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Application of ICT in the co-production of social services

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Abstract

Aim/purpose – The purpose of this article was to identify the information and communication technology (ICT) tools fostering the co-production of social services, acknowledging that the technological environment is an important contextual condition enhancing the development of co-production.

Design/methodology/approach – The method used was systematic literature review (SLR).

Findings – As a result of the review, the catalog of solutions and tools offered by information and communication technologies was presented. The results of the research carried out indicate that the co-production of social services is favored by the use of such ICT tools as mobile applications, crowdsourcing, open data, big data, real-time data collection and analysis, gamification, and social media.

Research implications/limitations – The main implication of the research is the comprehensive catalog of ICT tools that can be used to facilitate social service co-production. ICT tools also favor the emergence of new forms of co-production; therefore, the acquaintance of these tools can accelerate this process. The study is constrained by several limitations. The study is constrained by several limitations. First, applied methodology, which is qualitative, analyzes secondary data. Second, the co-production in the social services area includes many and various services, and ICT application and impact can differ by specific type of service.

Originality/value/contribution – This paper contributes to research on the co-production of social services, particularly in terms of the use of new technologies in this process, in two ways. First, the development of the catalog of ICT tools favoring social service

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co-production. Their application fosters the involvement of contextual actors, increasing the efficiency, effectiveness, and quality of social services. In this way, the social service co-production contributes to better addressing the citizens' needs, increasing their quality of life and well-being, and unleashing their potential. Second, by taking the PSL perspective and situating factors favoring co-production within a service ecosystem framework, this paper draws attention to public value emerging from new relations, extensive dialogue, deliberation, common arrangements, and collaborative activity in virtual communities.

Keywords: co-production, public services, social services, public management, ICT.

JEL Classification: H41, H83, O33, O35, Z18.

1. Introduction

In modern societies, social services are incredibly vital. They are not only beneficial for individuals, but they also have significant value for groups, communities, and ultimately, society (Evers, 2005; Frączkiewicz-Wronka, 2014). This is because by meeting basic human needs, the consumption of social services generates human capital (Janoś-Kresło, 2002), thus contributing to the stimulation of social development, economic growth, and civilizational progress (Sochacka-Krysiak & Małkowska, 2003). People should use all their resources, but due to their own and external constraints, they do not always have the capacity and appropriate skills. Social services can contribute to releasing these resources (Evers, 2009), thereby contributing to the construction and enrichment of an individual's intellectual abilities and physical potential (Bitner et al., 2020). This, in turn, determines the potential of society and the state. Therefore, the provision of social services is essential to the appropriate functioning of social and economic life.

Since social services are personal in nature (Voorberg et al., 2015), have enduring significance for citizens (Pestoff, 2012), and directly determine citizens' quality of life and opportunities in life (Podgórnjak-Krzykacz, 2015), they are especially receptive to participatory ways of their provision. One of them is the co-production of services.

For a while, co-production has been one of the cornerstones of public sector reform (Osborne et al., 2016) because of its ability to effect positive change for individuals, society as a whole, and the state. It is perceived as a valuable path to increasing the effectiveness and efficiency of the service delivery system, as well as improving service quality (Cepiku & Giordano, 2014; Mok, 2020; Radnor et al., 2014), and providing more responsive, inclusive, and sustainable services (Jaspers & Steen, 2020; Vanleene et al., 2017).

Colliding the potential of co-production and the importance of technology, it becomes relevant to ask how new technologies can contribute to facilitating social services co-production.

In the public sector and social service management, as in almost every area of our lives nowadays, an increase in the importance and the use of the opportunities offered by new technologies is observed (Meijer, 2012). Information and communication technologies (ICTs) reinforce the power of solutions based on networks, cooperation, and citizen contribution (Cepiku et al., 2021; Lynn et al., 2022). One of these is the co-production of social services supported by ICT (Clifton et al., 2020; Lember et al., 2019). It is indicated that, through the use of the solutions offered by new information and communication technologies, it is becoming increasingly easy to engage users of social services (Clark et al., 2013; Linders, 2012; Sorrentino et al., 2022). Thus, the development of ICT facilitates co-production and stimulates the emergence of new forms of it (Clifton et al., 2020; Lember, 2018; Osborne & Strokosch, 2013). Nevertheless, a comprehensive catalog of ICT tools for the co-production of social services is lacking in the literature. This paper contributes to bridging this gap.

The article aims to identify the tools of information and communication technologies that favor social service co-production. Its main contribution is the synthesis of existing research on the use of new technologies in this process. For this purpose, a systematic review of the literature was used, and an overview catalog of ICT tools has been developed.

The article starts with a description of the theoretical background and an explanation of the most important notions. Next, the research question and methods are described. Then, the author presents the results of a systematic literature review, identifying ICT tools applied in social services co-production. The article ends with a discussion and conclusions.

2. Theoretical background

2.1. Social services co-production in services ecosystems

Ways of understanding the notion of social services in science and socio-economic practice are numerous. The difficulty in defining social services stems from the different social policy traditions and welfare state models, compounded by the complexity and multifaceted nature of this term. In addition, conceptual categories, such as services of general interest, consumer services, personal services, person-centered services, and social benefits, are converging or closely related to social services (Grewiński, 2021).

Social services, as a particular type of public service, are related to the maintenance of social infrastructure. The provision of these services improves the quality of life for individuals as well as society as a whole. Social services include public provision of basic education, culture, recreation, social housing, social care, public safety, and healthcare services (Rogoziński, 2000). Social services are defined as “all activities directed towards human beings aimed at shaping and enriching their physical and intellectual resources, resulting in the formation of human capital” (Janoś-Kresło, 2002, pp. 28-29). Similarly, another definition indicates that “social services are activities aimed at satisfying, through collective consumption (i.e., publicly financed), such human needs that have a positive impact on the quality and usefulness of human capital, thus contributing to economic development and civilizational progress” (Sochacka-Krysiak & Małkowska, 2003, p. 241).

Therefore, social services are not only beneficial for individuals but are also considered to have significant value for groups, communities, and ultimately, society (Evers, 2005). This means that they serve socially useful purposes (Janoś-Kresło, 2002) and generate public value (Ćwiklicki, 2022; Moore, 1995). The provision of social services is essential to the proper functioning of societies and economies, constituting a source of benefits for all members of the community (Iwankiewicz-Rak, 2012). Therefore, the conclusion can be drawn that social services contribute significantly to the achievement of sustainable socio-economic development goals. Hence, we have observed the growing interest of both practitioners and scholars in the management of social services.

The currently dominant public management paradigm of governance is fundamentally concerned with the microstructures of social life and opens up the perspective of social micro-interactions (Hausner, 2008). Thus, it assigns an increasing role to citizens as active contributors in the social service delivery process and implies a more pluralistic model of these services (Osborne, 2021). One of these models is the co-production of services.

Co-production does not have a single, commonly accepted definition. The researchers define it as “an umbrella concept that captures a wide variety of activities that can occur in any phase of the public service cycle and in which state actors and lay actors work together to produce” benefits¹ (Nabatchi et al., 2017,

¹ I acknowledge the co-production typology proposed by Nabatchi et al. (2017), where “co-production involves two types of participants: (1) state actors who are (direct or indirect) agents of government serving in a professional capacity (i.e., the ‘regular producers’) and (2) lay actors who are members of the public serving voluntarily as citizens, clients, and/or customers (i.e., the ‘citizen producers’). However, to capture the multiplicity and diversity of non-state actors engage in co-production, in this article the term “contextual” has been adopted.

p. 796) or “the voluntary or involuntary involvement of social service users in any of the design, management, delivery and/or evaluation of social services” (Osborne et al., 2016, p. 640). To capture the multiplicity and diversity of non-state actors engaging in co-production, in this article, the term “contextual” has been adopted. Co-production is defined by the author as an alternative, and participatory model of social service provision that engages contextual actors in the design, management, delivery, and/or evaluation of these services and implies a significant contribution of their resources (including knowledge, capacity, skills, creativity, efforts, time, and money).

In the governance model, co-production is recognized as part of the very essence of social services for at least two reasons (Brandsen et al., 2018; Osborne et al., 2013; Osborne & Strokosch, 2013). First, “because the users themselves are an active part of the service process not a passive recipient of its outputs;” second, “because its performance is created where the users’ expectations collide with their experience of the service” (Osborne et al., 2015, p. 426). This approach is at the heart of public administration management (PAM), the initial strand in the study of co-production.

However, the current narrative in public management is that the collaborative perspective of governance is indispensable, but not sufficient (Osborne et al., 2015). This has set a further direction for the evolution of public management and social service delivery models. The next stage of public service logic (PSL) has been proposed (cf. Alford, 2016; Cordella & Paletti, 2018; Eriksson, 2019; Grönroos, 2019; Hodgkinson et al., 2017; Osborne, 2021; Sønderskov & Rønning, 2021). Drawing on service management theory, this approach no longer defines social services solely as produced within collaboration networks but more broadly within social service ecosystems (Osborne, 2021).

The service ecosystem is defined as “a self-sustaining, self-regulating system of resource-integrating actors who are linked by common institutional arrangements and mutual value creation” (Vargo & Lusch, 2016, pp. 10-11). Osborne (2021, p. 35) pointed out that “this metaphor, drawing upon ecological science, is a heuristic for representing and understanding the complex components and interactions that go into the delivery of a service and the creation of value through these processes.”

In the ecosystem approach, at the core of social service delivery are the interactions of actors integrating resources and creating value in the co-production of services, influenced by internal and external factors (Hodgkinson et al., 2017; Osborne & Strokosch, 2020; Petrescu, 2019). The co-production “generates

specific values directly for the recipients and the broadly understood social environment” (Gawron, 2022, p. 135). Among these values, co-production advocates indicate, in particular, the potential to make significant changes in the way social services are delivered, making them more effective, efficient, sustainable, and inclusive (Boyle & Harris, 2009; Jaspers & Steen, 2020; Vanleene et al., 2017; Verschuere et al., 2012). Co-production helps to hear the voices of different social groups, understand their experiences, and recognize and use their skills (Gawron, 2022), which can lead to citizen empowerment (Bovaird, 2007). It enables the provision of better-quality social services and contributes to greater service recipient satisfaction (Calabrò, 2012), the mobilization of community resources that would not otherwise be available to solve social problems (Kleinhans, 2017; Osborne et al., 2016; Sorrentino et al., 2018), as well as contributes to the strengthening civic behavior and social capital (Gawłowski & Makowski, 2022; Jakobsen, 2013; Osborne et al., 2016). Co-production restores the identity of the public service system, including social services, as a common good of shared responsibility between the state and the citizens (Sześciło, 2015). In this way, co-production has the potential to contribute to sustainable socio-economic development goals such as high social services adapted to future demographic changes, new technologies, evolving forms of work, migration, and climate change challenges; efficient, effective, and adequate social protection and support services; increasing quality of living; inclusive and sustainable economic growth (United Nations, 2015).

The ecosystem approach emphasizes that to deliver social services effectively and to achieve these socio-economic objectives, common arrangements between multiple actors are essential (especially with citizens) (Sønderskov & Rønning, 2021). However, shifting the focus from narrow interaction to a broader ecosystem perspective is most relevant (Meynhardt et al., 2016). Therefore, consideration of the wider political, social, institutional, economic, environmental, and technological context is crucial (Alonso et al., 2019; Ng & Vargo, 2018; Osborne, 2021; Parrado et al., 2013; Voorberg et al., 2015). Among them, the technological environment is creating new opportunities to engage contextual actors in the design, management, delivery, and/or evaluation of social services.

2.2. New technologies in social services co-production

Given the rapid digitization of everyday life, combined with the increasing processing power of computers and current cost-saving policies, information and communication technology (ICT) is expected to enable easier involvement of

contextual actors and to provide a greater contribution to social services (Clark et al., 2013; Linders, 2012). This is provided by information networks, in which the large-scale collection and coordination of information exchange reduces the need for bureaucracy and creates the opportunity for fast and effective communication (Lember, 2018). ICT tools can be deployed to increase efficiency within a public organization, but they can also be used to enable public sector organizations to increase their capacity to work with contextual actors to co-produce a social service (Cordella & Paletti, 2018).

Currently, the social services co-production facilitated by ICT attracts increasing attention. The advent and development of ICTs as a co-production driver has been investigated by, for example, Clifton et al. (2020), Lember (2018), Meijer (2016), Paletti (2016), as well as Sorrentino et al. (2022). Scholars indicated that ICTs foster co-production by, among other, empowering citizens, creating new social interactions, facilitating communication and interaction between contextual and state actors, allowing for more efficient information flows, increasing trust, providing support functions, enhancing citizens' participation, catalyzing citizen engagement in public and social life, and contributing to more inclusive policymaking (cf. Lember, 2018; Meijer, 2012, 2016; Tuurnas, 2016). Moreover, ICT supports the development of new forms of co-production (Osborne & Strokosch, 2013). Consequently, engaging contextual actors in the design, management, delivery, and/or evaluation of social services has never been easier and more comfortable (Meijer, 2012; Steen & Tuurnas, 2018). This has been made possible by a range of digital-based tools, which have the potential for a profound impact on the way lay actors participate in the design, management, delivery, and/or evaluation of social services. Nevertheless, a comprehensive catalog of ICT tools for the co-production of social services is lacking in the literature. Therefore, the paper aims to identify the tools of information and communication technologies that favor social service co-production.

3. Research methodology

The purpose of this article was the identification of the information and communication technology tools fostering the co-production of social services, acknowledging that the technological environment is an important contextual condition enhancing the development of co-production.

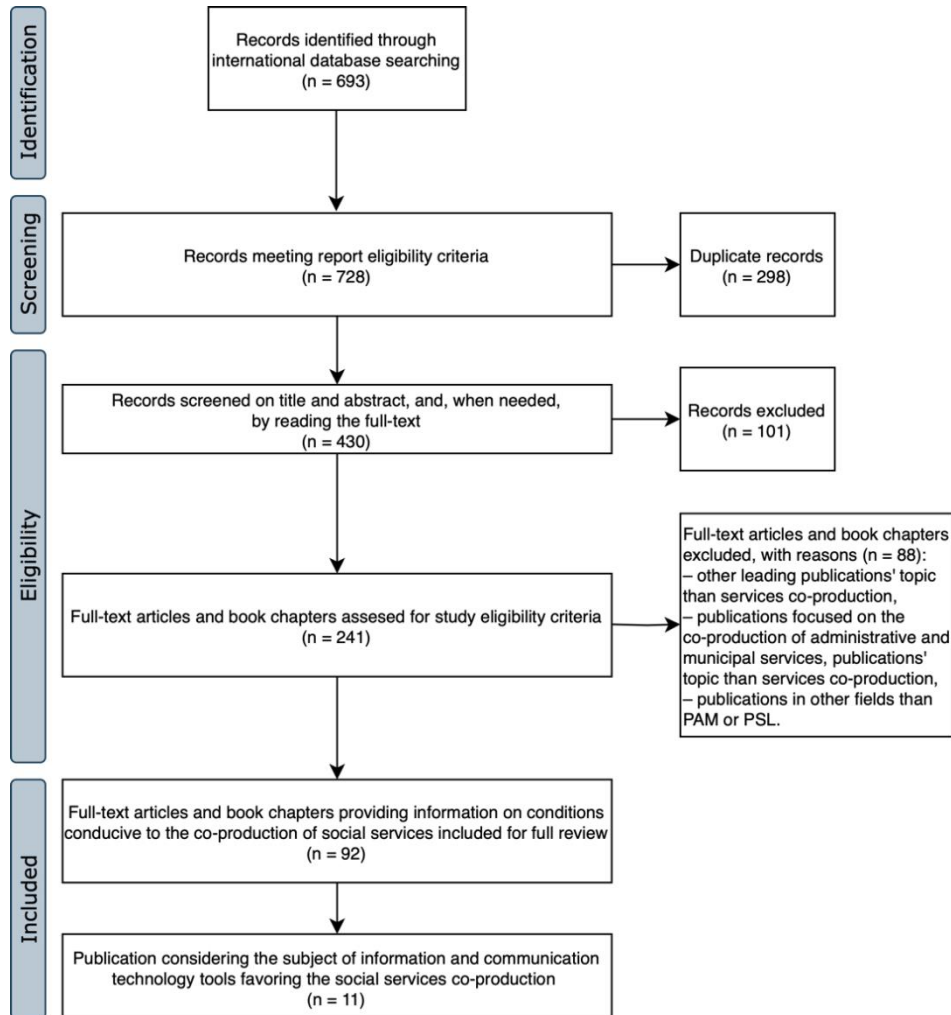
The method used was a systematic literature review (SLR). In the field of management science, a SLR is a key tool used to analyze the diversity of

knowledge. It is based on the establishment of facts through the analysis of secondary data, selected and critically evaluated to answer the formulated question (Czakon, 2013).

Systematic reviews differ from more traditional literature reviews since they are an iterative and transparent process. As a research strategy, it allows the objectivity of the analysis to be maintained, the entire research area to be covered, the sources for the study to be appropriately selected, and information from multiple sources to be merged, resulting in the generation of new knowledge (Tranfield et al., 2003). The aim of using this method is to create a conceptual map, assess the existing state of knowledge, and precisely define the directions of future research (Sienkiewicz-Małyjurek, 2016).

To ensure a transparent review procedure and complete reporting, the conducted review was adjusted as much as possible to the widely used ‘Preferred Reporting Items for Systematic Reviews and Meta-Analysis’ (PRISMA) (Figure 1).

In line with PRISMA, the report eligibility criteria and the study eligibility criteria were specified (Moher et al., 2009). The *report eligibility criteria* were: (1) language – English; (2) publication status – papers published in peer-reviewed journals or book chapters published by highly recognized publishers; (3) subject area – public management and administration or public and social policy. The *study eligibility criteria* were: (1) the subject of co-production – publications focused on the co-production of social services, i.e., education, culture, recreation, social housing, social care, public safety and healthcare; (2) study design – publications either theoretical or empirical in their approach; (3) research strand – publications in the field of public administration and management or public service logic; (4) co-production drivers – publications that provided information on factors and conditions conducive to the co-production of social services; (5) ICT tools – publications that indicate information and communication technology tools fostering social services co-production. As a result, publications concerning information and communication technology tools acting as social services co-production drivers have been filtered.

Figure 1. PRISMA flow diagram

Source: Adapted from Moher et al. (2009).

The search was conducted in international databases (EBSCOhost, Emerald Insight, ScienceDirect, ProQuest, Web of Science, and Scopus). The terms used were “co-production” and “social services” or “public services” in the title, abstract, and/or keywords sections. The term “public services” was used due to the difficulty in defining social services in the international literature. Application of the *study eligibility criteria* enabled filtering out publications concerning public services in general and strictly social services. The decision to consider publications on public services in general – since they included social service – has

been dictated by the low scientific recognition of social service co-production. As a result, 10 publications providing information on ICT tools fostering social services co-production were identified (Table 1).

Table 1. Publications providing information on ICT tools fostering social services co-production

No.	Author/s	Title	Year	Record's type	Journal/ Book	Stream	Publication's type	Method of analysis
1	2	3	4	5	6	7	8	9
1	A. Cordella & A. Paletti	ICTs and value creation in public sector: Manufacturing logic vs service logic	2018	Article	<i>Information Polity: The International Journal of Government & Democracy in the Information Age</i>	PSL	empirical	Case study
2	V. Lember	The increasing role of digital technologies in co-production and co-creation	2018	Book	<i>Co-Production and Co-Creation: Engaging Citizens in Public Services</i>	PAM	theoretical	–
3	V. Lember, T. Brandsen, & P. Tonurist	The potential impacts of digital technologies on co-production and co-creation	2019	Article	<i>Public Management Review</i>	PAM	theoretical	–
4	A.J. Meijer	Co-production in an information age: Individual and community engagement supported by new media	2012	Book	<i>New Public Governance, the Third Sector and Co-Production</i>	PAM	empirical	desk research
5	A.J. Meijer	New media and the coproduction of safety: An empirical analysis of Dutch practices	2014	Article	<i>American Review of Public Administration</i>	PAM	empirical	IDI, evaluation studies, media content analysis
6	A.J. Meijer	Coproduction as a structural transformation of the public sector	2016	Article	<i>International Journal of Public Sector Management</i>	PAM	theoretical	–

Table 1 cont.

1	2	3	4	5	6	7	8	9
7	M.J. Moon	Evolution of co-production in the information age: Crowdsourcing as a model of web-based co-production in Korea	2018	Article	<i>Policy and Society</i>	PAM	empirical	case study
8	A. Paletti	Co-production through ICT in the public sector: When citizens reframe the production of public services	2016	Article	<i>Lecture Notes in Information Systems and Organization</i>	PAM	theoretical	–
9	K. Paskaleva, I. Cooper, & G. Concilo	Co-producing smart city services: Does one size fit all?	2018	Article	<i>Public Administration and Information Technology</i>	PAM	empirical	case study, survey
10	V. Pestoff	Collective action and the sustainability of co-production	2014	Article	<i>Public Management Review</i>	PAM	theoretical	–

Source: Author's own elaboration.

4. Research findings

The results of the literature review carried out show that ICT as a co-production driver is a relatively rarely addressed subject by researchers. Since they are attributing an important role to new technologies, only 11 publications concerning the subject under consideration are noteworthy. Among these publications, nine are scientific articles, and two are book chapters. The oldest record identified is from 2012. The greatest interest in this topic is observed in England (four authors), Estonia (two authors), and the Netherlands (two authors). The leaders in these publications with the highest number of citations are Pestoff, Lember, Brandsen, and Tonurist, as well as Meijer. Meijer is also the author of the largest number of publications (3 records) (Table 2).

Although public service logic (PSL) has been proposed as the next stage of the evolution of the social service delivery models, publications concerning the topic of ICT tools favoring social services co-production are in line with PAM. Since the PSL is a relatively new strand, this may explain such proportions. Nevertheless, looking at the issue from the perspective of the PSL can bring important insights, and this perspective has been adopted in further analyses.

Table 2. Bibliometric data of publications providing information on ICT tools fostering social services co-production

No.	Author/s	Title	Country	Scopus Citations	WoS Citations
1	A. Cordella, & A. Paletti	ICTs and value creation in public sector: Manufacturing logic vs service logic	England, England	40	28
2	V. Lember	The increasing role of digital technologies in co-production and co-creation	Estonia	38	27
3	V. Lember, T. Brandsen, & P. Tonurist	The potential impacts of digital technologies on co-production and co-creation	Estonia, Netherlands, Estonia	126	82
4	A.J. Meijer	Co-production in an information age: Individual and community engagement supported by new media	Netherlands	12	55
5	A.J. Meijer	New media and the coproduction of safety: An empirical analysis of Dutch practices	Netherlands	60	54
6	A.J. Meijer	Coproduction as a structural transformation of the public sector	Netherlands	66	55
7	M.J. Moon	Evolution of co-production in the information age: Crowdsourcing as a model of web-based co-production in Korea	South Korea	33	31
8	A. Paletti	Co-production through ICT in the public sector: When citizens reframe the production of public services	England	21	14
9	K. Paskaleva, I. Cooper, & G. Concilo	Co-producing smart city services: Does one size fit all?	England, Italy, England	9	8
10	V. Pestoff	Collective action and the sustainability of co-production	USA	127	108

Source: Author's own elaboration.

As a result of the systematic literature review, seven ICT tools fostering social service co-production were identified (Table 3).

Table 3. ICT tools fostering social service co-production

Tool	Opportunities	Source
1	2	3
Mobile application	<ul style="list-style-type: none"> • Co-production 24/7. • Better and faster identification of citizens' needs by public organizations. • Easier expression of needs and new ideas, reporting problems, raising issues, and involvement by contextual actors. 	Fugini & Teimourikia, 2016; Paletti, 2016
Crowdsourcing	<ul style="list-style-type: none"> • Involving a broad group of people to perform tasks and propose solutions to meet specific objectives (performing simple and routine tasks or solving complex problems). • Cost reduction. • Drawing on collective knowledge. • Higher quality and a wider range of solutions. • Generating disruptive ideas. • Crowdfunding tool. 	Fugini & Teimourikia, 2016; Lember, 2018; Meijer, 2012; Moon, 2018

Table 3 cont.

1	2	3
Open data	<ul style="list-style-type: none"> • Support collaboration, participation, and innovation creation by contextual actors through access to data that was previously only available to public actors. • Improving the functioning of social services – the opportunity for contextual actors to take a more equal role in the design, management, delivery, and/or evaluation of these services. • Private sector growth – the economy can benefit from easier access to information, and knowledge. • Increasing well-being through the accessibility and usage of transparent and accessible information. 	Wimmer & Scherer, 2018
Big data	<ul style="list-style-type: none"> • Collecting and analyzing large data sets (so large and complex that they require new technologies such as artificial intelligence to process) from multiple sources (generated very quickly by humans or devices) to obtain new information. • Increased efficiency and effectiveness of social services - better matching of services to citizens' needs, and improved transparency. 	Lember, 2018; Paskaleva et al., 2018
Real-time data collection and analysis	<ul style="list-style-type: none"> • A set of tools and techniques that can be used to speed up the process of analyzing data and drawing conclusions so that the needed information can be obtained almost immediately. • More efficient information flow. • Changing the way contextual actors contribute to social service delivery. 	Lember, 2018
Gamification	<ul style="list-style-type: none"> • Application of game design elements or their principles and mechanisms in contexts other than games. • Encouraging citizen participation and ensuring their contribution to the provision of social services. • Increasing the involvement of contextual actors in generating ideas and creating innovations, collecting data, or carrying out assigned tasks. 	Fugini & Teimourikia, 2016; Lember, 2018; Paskaleva et al., 2018
Social media	<ul style="list-style-type: none"> • Facilitating new forms of co-production. • Dramatically reduced communication costs with contextual actors. • Almost unlimited frequency of interaction. • Intense, rich, direct, multifaceted, dynamic, and distributed exchange of data between state and contextual actors. • Reducing time constraints for co-producers and creating opportunities for “ubiquitous co-production” in virtual networks. • Reorganization of collective forms of cooperation. • Virtual communities facilitate interaction between people toward the development of networks of trust, and enable conscious discussion of public issues in a private forum and a comfortable atmosphere, contributing to greater involvement of contextual actors. • Creating a shared identity in open and flexible virtual communities. 	Lember, 2018; Meijer, 2012, 2014, 2016

Source: Author's own elaboration.

First and foremost, mobile applications should be mentioned as a tool for facilitating co-production. Both market and state actors face significant limitations in understanding the emerging needs of citizens, which are often too dif-

fuse and latent to be noticed. Apps allow authorities and public organizations to identify the needs of the public better and faster. Mobile applications enable contextual actors to more easily express their needs and new ideas, report problems, raise issues, and get involved. They also help them make better use of the knowledge they have to quickly provide effective solutions for emerging problems (Paletti, 2016). Mobile apps provide 24/7 co-production possibilities, regardless of location. Reporting a problem in only a few seconds and finding the right person who can solve the problem can be done quickly by an algorithm (Fugini & Teimourikia, 2016).

Another opportunity offered by new technologies is crowdsourcing understood as “an online, distributed problem solving and production model where organizations (company, government or individual) tap the collective intelligence of online communities” (Brabham, 2017, p. 593). In this approach, indispensable is the collaborative effort by a group of individuals to solve a given problem with the explicit intention of accessing their diverse knowledge. The collaborative aspect of crowdsourcing increases the quality and scope of solutions and leads to new disruptive ideas. Crowdsourcing can aim to perform simple and routine tasks or generate innovative solutions to complex problems (Fugini & Teimourikia, 2016). Such solutions enable public organizations to draw on collective knowledge, systematically collecting ideas, opinions, solutions, and data from contextual actors (Lember, 2018).

A special type of crowdsourcing is hackathons. The word *hackathon* is combined from the words *hack* and *marathon*, where the *hack* is used in the sense of exploratory and investigative programming (Briscoe, 2014). A hackathon is a problem-focused computer programming event that brings together programmers and other experts (interface designers, graphic designers, social researchers, and others) to collaborate intensively on software projects in a short amount of time, increasingly to compete for funding and other forms of support for further development (Heikki & Tucker, 2014). They have become a way for many software firms, as well as public organizations, to stimulate digital innovation with their assets and resources (Briscoe, 2014).

In terms of developing innovative solutions and supporting co-production, open data plays an important role. Open data is understood as information collected, provided, or paid for by public authorities (also referred to as public sector information) that is made available free of charge for re-use for any purpose (<https://data.europa.eu/pl/dataeuropa-academy/what-open-data>). By making their data publicly available, state actors provide contextual actors with a fundamental basis for collaboration and innovation. Giving contextual actors access to infor-

mation that was previously only available to public actors allows them to assume a more equal role in the social services co-production. As Wimmer and Scherer (2018) pointed out, various open data initiatives are available, and their number is growing.

The next ICT-enabled tool fostering co-production is big data, which refers to voluminous and intricate datasets that require new technologies, such as artificial intelligence, to process (Lember, 2018; Paskaleva et al., 2018). These data can be created by people in mobile applications, on the internet (including social media and commercial transactions), e-government records, etc. They can also be generated by devices and collected by sensors in objects connected to the network, including smart self-driving cars, factories, GPS, weather data collection satellites, etc. The data thus collected and analyzed can contribute to increasing the efficiency and effectiveness of social services – better-matching services to citizens’ needs and improved transparency².

A similar tool to open data offered by ICT is real-time data collection and analysis, which enables more efficient information flows. This allows public organizations to change the way contextual actors contribute to the delivery of social services (Lember, 2018).

Co-production is also increasingly facilitated by gamification, which refers to the application of game design elements or principles and mechanisms in contexts other than games (Robson et al., 2015). These strategies capture people’s engagement by creating a play atmosphere and environment. This way, they can help encourage citizen involvement and ensure their contribution to the provision of social services (Lember, 2018; Paskaleva et al., 2018). Targeting natural human desires, such as socializing, learning, competition, and a sense of achievement and success, gamification aims at increasing the involvement of contextual actors in generating ideas and creating innovations, collecting data, or completing assigned tasks.

Finally, the social services co-production can be facilitated by harnessing the potential of social media. In the face of the demand for better social services and scarce resources, social media can contribute to increased efficiency and effectiveness of services and financial savings (Gao, 2017). Social media is an important facilitator of new forms of co-production (Linders, 2012). On the one hand, the costs of communication with contextual actors have been drastically reduced. On the other, the frequency of interaction is almost unlimited (Meijer,

² <https://www.europarl.europa.eu/news/en/headlines/society/20210211STO97614/big-data-definition-benefits-challenges-infographics>

2012). Since social media enables anytime and anywhere interactions, it can reduce the time constraints of co-producers, increase their engagement, and create opportunities for “ubiquitous co-production” in virtual networks (Clark et al., 2013; Meijer, 2014, 2016).

While previous ICTs empowered public sector actors by facilitating central control, social media enables much more intense, rich, direct, equal, and multifaceted information exchange with contextual actors (Meijer, 2016). According to Meijer (2016), the most significant impact of social media lies in the opportunities they offer to reorganize mass forms of collaboration (for example, Wikipedia or Linux). Advocates of new technologies argue that similar forms of mass collaboration between individuals in social media-enabled co-production can bring effective solutions to social problems (Meijer, 2016).

With social media, the formation of virtual communities – such as Facebook groups – is possible, which significantly influence how contextual actors contribute to the provision of social services. Virtual communities facilitate interactions between people toward the development of networks of trust and enable aware discussion of public issues in a private forum and a comfortable atmosphere, as a result contributing to greater engagement of contextual actors (Paskaleva et al., 2018). Thus, virtual communities created through social media foster networked co-production of social services (Meijer, 2014).

Virtual communities shift our attention from individual and rational motives for co-production to collective and social factors. It seems that the creation of shared identities in open and flexible virtual communities lies at the heart of successful forms of social services co-production in today’s networked society (Castells, 2007). Therefore, Meijer (2014) argued that co-production can no longer be analyzed in isolation from the private sphere of citizens, as the mixing of information sources and functions – via social media and the virtual communities created therein – makes it significantly more difficult to distinguish between the private and the public sphere.

5. Discussion

The dynamic development of information and communication technologies has significantly changed the context of social service co-production. By reviewing current publications regarding ICT tools favoring co-production, this paper shows that there is a whole group of digital-based tools that have a profound impact on the way contextual actors participate in the provision of social services. This

review not only offers a comprehensive catalog of ICT tools applied in social services co-production but also contributes to our understanding of the role of ICT in favoring co-production, adopting the public service logic perspective.

First, a shift toward PSL in social service management means that citizens move beyond their roles as clients, customers, constituents, voters, or poll responders to become co-producers, co-creators, problem-solvers, and governors actively engaged in producing what is valued by and good for the public (Hodgkinson et al., 2017). As Osborne et al. (2013, p. 146) argued, by taking the public service logic, co-production becomes an inalienable component of social services provision that places the experiences and knowledge of the service user at the heart of effective public service design and delivery. Contextual actors are seen as resource integrators who interact to acquire the resources needed in their value-creation processes (Vargo & Lusch, 2008). The virtual environments, provided by digital solutions, networks, and social media, enable dynamic and distributed data exchange, encouraging and enhancing contextual actor involvement and contribution (Lember, 2018; Paletti, 2016; Paskaleva et al., 2018).

Second, the public service logic emerged from consistently shifting the attention in public management toward networks, with many different actors involved in the social service provision process (Osborne et al., 2013). Scholars advocating this new approach see public value emerging from extensive dialogue, deliberation, common arrangements, and collaborative activity (Hodgkinson et al., 2017; Sønderkov & Rønning, 2021). From the PSL perspective, relationships are often the most valuable resource of public organizations (Osborne et al., 2013). The new technology, by replacing or combining with traditional infrastructure and power structures, creates new networks and relations, encouraging communication and collaboration toward a common goal, which is indispensable in co-production. Crowdsourcing facilitates social service provision rapidly from a broad network of individuals and institutions, as well as enabling the collaborative effort by a group of individuals to design adjusted and effective social services. Hackathons bring together programmers and other experts to collaborate intensively on digital-enabled solutions. Open data provide the basis for collaboration and innovation to improve the functioning of social services. Gamification encourages collaboration to enhance service quality based on service users' feedback, while social media provides the opportunity for mass forms of collaboration and social service co-production.

Indeed, in the literature, we find examples of such ICT-enabled solutions based on contextual actors' contributions and collaboration. Fugini and Teimourikia (2016) indicated healthcare services as a potential application area for gamification strategies. Gamification can be used to elicit information from patients in a more enjoyable and interesting way, attracting their attention and encouraging collaboration to improve healthcare services based on the patients' feedback. Feedback forms can be designed to add narrative and give meaning to the choices. In addition, by applying gamification strategies, training procedures for co-producers can be improved. Social media supports communication and collaboration between people receiving care and their caregivers, family, friends, and the local community. Co-producers can easily communicate with the person receiving care through social media platforms, additionally providing encouragement and support that can improve the person's well-being (Fugini & Teimourikia, 2016).

Another example of the use of crowdsourcing is "fix-my-street" solutions enabling easy and quick data collection through mobile applications, as well as involving citizens in the voluntary provision of their personal data for the development of new social services (Lember, 2018). Social media, on the other hand, can serve as a source of real-time feedback (e.g., mood analysis) on delivered services (Meijer, 2011).

Finally, the Smart City concept is a solution combining different ICT tools, enabling the involvement of citizens and their direct participation in the policy-making and co-production of services. Consequently, citizens can take control of the design, delivery, and management of social services, ensuring that services are provided in line with their interests. The Smart City mechanisms for participating included hackathons, living labs, fab labs, smart urban labs, citizen dashboards, maker spaces, smart citizens' labs, gamification concepts, and open datasets (Webster & Leleux, 2018).

Nevertheless, in the literature, there is also an increasing emphasis that there are also dark sides to ICT-enabled co-production. Pestoff (2014) pointed out that too much emphasis is often placed on technical solutions, ignoring the human and social aspects. The first studies on the use of technology in the context of co-production tended to view this issue from a normative perspective, in which the adoption of solutions offered by new technologies to engage contextual actors is a "good thing" and a desirable action. Today, we already know that the engagement of contextual actors is more complex since the personal traits and backgrounds of given actors are different (Webster & Leleux, 2018). We

know that ICTs are not a panacea, and their use cannot be unreflective and indiscriminate. Moreover, as Dunleavy et al. (2005) emphasized, professionals can use technology to empower themselves at the expense of true co-production. Then the consequence of ICT use may be an increase in inequality and inefficiency in the provision of social services.

Therefore, what matters for favoring co-production is not so much the mere presence of information and communication technologies as how they are used and managed. Cordella, Paletti, and Shaikh (2018) pointed out that the choice of technology-enabled solutions used to support co-production should consider the impact that a particular configuration has on wider political and social value. In turn, Paskaleva et al. (2018) emphasized that the potential of ICTs needs to be tailored to the capacity of the local administration as well as the needs and skills of the local community.

6. Conclusions

Nowadays, we are undoubtedly embedded in the reality of information and communication technologies, with all their opportunities and threats. This concerns all areas of our lives, and the public sector is no exception. ICTs play a pivotal role in transforming industries, driving socio-economic development, catalyzing progress, improving quality of life, and favoring social service co-production.

The study aimed to identify the information and communication technology tools fostering the co-production of social services, acknowledging that the technological environment is an important contextual condition enhancing the development of co-production. The result of this study contributes to the research on the co-production of social services, particularly in terms of the use of new technologies in this process in two ways.

First, the development of the catalog of ICT tools fosters social service co-production. These identified tools are mobile applications, crowdsourcing, open data, big data, real-time data collection and analysis, gamification, and social media. Their application not only enables and facilitates the involvement of contextual actors in the design, management, delivery, and/or evaluation of social services. It inspires the emergence of new forms of co-production, contributing to increasing the efficiency, effectiveness, and quality of social services. This way, the social service co-production contributes to better addressing the citizens' needs, increasing their quality of life and well-being, as well as unleashing their potential.

Second, looking at co-production enabled by ICT from the perspective of the PSL provides important insights. Since public service logic places the experiences and knowledge of the citizens at the heart of effective public service design and delivery, co-production becomes an inalienable component of social service provision, and virtual environments provide the best opportunities and conditions for such citizens' contribution. Moreover, in this approach, public value emerges from extensive dialogue, deliberation, common arrangements, and collaborative activity, while ICT tools facilitate, encourage, and enhance the creation of new networks and relationships joined up and directed toward a common goal in a social service co-production.

The main practical implications of the paper are the comprehensive catalog of ICT tools that can be used by public managers to facilitate social service co-production. However, as indicated in the literature, what matters for enhancing co-production is not the mere presence of information and communication technologies, but how they are used. Therefore, as the management implications of the research carried out, five recommendations may be proposed:

1. **Investment.** Enhancing social services co-production through ICT needs investment in hardware and software.
2. **Accessibility.** To ensure digital-enabled citizens' contribution, applied ICT tools must be available to all stakeholders.
3. **Adaptation.** The ICT tools need to be adapted to the skills and capabilities of co-producers – often it need not be highly sophisticated, but should be very intuitive, especially considering people with disabilities.
4. **Understanding.** When applying ICT tools, public managers need to understand how they work and consider whether there is sufficient understanding among co-producers on how to use the tools effectively.
5. **Training.** There is a need to build a new society in terms of digital competencies and media literacy. They are essential if engaged actors are to effectively use the ICT tools for their purposes in the social services co-production.

Therefore, ICT use is not an easy or cheap way to increase the engagement of contextual actors. It requires investment, adaptation, education, understanding, and thoughtful, people-centered actions. ICTs can favor greater interaction between state and contextual actors, but only if we consider that people are still at the center of the process, and we equip them with the right tools and skills. It is essential whenever contextual and public actors are to use ICT tools effectively in the co-production of social services.

The study is constrained by several limitations. First, the applied methodology analyzed secondary data. Therefore, field studies are necessary to investigate the role of ICT tools in fostering social service co-production. Moreover, the methodology used was qualitative in approach, preventing generalizability, and quantitative research should be conducted. Second, the co-production in the social services area includes various services, and ICT application and impact can differ by specific type of service. Hence, one possible future research trajectory would be detailed studies concerning specific social services (i.e., education, culture, recreation, social housing, social care, public safety, or healthcare services). Third, since the co-production context matters, future research should focus on the specific national context.

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