about the Service for citizens – are based on a secondary analysis of a part of the case study reports conducted and produced in the context of the project COGOV (COGOV, 2021). The reports use data collected by means of nineteen semi-structured interviews conducted with stakeholders from the organization directly responsible for the management, organization and/or implementation of innovative projects. Specifically for the purpose of this paper, both the interviews and part of the case study reports (Ongaro et al., 2021; Pluchinotta, Williams, Ferlie, & Kitchener, 2020; Vrbek, 2020) were further analyzed to detect the keywords of the stakeholders’ argumentation and the causal connections among them.

To elicit and structure stakeholders’ knowledge on the promising practices’ drivers and barriers, Problem Structuring Methods (PSMs), and specifically Fuzzy Cognitive Maps (FCMs), were applied to the data from the interviews and the case study reports (for details on the methodology see Eden & Ackermann, 2004; Kok, 2009; Özesmi & Özesmi, 2004). The collected knowledge was, hence, processed in order to obtain a FCM for each case study (e.g. for details on the translation into variables and relationships of a FCM see Giordano, Pluchinotta, Pagano, Scricciu, & Nanu, 2020).

Specifically, PSMs are qualitative modelling approaches (Smith & Shaw, 2018) developed to deal with ill-structured problems (Rosenhead & Mingers, 2001). PSMs sit within Operational Research (OR) but represent an alternative paradigm for problem-solving, distinct from ‘traditional quantitative OR’ (see Rosenhead & Mingers, 2001). Cognitive Maps (CMs) and the derived FCMs are considered a suitable method to categorize and express structurally and manageably complex knowledge forms (Pluchinotta, Esposito, & Camarda, 2019). CMs are usually derived through group meetings or individual interviews and related reports and are thus intended to represent the subjective world of the interviewees. FCMs represent the fusion of the advances of the CM approach with the fuzzy logic theory (Kosko, 1986). Although traditional CMs were able to lay out the mutual influences of system elements, they were unable to express the fuzziness of relations in many complex implementation contexts (e.g. Pluchinotta et al., 2019).

FCMs are bidirectional graphs with feedback, consisting of nodes (i.e. variables, concepts) describing the main characteristics of the system, and connections between nodes (signed and weighted). Weights of the arcs are in the interval [−1,1] (Papageorgiou & Kontogianni, 2012). Afterward, FCMs are transformed into adjacency matrices (Harary, Norman, & Cartwright, 1965); namely, when a connection exists between two variables of the FCM, the value is coded in a squared asymmetric matrix. Following the principles of graph theory, for each variable of the FCM/matrix a Centrality Index (CI) was computed. The CI allows to identify the most important vertices within a graph, accounting for the complexity of its network of links (Özesmi & Özesmi, 2004).
It is defined as the summation of its in-arrows and out-arrows, describing the aggregated strengths of connections respectively as row and column sums of absolute values (Harary et al., 1965; Papageorgiou & Kontogianni, 2012). A higher CI implies higher importance of a variable of the maps, and thus to a driver or barrier identified by the interviewees. The CI of each variable is taken in consideration as the key criterion (along the nature of the driver/barrier – e.g. whether or not it refers to organizational aspects) to identify which drivers and barriers from the case studies are relevant to be integrated in the model.

FCM is a well-known tool used in different fields to capture expert knowledge, allowing to identify complex interrelations among elements of the system under investigation (e.g. (Ackermann, Howick, Quigley, Walls, & Houghton, 2014; Olazabal, Neumann, Foudi, & Chiabai, 2018). Within this paper, the use FCM was mainly aimed at enhancing the

Fig. 2. PRISMA diagram presenting the selection of WoS records.

Fig. 3. Examples of graphical representations of the FCM.
potential richness and diversity of the collected knowledge on co-creation drivers and barriers.

In the UK case study, the interview transcripts and final report were analyzed to detect the keywords of the stakeholders’ argumentation and the causal connections among them; in the Slovenian case study, the detailed case study report has been analyzed and final results verified with interviewers of Slovenian stakeholders. Fig. 3 displays an example of how the stakeholders’ narratives, collected during the interviews and coded from the transcriptions and case studies reports, are represented with FCM variables and relationships.

2.3. Multi-attribute decision support model supporting the assessment of organizational maturity for co-creation

A decision support model is a model supporting (public or private) decision makers in taking decisions of various types – in our case, the decision whether to implement co-creation or not (based on the assessment of organizational maturity for co-creation). Most often, decision problems require the consideration of multiple attributes/criteria, both in private and public sector domains and with regard to decisions taken by individuals (Doumpos et al., 2019). As mentioned in the Introduction, organizational maturity, in the context of our research, refers to the maturity (i.e. readiness) of a public organization for the (successful) implementation of co-creation. This organizational maturity cannot be assessed by a single measure. Instead, various attributes (i.e. organizational features) need to be defined in order to be able to measure organizational maturity for co-creation comprehensively. For such decision problems, a field of Multiple Criteria Decision Analysis (MCDA) has been established and is among the most dynamic fields in Operations Research and Management Science (Doumpos et al., 2019). The MCDA field offers a wide range of methods (MCDM – Multiple Criteria Decision Methods), techniques and tools offering support with challenges arising from multi-attribute decision making, such as: Analytic Hierarchy Process (Saaty, 1987), Multi-attribute Utility Theory (Von Winterfeldt & Fischer, 1975), Preference Ranking Organization METHod for Enrichment of Evaluations (Brans & Vincke, 1985) etc.

The MCDM employed in this paper is DEX (Decision EXPert) (Bohanec & Rajkovic, 1990). Its main characteristics are (Bohanec et al., 2017) (Dobnik et al., 2018):

- It is a qualitative MCDM. DEX has a finite value scale consisting of symbolic values such as low/medium/high or yes/no.
- DEX is hierarchical. Hierarchy represents a decomposition of a decision problem into smaller, simpler sub-problems.
- DEX is rule-based. Assessment of decision alternatives is defined in terms of decision rules.

These characteristics of DEX also indicate its core components (attributes/criteria, scales of attributes, hierarchy of attributes and decision rules) (Bohanec et al., 2013), elaborated in more detail below and presented in Fig. 4.

Attributes/criteria are symbolic variables that represent the basic properties of decision alternatives. As a qualitative MCDM, DEX uses symbolic (qualitative) attributes in contrast with the majority of MCDM methods, which use numeric attributes. In the context of this paper (see Section 4), the attributes are co-creation drivers and barriers describing the characteristics of organizational maturity.

DEX has a finite value scale consisting of symbolic values that are preferentially ordered, for example: low/medium/high, poor/average/good, yes/no (Fig. 4). When determining scales of attributes, the following recommendations need to be taken into account (Bohanec, 2007):

- Arrangement: arranged from worst (unwanted) to best (wanted).
- Avoidance of decreasing scales, as they are much less comprehensible compared to increasing scale; also, increasing and decreasing scale do not work when mixed together in a single utility function.
- The least number of values for basic attributes, but at the same time sufficient to describe all significantly different assessment situation – usually two to four values.

The number of values for aggregated attributes should gradually increase from basic attributes to the parent (root of tree) attributes – five-valued root attributes usually work quite well (Bohanec, 2007).

The hierarchy of attributes/criteria represents the decomposition of the complex decision problem (Y in Fig. 4) into simpler sub problems (Xi in Fig. 4) (Bohanec et al., 2013) (Damij, Boskoski, Bohanec, & Boshkoska, 2016). In the context of this paper, the complex decision problem represents the decision whether or not to introduce co-creation (based on the assessment of organizational maturity for co-creation); the latter has been decomposed into co-creation drivers and barriers presented in the following chapter.

Finally, decision rules represent utility functions (F in Fig. 4), which determine the aggregation of lower-level attributes to higher-level ones (Bohanec et al., 2013). Utility functions are most often represented in the form of decision tables. Three utility functions are shown on Fig. 4. Utility function #3, for example, is the aggregation of basic criteria into the second level category: F(X1, 1.1, X1, 1.2, X1, 1.3, X1, 1.4).

Fig. 4 shows DEX components incorporated in the context of the assessment of organizational maturity for co-creation. The “alternatives” represent different organizations with assessed co-creation maturity. This means that DEX can be used for absolute and relative assessment; in the first case, only one alternative (i.e. organization) is assessed for co-creation maturity; in the second case, several organizations can be assessed and compared to each other.

3. Co-creation drivers and barriers

Co-creation drivers and barriers have been extracted from two separate data sources: the in-depth literature review (i.e. content analysis) and the additional analysis of two case studies. They both inform the model supporting the assessment of organizational maturity for co-creation.

3.1. Co-creation drivers and barriers identified in the literature

The content analysis indicated that 78% (109) of the papers referred directly or indirectly to factors, i.e. co-creation drivers and/or barriers. However, in most cases, instead of being explicitly referred to as drivers and barriers of co-creation, they were mentioned indirectly as issues relevant for the process of co-creation. Hence, in the lack of explicit denomination of these issues as drivers and barriers, we identified and coded them as drivers or barriers depending on the connotation (positive or negative) of their relation to co-creation.

An additional problem faced during the content analysis was that drivers and barriers were rarely in the prime research focus, which means that they were not systematically approached and analyzed. This lack of systematization also reflected on our research result – an extensive list of substantially different drivers and barriers impossible to automatically integrate in a multi-attribute decision support model for assessment of the organizational maturity for co-creation.

The preliminary number of drivers and barriers extracted from the literature review was 502. Many of them were recurring or were too case specific, which required a thorough process of cleaning and a more general redefinition thereof. Once this process was completed, we
identified the common denominator of the drivers and barriers, namely the subject/area within the process of co-creation they affect (e.g., structure of the public organization, relationship among co-creators, external co-creators, internal co-creators and wider context). Hence, this aspect (i.e., the subject/area affected by a driver/barrier) was taken as the key criterion for the categorization of the drivers and barriers in the following five categories:

1. structural/organizational drivers/barriers,
2. drivers/barriers referring to the quality of the relationship between co-creators,
3. drivers/barriers related to internal (public organization) co-creators,
4. drivers/barriers related to external co-creators and
5. contextual drivers/barriers.

Such a categorization not only provides a more clear overview of the co-creation drivers and barriers, but enables an easy identification of the drivers and barriers that directly or indirectly affect the organizational structure of a public organization (the key issue of interest for the conceptual model developed here).

However, once the results were coded according to these categories, it became evident that the barriers to a great extent overlap as opposites to the drivers. Hence, to avoid repetition, we will initially present the co-creation drivers and then complement this information with the discussion of the barriers that lack a ‘positive’ counterpart among the drivers.

### 3.1.1. Co-creation drivers from the literature

On this basis, we identified the ‘change of existing institutional structure and culture’ as one of the key drivers within the first category – structural/organizational drivers (Rutherford & Spurling, 2016; Williams et al., 2016). This not only presumes change of the institutional ‘hardware’, but also a cultural change that reshapes the priorities, incentives, assumptions and expectations of all parties (Rutherford & Spurling, 2016). Such a change implies the introduction of new forms of accountability and governance, the formulation of new direct and interactive opportunities/channels for citizen involvement, as well as the restructurings of existing implementation, financing, monitoring and enforcement modes for accommodation of the co-creation process (Blume, 2016; Dunston, Lee, Boud, Brodie, & Chiarella, 2009; Saha, 2012; Tu, 2016; Williams et al., 2016).

Although networks are recognized as the most appropriate governance format for co-creation (Fledderus, Brandsen, & Honiingh, 2014; Nemec, Merickova, Svidronova, & Klimovsky, 2017; Pestoff, 2014), it is nevertheless difficult to determine a one-size-fits-all format for the organization of the co-creation process. Therefore, as a more general definition of a favorable model for co-creation, we note a multi-stakeholder decentralized and polycentric governance featuring less-centralized and highly connected structures (Cepiku & Giordano, 2014; Durose & Richardson, 2016c). Such a model implies flexible co-creation templates relying on incomplete, i.e. underspecified policy design – open to being directly affected by participants (Durose & Richardson, 2016a, 2016b; Poocharoen & Ting, 2015). Thus, instead of formalization and standardization of procedure, successful co-creation requires a high degree of freedom of action and autonomy of decision-making, in addition to an environment that stimulates collaboration over competition and citizen empowerment (Lindsay, Pearson, Batty, Cullen, & Eadson, 2018a; Surva, Tonurist, & Lember, 2016). Regarding the last issue (i.e. citizen empowerment), the literature indicates that the co-creation process needs to be carefully designed to secure diversity, inter alia engagement of marginalized and underprivileged groups (Compton & Meier, 2016; Tu, 2016; Van Eijk, Steen, & Verschuere, 2017). This could be achieved through what are known as ‘nudge strategies’ (Bovaird, Stoker, Jones, Loeffler, & Pinilla Roncancio, 2016), which aim to engage not only the ‘usual suspects’, but also ‘hard-to-reach’ groups (Pill & Bailey, 2012).

In the context of the second category of drivers – related to the quality of the relationship between co-creators – we register a high degree of dependency between a public organization and the citizens (Alford, 2016), as well as willingness by all to take part in co-creation (Bovaird & Loeffler, 2016; Howell & Wilkinson, 2016; Kemp & Rottmans, 2009; Pestoff, 2014; Sicilia, Guarini, Sancino, Andreani, & Rufini, 2016). The relationship between a public organization and the citizens needs to be open, accountable and transparent (Geert & Miranda, 2015; Saha, 2012), building on trust and equality (Andersen, Caswell, & Larsen, 2017; Burall & Hughes, 2016; Cho, Park, Son, & Lee, 2016; Kane & Boulle, 2018; Lindsay et al., 2018a; Lindsay, Pearson, Batty, Cullen, & Eadson, 2018c; Saha, 2012; Sicilia et al., 2016; Tu, 2016; Wild & Moraviala, 2018). Also, the relationship needs to rely on mutual understanding, constructive interaction (Edelenbos, van Meerkerk, & Schenk, 2015).
2018; Kane & Boulle, 2018; Surva et al., 2016), and the presumption that all parties clearly identify the expected outcomes and each other’s goals and effectively understand value other’s wants (Fledderus et al., 2014; Isett & Miranda, 2015; Putro, 2016; Tu, 2016; Tuurnas, 2016). There needs to be a clear commitment by all to work towards a common goal (Lam & Wang, 2014; Lindsay et al., 2018a; Ostling, 2017), which is best achieved in a sustained iterative relationship established from an early stage of the process (McCabe, 2016).

Moreover, the relationship among co-creators needs to be representative, meaning that the composition of participants needs to reflect different societal interests, views and power positions (Barbera, Sicilia, & Steccolini, 2016). Since co-creation often implies participation of many different actors, the process could benefit from inclusion of skilled/trained facilitators to guide participants to better articulate their positions, manage conflict, reconcile different needs/desires, and achieve mutual agreement (Duijn, Rijnveld, & van Halst, 2016; Howell & Wilkinson, 2016; Jones, Lorne, & Speed, 2016; Kane & Boulle, 2018; Merickova, Nemec, & Svidronova, 2015; Oldfield, 2017; Rose, 2016; Sicilia et al., 2016). Eventually, it is crucial that all co-creators feel that they have sufficient time for deliberation and performance of the tasks assigned to them (Burrall & Hughes, 2016; Isett & Miranda, 2015).

The drivers related to internal co-creators refer to the change of the mindset of public servants, i.e. change of their perception of citizens from passive subjects to active agents in the process of co-creation understood beyond mere consultation (Dunston et al., 2009; Griffiths, 2013). Such a shift presumes not only supportive perceptions, but also capacity and skills on the side of public servants to co-create (Tuurnas, 2016). Practically, this implies sufficient resources, autonomy and established networks with other public and third sector stakeholders (Lindsay et al., 2018c). Moreover, change in this direction depends on ‘strong’ leaders who take the role of advocates of co-creation with clear vision and sufficient capacity (i.e. authority) to introduce this concept within the system (Williams et al., 2016). It should be stressed, however, that strong leadership here is not understood in traditional terms, but as collaborative leadership (Crosby, Hart, & Torfing, 2017).

Among the drivers referring to external co-creators, we recognize salience of a problem as the most prominent one. This concept implies a public perception about the importance of a certain issue and the extent to which it represents an explicit real threat for citizens (McCabe, 2016; Van Eijk & Steen, 2016; Vanleeene, Voets, & Verschueren, 2017). Additional drivers for citizens to take the role of co-creators are, on the one hand, material rewards, self-interest and self-centered motivation, and, on the other hand, community-centered non-material rewards such as solidarity, normative appeal or gaining local and community control (Alford, 2016; Alford & Yates, 2016; Chang, Zhong, & Grabosky, 2018; Fledderus & Honingh, 2016; Nisti, 2018; Rutherford & Spurling, 2016; Van Eijk & Steen, 2016). A crucial role, here, is also played by self-efficacy and external/political efficacy. The former refers to citizen confidence in their capability to contribute (Bovaird & Loefller, 2016; Chaebo & Medeiros, 2017; Fledderus, Brandsen, & Honingh, 2015; Lindsay et al., 2018a; Parrado, Van Ryzin, Bovaird, & Löffler, 2013; Van Eijk & Steen, 2016; Vanleeene et al., 2017), while the latter presumes trust in public organizations to respond to citizen demands and general perception that citizen views, choices and priorities are valued and their efforts are not wasted (Fledderus et al., 2014; Griffiths, 2013; Lindsay, Pearson, Batty, Cullen, & Edson, 2018b; Van Eijk & Steen, 2016). Eventually, as a key driver, during the very process of co-creation, we identify the perception that the opportunity to influence is given to citizens about the format of participation, the co-creation activities in which they want to participate, and the degree to which they want to be engaged (Baker & Irving, 2016; Gebauer, Johnson, & Enquist, 2014).

The last group – contextual drivers – captures issues such as loose regulative framework, strong political support for co-creation, and administrative tradition. Policy change towards co-creation is easier if it is not ‘obstructed’ by rigid regulative frameworks, meaning that less defined policy areas, where neither the government nor other actors have clear solutions, are more suitable for co-creation (Burrall & Hughes, 2016; Voorberg et al., 2017). Moreover, strong political will at the highest, i.e. senior political level is crucial for the introduction of this concept in practice (Burrall & Hughes, 2016; Cepiku & Giordano, 2014; Griffiths, 2013; McCabe, 2016; Strokosch & Osborne, 2016). Regarding the effects of different administrative traditions, it is observed that authoritative state tradition and Rechtsstaat (rule of law) culture (e.g. Germany) represent an obstacle to co-creation, while authoritative state tradition and public interest culture (e.g. the UK) offer a more favorable context (Voorberg et al., 2017). An additional conducive context to co-creation is the combination of consultative and Rechtsstaat traditions (e.g. The Netherlands), as well as the combination of consultative and public interest traditions (e.g. the UK) (Voorberg et al., 2017). In the end, a favorable context presumes that co-creation is already introduced at some level in the system (for instance, as a topic within the undergraduate and postgraduate curriculum) and that the idea enjoys strong international support – implying a potential for a spill-over effect at the national level (Dunston et al., 2009; Kekez, 2018).

3.1.2. Co-creation barriers from the literature

A specific structural/organizational barrier for public organizations that already practice co-creation is the lack of evidence (i.e. formal evaluation) of the positive impact of co-creation (Baker & Irving, 2016; Loeffer & Bovalid, 2016). In contrast, as more general organizational impediments to co-creation, there emerge output-oriented practices (Fledderus et al., 2015; Parrado et al., 2013) and use of productivity (instead of quality) targets (Martin, 2018).

The key barrier that undermines the quality of the relationship between co-creators is asymmetry in knowledge, skills, power, expertise, and information (Burrall & Hughes, 2016; Hardyman, Daunt, & Kittchen, 2015; Pestoff, 2014; Wiewiora, Keast, & Brown, 2016; Williams et al., 2016). The situation could be additionally complicated by unclear accountability, fostered by vaguely defined roles and unclear expectations among co-creators (Levasseur, 2018). Moreover, the quality of this relationship could be strained by misuse of resources during the interaction (Williams et al., 2016), as well as by immense politicization of the process (Bartenberger & Szecilo, 2016). There are also psychological barriers, i.e. ‘self-serving bias’ which imply “a person’s tendency to claim more responsibility than a partner for success and less responsibility for failure in a situation in which an outcome is produced jointly” (Fledderus et al., 2015).

Furthermore, as barriers related to internal (public organization) co-creators, we recognize not only the fear from increased workload (Nesti, 2018), but also the fear that the process of co-creation could reveal existing systemic/organizational flaws (Merickova et al., 2015).

Within the fourth category of barriers which refer specifically to external co-creators (citizens, third sector organizations, etc.) we identify: the ‘risk of deflecting’, i.e. doubts among co-creators that other participants will be actively co-creating (Fledderus et al., 2015); the fear of being disproportionately burdened with a higher share of risk and responsibility, or with tasks that are too professionally oriented/abstract (Levasseur, 2018; Tuurnas, 2016); and the feeling that the costs of participation outweigh the benefits (Williams et al., 2016). External co-creators are not only discouraged to co-create when the process touches upon sensitive issues which could lead to personal confrontation and/or communal tension (Loefller & Bovalid, 2016), but also when they fear that the questions and/or criticism they raise could undermine their position, for example leading to losing social benefits (Levasseur, 2018). An additional barrier worth to be mentioned, especially in the light of the general political climate, is conservatism and bigotry among citizens belonging to the national majority directed towards marginalized vulnerable groups, whose position/status is supposed to be improved as a result of co-creation (McCabe, 2016). Eventually, as the key context related barrier, we identify cold fiscal climate – precisely, budgetary restrictions and austerity measures implemented at the national level (Lum, Evans, & Shields, 2016; Martin,
Tensions among competing public values (Crosby et al., 2017; Van Klee & Van Eijk, 2016; Williams et al., 2016) are also not helpful for the establishment of a favorable environment for co-creation. At the end, the following, more specific contextual barriers to co-creation should be pointed out: diverse local population, political divisions and conflicting personalities (Andrews & Brewer, 2013; Edelenbos et al., 2018); low average income and high levels of income inequality (Andrews & Brewer, 2013); and clientelistic policy-making (Kekez, 2018).

3.1.3. Summary of attributes from the literature review

On the basis of the literature review, 24 attributes were identified to be included in the decision support model for assessment of organizational maturity on co-creation (see Table 1). They represent a synthesized and ‘cleaned’ version of the drivers and barriers discussed in the following three categories: structural/organizational drivers/barriers; drivers/barriers related to internal (public organization) co-creators; and contextual drivers/barriers. Thus, the drivers and barriers from these categories were additionally analyzed with the purpose of excluding all those recognized as too specific – featuring either a concrete national context or practice, i.e. experience of co-creation (for more see Section 4).

Table 1
List of attributes from the literature review.

| Category                                                       | Attributes                                                                 |
|---------------------------------------------------------------|---------------------------------------------------------------------------|
| Capacity of the organization (structure, culture, competences and resources) (deriving from the structural/organizational drivers/barriers) | Readiness for change of existing institutional structure                  |
|                                                               | Network governance/decentralized/ highly connected structure              |
|                                                               | Collaborative culture                                                    |
|                                                               | Quality targets (instead of output-oriented practices and use of productivity targets) |
|                                                               | Continuous two-way channel of communication                              |
|                                                               | Engaging activities with stakeholders                                     |
|                                                               | Existence of public servant actively collaborating with the public       |
|                                                               | Evidence, i.e. formal evaluation that co-creation has positive impact     |
|                                                               | Appropriate funding and system of incentives                              |
|                                                               | Budgetary benefits for the public organization                           |
|                                                               | Soft skills by frontline public servants                                 |
|                                                               | Supportive perceptions on co-creation                                    |
|                                                               | Awareness of the benefits from collaboration with the public             |
|                                                               | Desire for positive public image of the public organization              |
|                                                               | High profile public servants take the role of advocates of co-creation   |
|                                                               | Level of decision-making autonomy                                        |
|                                                               | Readiness to give significant discretion to external co-creators         |
|                                                               | Tailor-made solutions matching the needs of each individual              |
|                                                               | Loose regulative framework                                                |
|                                                               | Support and promotion of co-creation by international organizations, e.g. OECD, EU |
|                                                               | Strong political will for co-creation                                    |
|                                                               | Collaborative-based institutional environment                             |
|                                                               | National legislation in favor of co-creation (i.e. budgetary restrictions, austerity measures) |

In addition, the drivers and barriers from the two categories referring to ‘external co-creators’ and ‘quality of the relationship between co-creators’ were excluded as not suitable, since they do not refer (directly or indirectly) to organizational aspects of public organizations, i.e. their properties and capacity. Precisely, the latter category is excluded for being focused predominantly on the quality of the relationship developed among (external and internal) co-creators within the context of a specific co-creation process; while the former for referring to intrinsic features and perceptions of external co-creators (e.g. citizens and third sector organizations), which goes beyond the understanding and control of public servants – the prime users of this model.

3.2. Elicitation and analysis of promising practices’ barriers and drivers: stakeholders’ point of view

In the previous section, co-creation drivers and barriers identified in the literature were presented. In this section, we present the results of the FCM analysis which builds on the drivers and barriers identified in the context of the two case studies – precisely, in the interviews and the case study reports. For each case study, we provided a list of drivers and barriers identified by the stakeholders interviewed, together with the centrality index (CI), a graphical presentation of their relationships, and a brief explanation of the most important results (i.e. drivers and barriers with the highest CI). Within this paper, the CI represents the level of importance of each driver/barrier in each case study.

3.2.1. Welsh Water - UK

The UK case study refers to the Water Resilient Community project implemented by the Welsh Water (WW) in the Rhondda Fach in Wales, a place characterized by several vulnerabilities such as high level of unemployment and deprivation. An aged water distribution network in the Rhondda Fach area needed to be replaced in order to meet water quality standards. WW decided to use this event as an opportunity for customers affected by the works, ensuring the continuity of the supply with less discomfort as possible for the community. Thus, the Water Resilient Community project also focused on civic engagement, listening to and communicating with residents to increase the community resilience of the area and to provide lasting benefits, such as securing high-quality customer service.

WW is a company limited by guarantee but a not-for-profit organization, providing drinking water and sanitizing wastewater for 3 million customers across Wales and some parts of England. After its privatization in 1989, WW was bought by Wester Power Distribution in 2000, and afterwards, the water department was sold to Glas Cymru, which owns, finance and manages WW. In 2001, Glas Cymru deprivatized and transformed WW into a not-for-profit organization (unique example in the water sector in England and Wales). Namely, WW has no shareholders, and any financial surplus is reinvested into the organization and for the local community.

Despite the ownership specifics and the fact that WW is not a classical public organization, we included this COGOV case in the paper due to the following features that strongly resonate with the idea of public organizations:

- provision of public service,
- long-term community oriented strategic objectives, and
- strong sense for public interest (community it serves) vs. profit maximization.

The case study (including information about the organization responsible for its implementation) is fully described in the Deliverable 2.3 of the COGOV project (Pluchinotta et al., 2020).

The main barriers (with the highest CI) identified for the WW case study are the variables ‘suitable organizational structure’ (variable A18 in Table 2) and ‘teaming-up activities’ (A17). They represent a causal-effect chain where the effects of the former (A19, A20, A21 and A22),
Table 2

| ID | Variable | Cluster | Centrality index |
|----|----------|---------|-----------------|
| A3 | Effectiveness of the WW’s Rhondda Fach water resilient community project | Main | 4.60 |
| A18 | Suitable organizational structure | Objective | 4.30 |
| A17 | Team-up activities within WW | Barrier | 4.20 |
| A7 | Designated staff | Driver | 3.50 |
| A13 | Clear objectives and ideas on the approach to use | Barrier | 3.50 |
| A24 | Dedicated budget | Driver | 3.40 |
| A14 | Engaging activities with stakeholders | Barrier | 3.20 |
| A12 | Structured stakeholder analysis (identifying who are the right people to involve) | Barrier | 2.80 |
| A11 | WW’s willingness to invest in the community | Driver | 2.70 |
| A9 | Customers’ trust | Driver | 2.50 |
| A15 | Delays | Barrier | 2.20 |
| A6 | Effective meetings/workshop/activities with the community | Driver | 2.00 |
| A19 | Flexibility in allocating budget and time for project’s activities | Barrier | 1.90 |
| A10 | Long term community-oriented objectives of the WW’s board | Driver | 1.40 |
| A25 | Dedicated resources (as a medium/big team involved) | Barrier | 1.40 |
| A20 | Collaborative working setting | Barrier | 1.20 |
| A1 | Collaboration with community | Objective | 1.00 |
| A2 | Collaboration with other local organizations/associations | Objective | 1.00 |
| A4 | Effective project management | Driver | 1.00 |
| A21 | Efficient communication within WW | Barrier | 1.00 |
| A16 | Project’s costs | Barrier | 1.00 |
| A8 | Customers’ awareness on WW’s mission | Driver | 0.80 |
| A5 | Strong relationship with gatekeepers | Driver | 0.60 |
| A22 | Assessment homogeneity from different areas of WW (i.e. GPR assessment) | Barrier | 0.60 |
| A23 | Availability of a centralized file storage system | Barrier | 0.60 |

3.2.2. Service for citizens’ initiatives in the city of Ljubljana – Slovenia

The Slovenian case study refers to the Service for Citizens’ Initiatives in the City of Ljubljana, which is a web portal enabling citizens to directly participate and contribute to the work of the municipality. This interactive online tool was established in 2008, with the purpose of providing a direct channel of communication and access of citizens’ initiatives regarding local problems. Ten years later, i.e. in 2018, the Service for Citizens’ Initiatives was upgraded with the aim of, on the one hand, easing the work of the municipal administration, and, on the other hand, improving consistency and relevancy of the answers to citizens’ initiatives. Precisely, the reform of the Service addressed the lack of a central point where all citizens’ initiatives are gathered and then sent to the relevant department. The reform not only implied a more sophisticated technological solution, but also resulted in a better communication and cooperation with citizens. Hence, citizens have used the Service for Citizens’ Initiatives to complement the work of the municipal administration and thus improve public service provision – e.g. by turning the attention of the municipality to damaged (or a lack of) infrastructure or suggesting solutions to specific local problems under municipal authority.

The Municipality of Ljubljana is the organization responsible for the implementation of the Service for Citizens’ Initiatives. The municipality is composed of its municipal administration, local public institutions and public enterprises (in the areas of primary education, health care, culture, sport, local infrastructure, etc.). Its internal organizational structure is rather centralized, presuming clear division of tasks and responsibilities across vertical and horizontal lines. In such a context, the unit responsible for the Service for Citizens’ Initiatives has a central coordinating role in securing that as many as possible municipal departments and subjects under municipal authority are properly included and responding to citizens’ initiatives. More detail information about the case study and the organizational features of the Municipality of Ljubljana (as the organization responsible for its implementation) are presented in the Deliverable 2.3 of the COGOV project (Vrbek, 2020).

The variable ‘workload’ (A16) is the main barrier (with the highest CI) identified by the respondents in the context of the Service for Citizens’ Initiatives in Ljubljana. Precisely, it was the increased workload that pressed for the 2018 upgrade of the Service, while at the same time it represented a constraint to the reform itself as the change was feared to imply an additional burden for the municipal employees. Interestingly, although the barrier ‘suitable internal organizational structure’ (A15) causes the same effects (i.e. A12, A13, A14) as the key barrier – ‘workload’ (A16), it (A15) has been only marginally considered by the respondents (indicating low CI). Due to the same reason, i.e. low CI, the barriers ‘Service’s cost’ (A17) and ‘adaptation period to the new system’ (A4) are also considered marginal.

Hence, instead of barriers, the interviewees rather focused on the drivers of the process. The variable ‘long term community-oriented objectives’ (A5) – which derives from the ‘strong leadership of the Mayor’ (A7) and represents a causal chain together with ‘willingness to invest in the Service’ (A6) – emerges as the main driver. Moreover, this variable (A5) and ‘awareness among Civil Servants of the importance of their work’ (A8) enhance the ‘motivation among Civil Servants to support the reform’ (A9). Accordingly, the role of the Mayor and the consequences of his decisions are recognized as the central drivers within this case study. Table 3 shows a list of variables of the Service for Citizens’ Initiatives in the city of Ljubljana and Fig. 6 shows FCM variables and relationship.

3.2.3. Summary of attributes from the case studies

The analysis of the case studies provides drivers and barriers that support 8 attributes of the decision support model for the assessment of organizational maturity for co-creation. The drivers and barriers, relevant for the model, were identified on the basis of the following three criteria: 1) high CI; 2) tackling an organizational aspect; and 3) not being too case specific. Thus, the main goal of the additional FCM analysis of the case studies is to confirm and complement the data from the literature review.

Table 4 presents the data from the case studies linked to the specific model attributes it supports. It is evident that the findings of the additional analysis of the case studies strongly resonate with the data from literature review. Namely, 7 of the case study drivers and barriers support the model attributes already identified on the basis of the literature review, whereas one model attribute – structured stakeholders analysis – derives specifically from the findings of the UK case study. The latter was given a special place, not only because of its strong CI, but also because of the importance assigned (in the literature review) to the representativeness of...
4. Multi-attribute decision support model supporting the assessment of organizational maturity for co-creation

In previous steps, co-creation drivers and barriers were identified through the content analysis of WoS records and detailed analysis of two case studies. Based on these two data sources, a multi-attribute decision support model supporting the assessment of organizational maturity for co-creation was developed using the DEX method.

4.1. Attributes of the model

The attributes represent co-creation drivers and barriers, which were elicited from the content analysis of WoS records and case studies presented in the previous section. The model structures the criteria in three categories which (to a certain extent) follow systematization, i.e. categorization of drivers and barriers gathered from the content analysis – the categories related to ‘to external co-creators’ and ‘quality of the relationship between co-creators’ were excluded (see sub-Section 3.1.3). Moreover, the model is selective regarding the drivers and barriers identified in the context of the case studies. This implies that only organization related drivers and barriers with high or moderate centrality degree, i.e. recognized by stakeholders as important, are used as basis for the criteria of the model.

Eventually, the final filter for the drivers and barriers (from both the literature review and the case studies) to be integrated as attributes in the model was to fulfil two additional criteria: 1) not to be exclusive to a specific national context and 2) not to be related to a specific project, i.e. experience of co-creation. The former criterion is set with the purpose to ensure universal application of the model across different administrative traditions. The latter, however, emerged as a response to the observation that many drivers and barriers are too project/practice specific, lacking a ‘higher’ organizational perspective and thus being irrelevant for a model that aims to assess organizational maturity regardless of context.

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Table 3
List of variables of the Service for citizens’ initiatives in the city of Ljubljana FCM.

| ID  | Variable                                                                 | Cluster         | Centrality index |
|-----|--------------------------------------------------------------------------|-----------------|------------------|
| A3  | Effectiveness of the Service for Citizens’ initiatives in the City of Ljubljana | Main            | 3.20             |
| A16 | Workload                                                                 | Objective       | 2.50             |
| A10 | Improvement of the Service (upgrade 2018)                                | Objective       | 2.30             |
| A5  | Long term community-oriented objectives                                   | Driver          | 1.90             |
| A8  | Awareness among Civil Servants of the importance of their work           | Driver          | 1.70             |
| A11 | Negative image of the Municipality                                        | Driver          | 1.50             |
| A2  | Better and easier access of Citizen’s initiatives                         | Objective       | 1.40             |
| A6  | Willingness to invest in the Service                                      | Driver          | 1.40             |
| A7  | Strong leadership of the Mayor                                            | Driver          | 1.40             |
| A9  | Motivation among Civil Servants to support the reform                     | Driver          | 1.30             |
| A12 | Inconsistent and contradictory responses to same/similar citizens’ initiatives | Barrier         | 1.10             |
| A13 | Delayed answers                                                           | Barrier          | 1.10             |
| A14 | Lost and unanswered initiatives                                           | Barrier          | 1.10             |
| A15 | Suitable internal organizational structure                                 | Barrier          | 0.90             |
| A17 | The Service’s cost                                                        | Barrier          | 0.80             |
| A1  | Collaboration with Citizens and contribution to a better public service   | Objective       | 0.70             |
| A4  | Adaptation period to the new system                                       | Barrier          | 0.50             |
Hence, the decision support model for assessment of organizational maturity for co-creation consists of the drivers and barriers of co-creation divided in three main categories (Fig. 7):

- organization capacity (structure, culture, competences and resources);
- staff capacity (knowledge and skills, attitudes, autonomy); and
- the wider political and normative context in which the public organization acts.

The criteria from the first category ‘capacity of the organization (structure, culture, competences and resources)’ are further divided into three sub-categories: structural characteristics of organization; communication; and financial capacity.

In the context of the first sub-category, i.e. ‘structural characteristics of organization’, we defined four criteria for assessment of the organizational setup and features of their public organization:

- Readiness for change of existing institutional structure (literature and the UK case study – A18).
- Network governance/decentralized/highly connected structure (literature).
- Collaborative culture (literature and the UK case study – A17).
- Quality targets (instead of output-oriented practices and use of productivity targets) (literature).

The second sub-category embeds five criteria referring to the public organization’s communication strategy:

- Continuous two-way channel of communication (literature).
- Engaging activities with stakeholders (literature and the UK case study – A14).
- Structured stakeholder analysis, i.e. identifying who are the right people to involve (the UK case study – A12).
- Existence of public servant actively collaborating with the public (literature).
- Evidence, i.e. formal evaluation that co/creation has positive impact (literature).

The third sub-category refers to the financial capacity of the public organization, which is measured on the basis of the following two criteria:

- Appropriate funding and system of incentives (literature and the UK – A24).
- Budgetary benefits for the public organization (literature).

The second category ‘staff’s capacity (knowledge and skills, attitudes, autonomy)’ consists of three sub-categories: competences; mindset; and autonomy.

The first sub-category i.e. ‘competences’ refers specifically to the competences of public servants:

- Soft skills by frontline public servants (literature)
- Co-creation education and trainings (literature).

In addition, the second sub-category ‘mindset’ is interested in
assessing the readiness of public servants for co-creation, which is based on four criteria:

- Supportive perceptions on co-creation (literature and the Slovenian case study – A9).
- Awareness of the benefits from collaboration with the public (literature and the Slovenian case study – A8).
- Desire for positive public image of the public organization (literature).
- High profile public servants take the role of advocates of co-creation (literature).

The last sub-category ‘autonomy’ builds on three criteria:

- Level of decision-making autonomy (literature).
- Readiness to give significant discretion to external co-creators (literature).
- Tailor-made solutions matching the needs of each individual (literature).

Eventually, the third category of the model – ‘the wider political and normative context in which the public organization acts’ consists of five criteria:

- National legislation in favor of co-creation, i.e. budgetary restrictions, austerity measures (literature).
- Loose regulative framework (literature).
- Collaborative-based institutional environment (literature).
- Support and promotion of co-creation by international organizations, e.g. OECD, EU (literature).
- Strong political will for co-creation (literature and the Slovenian case study – A7).

4.2. Scales of attributes

Attributes at the lowest level (i.e. basic attributes) have a scale with Yes/No options/values (this means that for each of the basic criteria presented, a question is defined to be answered based on a Yes/No scale). Sub-categories (i.e. attributes at the second level) have a three-point scale (Poor, Average and Good), while a five-point scale has been defined for the attributes at the highest level (Poor, Average, Good, Very good and Excellent). Higher levels of the decision tree are required to have a bigger scale as this improves the sensibility of decision model.

4.3. Hierarchy of attributes

As mentioned in Section 2.3, the hierarchy of attributes represents the decomposition of the complex decision problem into simpler subproblems. In our case, simpler subproblems are represented by co-creation drivers and barriers as identified earlier. Hence, assessment of organizational maturity for co-creation (complex problem) is to be conducted using a decision-support model. This tree-like hierarchy of attributes is presented in Figs. 4, 7 and 8.

4.4. Decision rules

With the help of utility functions (i.e. decision rules), basic attributes are aggregated to higher ones (categories and sub-categories). All basic attributes in each sub-category have the same weight.

Fig. 8 shows the number of decision rules in the decision model. In total, there are 291 decision rules. The total number of decision rules for each (sub)category is calculated based on the used scale for each attribute: \( \text{number of decision rules} = \text{Scale} \times \text{Number of basic attributes} \). For example:

- The sub-category Financial capacity contains two basic attributes: (1) Appropriate funding and system of incentives and (2) Budgetary benefits for the public organization. The scale for both basic
attributes consists of two possible values (Yes and No). The total number of decision rules in this case is \(2^2 = 4\). These decision rules are shown in Fig. 9. This sub-category (i.e. Financial capacity) has a three-point scale and there are four possible combinations of basic attributes. If both basic attributes are assessed with “No”, then the value for the sub-category Financial capacity will be “Poor”. If both basic attributes have “Yes”, then the assessed value for the sub-category Financial capacity will be “Good”. If one of the basic attributes will be assessed with “No” and the other with “Yes”, the sub-category Financial capacity will be assessed as “Average” (Fig. 9).

- Another example of utility function for the category Staff capacity (knowledge and skills, attitudes, autonomy) is shown in Fig. 10. The total number of decision rules is \(3^3 = 27\). The category Staff capacity has five-point scale and in Fig. 10 we can see how the final score for this category changes based on the assessed values of the sub-categories.

- Fig. 11 shows the utility function for the category ‘Structural characteristics of organization’. The utility function for this category shows that an organization would get a final score ‘Good’ in this field only if three or more criteria were assessed with “Yes”; in addition, if three criteria were assessed with “No”, then the final assessment of this category would be “Poor”. In other cases, the final score for this category would be “Average”.

Similarly, decision rules for other criteria and (sub)categories in the decision model have been defined.

4.5. Development and evaluation of the model

Based on the above presented elements of the multi-attribute decision support model DEX, the model has been developed using the software tool DEXi (Bohanec, 2020). When the model was built, the assessment was performed with ten synthetic cases (organizations) and with equally weighted criteria. The values for each basic criterion (i.e. Yes/No) have been determined randomly for all (ten) cases using a random generator (Random.org, 2021).

After the maturity assessment had been conducted with 10 synthetic cases, we came to the following realization. Nine out of ten cases achieved an identical score in the third category of the model (‘the wider political and normative context in which the public organization acts’), indicating that this part of the model is insensitive to changes made in the values of attributes. This led us to re-think the structure of this category and, consequently, to conduct a sensitivity (i.e. if-then) analysis of this part of the model. At first, this category consisted of five attributes (see Section 4.1) which were not organized within subcategories. During the if-then analysis, we split the third category into two sub-categories: normative environment and political context (thus, we did not influence the content of the model, but its structure).

Fig. 12 shows the second round assessment results for 10 synthetic cases (organizations) gained with the model with a newly structured structure.
The final score of organizational maturity for co-creation is seen in the second row (Fig. 12). The results reveal that, with changes of the structure of the third category of the model, the sensitivity of the latter increased.

According to the assessment results (Fig. 12), the most mature alternative (i.e. organization) for co-creation is the alternative ‘Selected organization 2’. An example of selective explanation analysis (Fig. 13) for this organization shows the weak points from which the alternative would benefit in terms of co-creation maturity if they could improve it.
5. Discussion and conclusion

5.1. Contributions to existing literature

The paper was guided by two research questions:

1. Which co-creation drivers and barriers are relevant in terms of the organizational structure of a public organization?
2. How could co-creation drivers and barriers related to the organizational structure of public organizations be used for designing a multi-attribute decision support model supporting the assessment of organizational maturity for co-creation?

Co-creation drivers and barriers have been (in)directly addressed by several studies. The present article builds on existing research efforts in two directions. First, it offers a classification of co-creation drivers and barriers into five categories relating to: 1. organizational structure; 2. quality of the relationship between co-creators; 3. internal (public organization) co-creators; 4. external co-creators; and 5. context. Second, it uses (most of) these drivers and barriers to build a conceptual design of the model for the assessment of organizational maturity for co-creation for public organizations. Thereby, the article fills the gap in the relevant literature, which has never dealt with such assessment before. By organizing co-creation drivers and barriers hierarchically within the identified categories, it was possible to build a hierarchical decision support model offering support to public organizations in the assessment of their co-creation maturity.

5.2. Research limitations

Our findings suggest that the model criteria cannot be applied nondiscriminatively across different administrative contexts. For instance, the Slovenian case study emphasizes the role of the mayor at the expense of the institutional organizational structure. Due to the strong interest of the mayor to hear/respond to citizens’ needs, the hierarchical set-up of the municipal public administration did not represent an impediment. This is very much in line with the conclusion of (Voorberg et al., 2017), made in another CEE context (i.e. the Estonian), that institutional barriers cannot hinder co-creation if policy-makers are convinced of its usefulness. However, these observations contradict the results of the UK case study (Anglo-Saxon administrative tradition) where suitable organizational structure is noted as the key barrier. Moreover, some authors (Tomazević, 2019) warn about specific governance features of the CEE countries, in particular over-detailed regulation as a problem that could hinder complex administrative processes. This observation is important considering the contextual criterion ‘loose regulative framework’ identified in the model as a driver of co-creation. Thus, these concerns about potentially different impact of the results of the literature review and the case studies imply that an organizational maturity assessment model for co-creation needs to be sensitive to the context where it is applied, inter alia to different administrative traditions.

The paper, however, does not give an answer as to what is the best
way to integrate this aspect in such a model (which stands out as one of the article’s limitations). Instead, it leaves this issue for further academic debate to critically discuss the pros and cons of different scenarios – e.g. definition and incorporation in the model of several sets of criteria featuring different administrative traditions, or use of different weights and decision rules in one decision support model (depending on administrative tradition). While the latter is enabled by the DEX methodology, the target users and their digital skills should also be taken into account. Thus, at first glance, the former option referring to different sets of context specific attributes seems more reasonable and realistic. However, the model attributes presented here rely on a solid number of papers and two case studies featuring co-creation drivers and barriers that repeat in different contexts. This could imply that, in the end, different sets of context bound model criteria might not turn out to be substantially different. Seen from this perspective, it seems more appropriate to determine different weights of the present list of attributes according to the contexts where the model is planned to be applied.

Additional limitation of the article is that it offers a conceptual model of organizational maturity assessment for co-creation and not a fully-fledged developed tool (or a prototype). This means that the data and conclusions presented here were not tested on the ground, but on 10 synthetic cases for which the values of criteria were determined with random generator. Nevertheless, these 10 cases allowed us to apply a sensitivity analysis and, based on the latter, to adapt the model structure. Thus, the article only conceptualizes the structure and substance of the model for organizational maturity assessment for co-creation, leaving an open door for other academics and practitioners to test and/or adapt it to their context. At the more operational level, this could imply a need for a ‘sensitivity analysis’ with the purpose of revealing a potentially prevailing impact of a specific attribute on the assessment result.

Moreover, the conceptual model presented here relies on a systematic literature review that has a relatively narrow focus, placed explicitly on co-creation and co-production. So, despite the relatively high number of papers analyzed (109) and the overlap of drivers and barriers from the two sources, the decision to limit the literature review only to these two terms may have led to overlooking drivers and barriers relevant for co-creation discussed in the context of similar concepts (e.g. network governance).

These limitations, however, do not undermine the contribution of the article to both science and practice. The original scientific contribution lays in the conceptualization of the idea of organizational maturity for co-creation specifically in the context of the public sector. The article not only systematically summarizes the present theoretical knowledge about co-creation (and coproduction), but goes a step further and combines it with the concept of decision support models with the purpose of maximizing its practical applicability. Thus, the article sets the layout of a model with an enormous practical potential for public organizations to use the co-creation theory strategically – with the purpose of improving their capacity to implement this promising concept in their work. In addition, the originality of the paper also comes from the methodology point of view, i.e. integrated application of cognitive maps and decision support model; namely, in the literature only one such approach has been identified (Grillo et al., 2018).

5.3. Future research directions

The article makes a pioneer step in conceptualizing a model for assessment of organizational maturity for co-creation, thus aiming to provoke a wider academic debate about:

- its practical usage in different administrative settings,
- its operationalization (in terms of technical requirements, substance and methodology), and
- possibilities of widening the application of the idea of assessment of maturity for co-creation to other relevant areas (beyond the organizational capacity).

Regarding the first issue, the two case studies indicate a need for determining context sensitive weights for securing the relevance of the model on the ground. A research of different contexts as potential sites for application of the model will not only have a practical value (in terms of the application of the model), but also theoretical value by providing a comparative insight into the impact of different contexts (including administrative traditions) on organizational maturity for co-creation.

Regarding the second point, future research is expected to contribute to the improvement of the conceptual design and operationalization of the model for assessment of organizational maturity for co-creation. This could be achieved by suggesting more sophisticated solutions that build on a higher number of case studies; additional data-gathering methods for model criteria identification; and/or alternative methodologies to the DEX methodology as a more suitable basis of the organizational maturity assessment model for co-creation.

Last but not least, the very idea of ‘assessment of maturity for co-creation’ presented here in the context of public organizations might inspire future research to design similar models that will refer to other aspects, i.e. areas relevant for successful co-creation. For instance, not all public services are equally suitable for co-creation, therefore widening and readapting this concept of assessment of maturity for co-creation to public services could be the next logical step. This will significantly help public organizations in assessing which public services they provide are more suitable (i.e. mature) to be renewed on the basis of co-creation.

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