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Collaboration and Co-production in Public Service Delivery: New Practices for New Challenges

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Doctoral Thesis

Collaboration and Co-production in Public Service Delivery: New Practices for New Challenges

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Hay gente que entiende que el conocimiento y experiencia que se obtiene durante la formación nos crea una deuda que debemos pagar transmitiéndolo a nuestra sociedad y a las próximas generaciones. El hecho de que se entienda como una deuda, supone que en algún momento haya que dejar de hacerlo por haberse pagado. Por tanto, yo no entiendo la transmisión de conocimiento como una deuda sino como deber moral de todos los partícipes en una sociedad. Un deber que en mi caso me gusta cumplir y al que espero dedicarme en las etapas futuras de mi vida.

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General Introduction

New Public Management (NPM) (Aucoin 1990; Ferlie et al., 1996; Hood, 1991, 1995; Pollit, 1993) arose in the 1970s and 1980s, especially in Anglo-Saxon countries, and focused on a greater emphasis on efficiency, effectiveness, competition, managerial approaches (e.g., performance measurement and incentive structures), decentralization, and customer satisfaction. However, NPM reforms suffered from contradictions, problems and limitations, such as citizens' distrust, loss of legitimacy, lack of improvement in public services, evasion of responsibilities by governments and coordination problems (Pollit & Bouckaert, 2000). At the beginning of the new century, there was an increasing mistrust in governments, as NPM reforms did not achieve the expected results (Kettl, 2000; Pollit & Bouckaert, 2000).

The idea of 'good governance' became more relevant to solve these problems and regain citzens' trust by bringing the government closer to citizens. Transparency, participation and collaboration with citizens and other stakeholders were as a result encouraged (Kim et al., 2005; OECD, 2001; Weiss, 2000; World Bank, 1997). It was in this context that the New Public Governance (NPG) paradigm (Klijn, & Koppenjan, 2012; Osborne, 2006, 2010; Pestoff, Brandsen, & Verschuere, 2012) emerged, based on institutional and network theories. According to this paradigm, an interdependent network of public and private institutions, citizens and third sector organizations participate in policy preparation processes and public service delivery. The involvement of these non-state actors is seen as necessary to achieve an efficient, effective and democratic public sector (Pierre & Peters, 2020).

Contrary to previous models, co-production with citizens and other non-state actors is a core issue (Brandsen & Honingh, 2015; Pestoff, Brandsen, & Verschuere, 2012; Osborne, Radnor & Strokosch, 2016; Osborne, & Strokosch, 2013). Nevertheless, it does not mean reduced government importance, as it is central in the creation of governance architecture (Swyngedouw, 2005). In the NPG paradigm, accountability cannot only be hierarchical, because Public Administration has to deal with many different actors and networks. Furthermore, different actors may have different goals, strategies and values. Performance measurement and accountability in networks are not only established through formal agreements (e.g., contracts), but also informally through shared norms (e.g., trust and reciprocity) and facilitative behaviours (e.g., frequent communication and transparency) and non-formal types of rewards (e.g., public recognition and reputation,

opportunities for future collaboration and advance notice) and sanctions (e.g., diminished reputation) (Provan, & Kenis, 2007; Romzek, Leroux, Blackmar, 2012; Powell, 1990). This model raises new problems such as (1) decision-making in an environment without clear decision rules, (2) achieving mechanisms for active, balanced and continuous multi-stakeholder participation that reflect societal interests, (3) achieving efficient coordination between actors with different objectives, and (4) improving and designing new accountability mechanisms that replace the diminished capacity of governments to control and enable the correction of errors in the public sector (Koppenjan, & Koliba, 2013; Osborne , 2010, pp.40-42; Torfing & Trianfillou, 2013).

In this context, Information and Communication Technologies (ICTs) have played an important role as facilitators of transparency, accountability, interaction and collaboration among citizens, other stakeholders and governments, both for policy design and service delivery. Different tools have been used, such as websites, social media, transparency portals, open data portals, e-participation platforms, big data, wearables and Enterprise Resource Planning, among others (Agostino, Saliterer & Steccolini, 2021; Bertot, Jaeger & Grimes, 2012, 2010; Bonsón, Torres, Royo & Flores, 2012; Jaeger & Thomson, 2003; Meijer, Curtin & Hillebrant, 2012; OECD 2003; Welch, Hinnant & Moon, 2005; World Health Organization, 2016). The adoption of these technologies in the public sector has been particularly boosted by critical events like the Covid-19 pandemic (Agostino, Arnaboldi & Lema, 2021). However, previous literature highlights that the adoption of these technologies and their success not only depend on ICT-related factors and capabilities (technological compatibilities, experience and the technological skills of citizens and staff) but also on several factors (e.g., contextual, organizational and individual factors, such as political and managerial support, or citizens' distrust, among others) (Meijer, 2015; Gilbert, Balestrini & Littleboy,2004; Gil-García & Pardo, 2005; Panopoulou, Tambouris & Tarabanis, 2014; Randma-Liiv, 2021).

Even if collaboration and co-production have been defended as a possible solution to the loss of legitimacy and lack of efficiency, previous research has shown that these practices are asymmetrically adopted and may fail to achieve their supposed benefits (Brainard & Mcnutt, 2010; Criado & Rojas-Martín, 2016; Koppenjan, & Koliba, 2013; Norris & Reddik, 2013; OECD, 2018; Howlet & Ramesh, 2014). This Thesis analyses various public sector innovation initiatives in collaboration and co-production carried out by European and US public sector entities in recent years, in order to measure their degree

of adoption, check the achievement of their theoretical benefits and highlight areas for improvement. This study covers initiatives to improve transparency, promote citizens and users' engagement, foster public sector innovation processes and improve efficiency in public service delivery in order to answer the following research questions:

RQ1: How are public sector entities adopting and using ICTs to promote transparency, participation and collaboration?

RQ2: What contextual, organizational, and individual factors influence the adoption and performance of collaboration and co-production initiatives?

RQ3: How do citizens respond to collaboration and co-production practices?

RQ4: What is the impact of collaboration and co-production practices in the public sector?

This Thesis is structured into three sections, in addition to this Introduction and the Final Conclusions. The first section covers two chapters related to the use of digital tools to facilitate transparency and citizen participation (social media and e-participation platform). The second section consists of one chapter dealing with co-production initiatives, specifically with the participation of users in digital health collaborative innovation projects. The third section analyses collaboration between public and private organizations for the provision of public services.

The first chapter analyses the adoption and use of Web 2.0 and social media tools by Audit Institutions in the European Union and the United States, at central and regional levels. To do this, it evaluates the relationship between contextual and organizational factors (public administration style, transparency and corruption perceived in the region, internet and social media penetration rates, and development of public e-services) and the different rates of adoption. Then, it analyses the communication strategy of the Audit Institutions on Twitter, the most widely adopted tool, and the audiences they reach.

The second chapter is a case study of the e-participation initiative of the city council of Madrid (Spain), *Decide Madrid*, to identify the critical success factors and the main barriers that determine its performance. This initiative won the Public Service Award of the UN in 2018. The initiative is analyzed following a five-element analytical model based on Randma-Liiv & Vooglaied (2019): context, e-participation initiative characteristics, organizational factors, individual factors, and evaluation of the initiative. Among other data sources, three different types of stakeholders were interviewed: politicians, civil servants and citizens.

The third chapter analyses users' participation in collaborative innovation projects to define their roles in these projects. Users' participation is studied in the context of public and private organization partnerships for the development of digital health innovations. Their roles are evaluated and described in three dimensions: the motivation for their participation, their activities in the partnership, and the support of the partnership for users' involvement.

The fourth chapter analyses the impact of collaborative practices on the efficiency of public service delivery. To do so, the efficiency of Spanish municipalities in the management of the waste collection service is obtained with Data Envelopment Analysis (DEA). The differences in scale efficiency are then related to different types of collaboration practices (public-public or public-private), contextual factors, and changes in the legal framework to encourage collaboration between municipalities.

Section 1:

Collaboration and Co-production Through ICTs

Chapter 1: Social media adoption by Audit Institutions. A comparative analysis of Europe and the United States

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Abstract

Several authors and international organizations have recommended that public sector Audit Institutions use social media (SM) to communicate with and engage stakeholders, but the adoption and use of these tools by Audit Institutions has remained unexplored. This chapter analyzes the presence of Audit Institutions in Web 2.0 and SM tools, in the EU and US, at regional and central government level, in order to answer the following research questions: What is the level of adoption of Web 2.0 and SM tools among Audit Institutions? Can any patterns of adoption be identified? What factors are related to the adoption of Web 2.0 and SM tools? What is the main objective of the content published? What is the number of followers and the level of citizen awareness? Results show that the adoption of Web 2.0 and SM tools by Audit Institutions is at an initial stage. There are differences in adoption between Supreme and Regional Audit Institutions, among the different public administration styles, and depending on the population size and level of use of SM and previous levels of transparency at country level. This results in predictable patterns of adoption consistent with path dependencies derived from the institutional context and citizen demands. The number of followers and citizens' awareness is generally low and the contents published rarely aim at encouraging stakeholder participation. Based on these findings, theoretical and practical implications are highlighted.

Keywords: Audit Institutions, Social media adoption, Europe, United States.

(*) This chapter was extended for European audit institutions and published in Profesional de la Información (SSCI-JCR, Q3). It included the analysis of citizen engagement on the most adopted social media (Facebook and Twitter) and multivariate regression analysis to explain the adoption of these tools by audit institutions. García-Rayado, J., Royo, S. & Torres, L. (2021). Instituciones de Auditoría Pública y Medios de Comunicación Social: ¿Interactuando con los Usuarios?. Profesional de la Información, 30(1), e300109 (IF 2020: 2.253, Subject Categories "Information Science & Library Science" and "Communication"). https://doi.org/10.3145/epi.2021.ene.09

1.1 Introduction

Public sector auditing is a complex and comparatively unexplored research area where more investigation is valuable (Hay & Cordery, 2018). Public sector Audit Institutions (Supreme and Regional Audit Institutions, SAIs and RAIs, respectively) are the main external control bodies of the public sector and their most important functions are to carry out compliance, financial and performance audits (GAO, 1972; OECD, 2011). Therefore, they are fundamental public entities in the transparency and accountability of the public sector (Cordery & Hay, 2019). However, they have traditionally been seen as isolated and technocratic entities serving other government organizations and having little to do with citizens and broader governance issues (Baimyrzaeva & Kose, 2014; González, López, & García, 2008). This has started to change in recent years in the context of the transformation from government towards governance. The communication of Audit Institutions' activity, their engagement with stakeholders, their competencies in improving the quality of government, and the development of collaborative networks among them to improve their activity have become more important (Baimyrzaeva & Kose, 2014). The target audience of Audit Institutions is expanding and there is a great interest in including citizens, civil society organizations, other public and private audit entities, professional associations, research organizations and donor communities, among others (González-Díaz, García-Fernández, & López-Díaz, 2013).

The International Organization of Supreme Audit Institutions (INTOSAI, 2013a) has recognized that "communicating effectively with stakeholders" and "ensuring appropriate transparency and accountability of SAIs" are two necessary principles for making a difference to the lives of citizens. Furthermore, engagement with stakeholders, including citizens and civil society organizations, is now deemed essential to maximize the efficiency and impact of Audit Institutions (INTOSAI, 2013b; Reed, 2013; United Nations, 2013; Baimyrzaeva & Kose, 2014; Effective Institutions Platform, 2014; World Bank, 2015; Cordery & Hay, 2019). According to the United Nations (2013, p. 14) "as the ultimate beneficiaries of a better use of public funds, citizens are the most important stakeholders of Supreme Audit Institutions".

Recent advances in Information and Communications Technologies (ICTs), based on the use of Web 2.0 and social media (SM), have created great expectations for the improvement of government-to-citizen relationships because of their potential to improve transparency, communication, collaboration and engagement (Bertot, Jaeger, & Grimes, 2012; Bonsón, Torres, Royo, & Flores, 2012; Haro-de-Rosario, Sáez-Martín, & Carmen Caba-Pérez, 2018). SM support the communication strategy of organizations, helping to provide a more complete image of the organizations and to eliminate dependence on traditional communication media (González-Díaz et al., 2013; Stamati,

Papadopoulos, & Anagnostopoulos, 2015). They make the content published in official websites and other information channels more visible and allow two-way direct communication with stakeholders about different topics, which may be different to those which attract media attention. The many-to-many interaction allowed by SM also increases the level of information sharing: followers receive immediate notifications about new publications and, if they re-direct the information to other users, the information can become "viral". SM foster a more extensive interaction with citizens, allow public sector institutions to easily obtain stakeholder feedback and open new areas for the participation of stakeholders at a small cost (Agostino, Arena, Catalano, & Erbacci, 2017; Bertot et al., 2012). Furthermore, they allow a wide variety of formats to be used to transmit the information and reduce temporal and spatial obstacles, which facilitates the monitoring of public sector activity. Because of these properties, SM are said to have the potential to change the way the public sector communicates with stakeholders, advancing from a scenario where the information is available online to a new one that really engages citizens and the rest of stakeholders (Bearfield & Bowman, 2017).

Previous studies in the public sector have mainly been theoretical, dealing with the advantages of SM use or possible strategies to promote their use (e.g. Bertot et al., 2012; Stamati et al., 2015). Empirical studies have mainly analyzed local governments, as they are the level of government closest to citizens (Agostino, 2013; Bonsón et al., 2012; Bonsón, Royo, & Ratkai, 2015, 2017; Haro-de-Rosario et al., 2018; Zheng & Zheng, 2014). Several authors (Genaro, 2014; González-Díaz et al., 2013) and international organizations (INTOSAI, 2010, 2013a; United Nations, 2013) recommend public sector Audit Institutions to use SM to communicate with and engage stakeholders, but the adoption and use of these tools by Audit Institutions has remained largely unexplored to date. González-Díaz et al. (2013) analyzed the communication strategies of Audit Institutions and provide a brief description of the use of SM and Web 2.0 by Audit Institutions and the advantages they imply. Empirical evidence and comparative analyses about the relationships between different contextual factors and the adoption of transparency and engagement tools by Audit Institutions are needed (Effective Institutions Platform, 2014, pp. 70–74). Therefore, this empirical study covers different research gaps as regards SM use in the public sector (namely, its real use in Audit Institutions) and the relationship between contextual factors and the adoption of these transparency and engagement tools by Audit Institutions.

In this context, the objective of this chapter is to analyze the presence of Audit Institutions in Web 2.0 and SM tools, in the EU and US, at central and regional level, in order to answer the following research questions: RQ1. What is the level of adoption of Web 2.0 and SM tools among Audit Institutions? RQ2. Can any patterns of adoption be identified? RQ3. What factors are related to the adoption of Web 2.0 and SM tools? RQ4. What is the main objective of the content published on SM?

RQ5. What is the number of followers and the level of citizen awareness? Research questions 1 to 3 deal with the adoption of Web 2.0 and SM tools and the factors related to different levels of adoption. Research questions 4 and 5 are focused on Twitter as this is the platform with the highest rate of adoption among the Audit Institutions analyzed.

The rest of the chapter is structured as follows. The second section provides the background and theoretical framework. The third section describes the methodology applied. The results are presented in the fourth section. Finally, the discussion and conclusions section brings the chapter to an end.

1.2 Background

1.2.1 Rationale for SM use by Audit Institutions

Audit Institutions make significant contributions to society by bringing transparency, accountability and integrity to government and promoting higher quality in the use of public resources. These contributions are maximized when the Audit Institutions are able to clearly and effectively communicate the results of their work to citizens and other stakeholders (Bowling, 2013; Cordery & Hay, 2019; González et al., 2008; OECD, 2011). In this way, the public's role in ensuring improved governmental compliance and performance is strengthened and pressure for the follow-up of recommendations is created (Reed, 2013; Reichborn-Kjennerud, 2013; United Nations, 2013; Baimyrzaeva & Kose, 2014; Effective Institutions Platform, 2014; World Bank, 2015; Johnsen et al., 2019; van Acker & Bouckaert, 2019). According to Johnsen et al. (2019, p. 177), media attention alone is not enough, but the consequences of media attention are important.

Recently, the importance of communication strategies for public sector Audit Institutions has been highlighted (Erbiti, 2003; EUROSAI, 2017; González et al., 2008; González-Díaz et al., 2013; INTOSAI, 2009a, 2009b). INTOSAI has been particularly active in this regard, indicating that communication should be regarded as a strategic element in auditing (INTOSAI, 2010, p. 2). According to Cordery and Hay (2019), Audit Institutions should develop new ways to demonstrate their ongoing relevance and how they contribute to increasing public value. They can establish dialog with stakeholders using a variety of instruments and tools. Keeping pace with technology advances in order to ensure that they are reaching their stakeholders is a challenge for them (Genaro, 2014; INTOSAI, 2013b). The key is communicating with citizens and other stakeholders in a manner that allows them to access the content produced by Audit Institutions in a variety of ways that can best meet their needs (Bowling, 2013).

At the end of 2009, INTOSAI passed two International Standards of Supreme Audit Institutions, ISSAI 20 and ISSAI 21 (INTOSAI, 2009a, 2009b), that propose principles and good practice related

to transparency and accountability to help SAIs promote a greater understanding of their functions and role in society among the general public. Of the nine principles defined in ISSAI 20, number 7 highlights the fact that SAIs need to report publicly about their activities and number 8 states that the media, websites, and other channels should be used to provide timely and widespread communication of their activities. Websites and SM are tools that should be used in the communication plans of Audit Institutions to guarantee external communication success (INTOSAI, 2010, pp. 11-12; INTOSAI, 2013b; Gonzalez-Diaz et al., 2013; United Nations, 2013; Genaro, 2014). Among the different instruments and tools for communicating the value and benefits of Audit Institutions to stakeholders, INTOSAI (2013b, pp. 6–7) recognizes that Web 2.0 and SM tools (e.g., YouTube, podcasts, Facebook, Twitter, Flickr, Slide-Share, sharing widgets, online chats and blogs) play a key role. However, recent research indicates that Audit Institutions can be divided into two broad categories: one with an extensive media strategy and one that intentionally wants to avoid media attention (van Acker & Bouckaert, 2019, p. 66).

The improvements that SM can generate in the communication and activity of Audit Institutions can help to achieve the benefits of SAIs, as defined in ISSAI 12: (1) strengthening the accountability, transparency and integrity of government and public sector entities; (2) demonstrating ongoing relevance to citizens, parliament and other stakeholders and (3) being a model organization through leading by example (INTOSAI, 2013a). Furthermore, as explained in the Introduction section, the possibilities for information sharing, direct communication, and interactivity offered by SM add value and opportunities for citizen engagement that are not possible with traditional media.

Mergel (2013) distinguishes three SM tactics for public sector entities based on their existing communication and interaction style: (a) a “push strategy” that represents formal government information on SM as additional channels of communication; (b) a “pull strategy” that engages and includes information from stakeholders; and (c) a “networking strategy” that includes both push and pull activities, with a highly interactive and bidirectional responsiveness that produces reciprocal feedback cycles. However, empirical findings have found that most public sector entities use these tools mainly for transparency purposes (DePaula, Dincelli, & Harrison, 2018; Golbeck, Grimes, & Rogers, 2010; Zheng & Zheng, 2014) and even in an essentially ornamental way (Gandia, Marrahi, & Huguet, 2016; Gunawong, 2015).

While SM use by Audit Institutions presents an unprecedented opportunity, it also creates risks and new institutional challenges, particularly when these tools are used for engagement purposes that require staff attention and the development of mechanisms to incorporate and respond to external input. As with other tools, if they are not properly implemented, they can have negative impacts on

social perceptions (Effective Institutions Platform, 2014; EUROSAI, 2017). Furthermore, populism, disinformation campaigns and strategic political propaganda are increasingly important issues in today's society (Bastos & Mercea, 2018; European Parliament, 2019; Hall, 2017; House of Commons, 2018). Counter-propaganda mechanisms, such as disinformation laws, as well as anti-fake news units or programs developing citizens' critical thinking skills, are being promoted in the EU and US (Hall, 2017). Tackling disinformation and propaganda requires engaged, informed, and media-literate citizens and the cooperation of all social actors and stakeholders (Hall, 2017; European Parliament, 2019, p. 96). Audit Institutions, as independent experts on the supervision of public financial management issues, could play an important role in fighting disinformation campaigns aimed at increasing mistrust between citizens and public institutions (either on their own or by working in collaboration with anti-fake news units) by publishing independent trustworthy information about audit reports' findings.

González-Díaz et al. (2013) found that, by September 2011, among the 36 OECD member-country SAIs, only the US, Australian and Estonian SAIs were using Facebook and Twitter. According to these authors, "GAO usage of SM and Web 2.0 technologies may be considered an example of good practice that other SAIs, which hardly use them, would do well to emulate" (González-Díaz et al., 2013, p. 600). Legitimacy is one of the reasons that has been used to explain why organizations within the public sector provide information voluntarily and seek stakeholder participation (Pina, Torres, & Royo, 2010; Yetano, Royo, & Acerete, 2010). In some cases, it seems that the search for legitimacy has become, in itself, a rationale for the adoption of new communication and engagement tools.

1.2.2 Theoretical framework

The two main theories used to explain the adoption of new communication and engagement tools are institutional theory (DiMaggio & Powell, 1983) and the diffusion of innovations theory (Rogers, 2003). Institutional theory establishes that organizations care about legitimacy to justify their existence and the activities they carry out. According to this theory, organizations respond to pressures from their institutional environments and adopt structures and practices that have high social value in reaction to external changes in expectations and formal rules, which explains the tendency towards similarity between organizations. Isomorphism, a key concept embedded in institutional theory, can be used to predict that audit institutions would adopt Web 2.0 and SM tools as a "symbol" of openness and modernity. Three types of isomorphism are proposed within this theory: coercive, mimetic and normative (DiMaggio & Powell, 1983). Coercive isomorphism results from pressure imposed on an organization by legal, hierarchical or resource dependence. In mimetic isomorphism, organizations imitate practices and models of leading organizations in their institutional

field in an attempt to achieve greater recognition. Finally, normative isomorphism stems from environmental pressure for transformation from stakeholders, such as politicians, financial institutions, scholars, multilateral organizations and professional groups who try to define the conditions and method of work. The three specific values and benefits of SAIs listed above - strengthening accountability, demonstrating ongoing relevance to stakeholders and being a model organization, as defined by INTOSAI (2013a)- are strongly related to the idea of legitimacy, which, according to Suchman (1995), is defined as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions." The adoption of transparency and accountability practices strengthens the public image of Audit Institutions and contributes to legitimizing their authority to control (Mendoza, 2013). Web 2.0 and SM also increase social legitimacy because of the higher involvement of the public (Agostino et al., 2017). Therefore, the use of SM to give visibility to the activities that Audit Institutions carry out can help them to improve their legitimacy by increasing the value perceived by stakeholders, although it can also become a rhetorical instrument in some cases and gaps between rhetoric and reality are likely (Bonson et al., 2012; Pina, Torres, & Yetano, 2009; Torres, Yetano, & Pina, 2019).

SM use by Audit Institutions can be considered an innovation, since it is a new channel for interacting with different user groups. Diffusion is "the process by which an innovation is communicated through certain channels over time among members of a social system" (Rogers, 2003, p. 35). According to the diffusion of innovations theory, the innovations that are perceived as having greater advantages and observability –how visible the results of the innovation are to others– will be adopted more rapidly. This theory studies the factors affecting the adoption of an innovation. Together with costs, adopters take into account to what extent the innovation would disrupt other functions of their organization, that is, whether it is compatible with existing patterns and values–the compatibility issue, as described by Reichborn- Kjennerud (2013). Five categories of adopters of an innovation are distinguished: innovators, early adopters, early majority, late majority, and laggards. Innovators are on the cutting edge. Early adopters take into account the innovators' experience to make their own adoption decisions: if they observe that the innovation has been effective for the innovators, they will be encouraged to adopt. This group earns respect for its judicious, well-informed decision making and, hence, it is where most opinion leaders reside. Well-informed opinion leaders communicate their approval or disapproval of an innovation, based on the innovators' experiences, to the rest of the social system. Much of the social system merely wants to keep in step with the rest, so a large subsection of the social system follows the trusted opinion leaders.

Even though Audit Institutions' communication goals when interacting with the general public should not be aimed at creating an image (EUROSAI, 2017), according to the institutional and diffusion of innovation theories (mainly, coercive and normative pressures coming from INTOSAI and other international organizations) and due to the increasing adoption of SM by corporations, public sector entities and citizens in general (mimetic isomorphism and diffusion of innovations), a gradual and increasing adoption of SM by Audit Institutions should be expected.

1.2.3 Public administration styles

Agostino et al. (2017) highlight the need for further research about SM use in the public sector which takes the influence of the national culture into account. The public administration style has been an important element for explaining the evolution of other public sector reform initiatives (Hood, 1995; Pina et al., 2009; Pollitt & Bouckaert, 2000; Pollitt & Summa, 1997; Torres, 2004; Torres et al., 2019) and developments in e-government related to transparency and accountability (Pina et al., 2010; Pina, Torres, & Royo, 2007). According to these authors, the dissemination of public sector management innovations is influenced by their organizational and administrative culture, historical background and legal structural elements. Torres et al. (2019) also note that Anglo-American, Nordic and Germanic Audit Institutions usually carry out more value for money audits. On the contrary, Napoleonic and Eastern European countries usually pay more attention to regularity (financial-compliance) audits. Therefore, the public administration style also encapsulates, to some extent, the type of work carried out by different Audit Institutions.

Among the countries included in this study, five broad styles of public management may be distinguished (Pina et al., 2009): Anglo- American, Nordic, Germanic, Napoleonic and Eastern European. During the 1980s, Anglo-American countries introduced a new public managerial approach that emphasized efficiency, effectiveness, and value for money. These countries were pioneers in the introduction of market mechanisms, notions of competitiveness, and attempts to make public services more responsive to users/customers. Nordic countries also belong to a public administration style that is concerned with meeting citizens' needs and they have been front-runners in performance audits (Johnsen et al., 2019). They have an explicit ambition to create and sustain a welfare state and a cultural tradition of openness, transparency, negotiation and consultation. The Germanic and Napoleonic countries are influenced by structures inherited from a bureaucratic, hierarchical, Weberian public administration grounded in administrative law. The citizen has traditionally been considered as a “subject”, although this view is changing. The Eastern European group is made up of the countries which were under the political and administrative influence of the USSR, but now belong to the EU. Toonen (1993) identified five principles that guided Eastern

European societies in building their governments: decentralization; the improvement of channels of communication between government and citizens in response to a demand for participation; a concern for public welfare and social justice in terms of services and human rights; an efficient government administration at all levels; and internal and external accountability.

The literature on public sector management usually considers that Anglo-American and Nordic countries have a long-standing reputation of public sector reforms, transparency, and citizen engagement. On the contrary, Germanic and Napoleonic countries belong to a more legalistic tradition and have been considered as laggards in introducing some public sector reforms. From the literature discussed above and the leading role of Eastern European countries as regards ICTs in general, and SAIs innovative practices using ICTs in particular (EUROSAI, 2019), a priori, a higher level of development of Web 2.0 and SM tools could be expected in Anglo-American, Nordic and Eastern European Audit Institutions. Previous research analyzing the use of SM to engage citizens in spending review processes in the UK, France and Italy has found that the UK was the only country using Web 2.0 tools (Agostino et al., 2017). Similarly, less than 40% of Germanic RAIs publish the complete version of their performance audit reports on the Internet (Torres et al., 2019). However, Bonsón et al. (2012) found that the public administration style was not a determining factor of the level of development of Web 2.0 and SM at the local level.

1.3 Sample and method

The sample of this study includes all the Audit Institutions (SAIs and RAIs) of the US and the EU (except for those RAIs that act as subsidiaries to the SAI) and the European Court of Auditors (ECA), making a total of 143 Audit Institutions (see the Appendix 1.1). The ECA is a unique, supranational Audit Institution responsible for auditing the institutions of the EU. Although not technically a SAI, its status and operations are sufficiently similar to national SAIs and RAIs (Pollitt & Summa, 1997) to be included in the comparison. In general terms, SAIs and RAIs carry out similar functions, but their competences are over different public bodies and, in some federal and quasi-federal countries, such as Germany and Spain, most performance audits are carried out by RAIs. Therefore, differences in countries' structures require the study of the activity of the RAIs (Torres et al., 2019) in order to provide an overall view of SM use by Audit Institutions. Furthermore, in those countries where both SAIs and RAIs coexist, RAIs are the public sector Audit Institutions closest to citizens and, due to this, a higher use of SM tools and citizen awareness could be expected.

The US and European Audit Institutions were chosen for the analysis as they are pioneers in public sector auditing and they have traditionally been the geographical environments with the highest rates of adoption of new technologies and e-government indexes in international rankings (United Nations,

2018). Therefore, these countries have both the capacity and a high potential critical mass of networked stakeholders.

In the first part of the research (RQ1), the presence of the Audit Institutions in the different Web 2.0 and SM tools was evaluated based on the existence of an active link to them on their official websites. All the SM and Web 2.0 tools, according to the classification used by Bonson et al. (2012), were considered. These data were collected in June 2018 and 13 platforms/tools were found.

Then, in order to answer RQ2, a cluster analysis was carried out taking as observations the 143 Audit Institutions in the sample. The variables used for the analysis were the 13 dichotomous variables measuring the adoption of SM and Web 2.0 tools. The Ward method was used as the level of adoption of these tools was very asymmetrical and there were some atypical data and outliers. The possibility of eliminating outliers was ruled out because they have the highest adoption rates and the purpose is to show the situation of all Audit Institutions. The resulting groups were evaluated according to their presence in each platform/tool, the average number of tools adopted, the public administration styles and countries of origin, and the type of institutions (RAI/SAI). The five public administration styles defined in the previous section were taken into account, plus the ECA that is not included in any of these styles.

In order to answer RQ3, bivariate analyses were carried out to analyze the factors related to the adoption of these communication platforms (dichotomous variable, taking the value 1 if the Audit Institution has adopted any of the 13 tools/platforms analyzed and 0 otherwise) and the number of SM and Web 2.0 tools adopted. Research on transparent and open government usually highlights two critical success factors (Bertot, Jaeger, & Grimes, 2010): a culture of transparency embedded within the governance system and a transparency "readiness" factor, including factors related to technology penetration. In order to understand what factors are related to the adoption of Web 2.0 and SM tools, the following variables have been considered: the public administration style, the open budget index (OBI) and the corruption perception index of the country (as proxies of the culture of transparency embedded within the governance system), the Internet and SM penetration rates (as a general and a more specific measure, respectively, of the technological readiness of the population) and the online service index (OSI) (as a measure of the level of development of public e-services provided by the respective countries). The population of each country/region and the type of Audit Institution (SAI/RAI) were also considered as control variables. The population data was collected from Eurostat, the UK office for National Statistics (for Scotland and Wales) and the US Census Bureau; the Internet penetration data was obtained from the International Telecommunications Union (www.itu.int); SM penetration was collected from We are social (2018); the corruption perception

index was obtained from Transparency International (www.transparency.org), the OBI was collected from the International Budget Partnership (2018) and the OSI was collected from the United Nations E-Government Survey (United Nations, 2018). For some of the variables (Internet penetration, SM penetration, corruption perception index, OBI and OSI) the information for the RAIs is at country level because data for regions is not available. The bivariate analyses consisted of Pearson's Chi-squared test (two qualitative variables), the U-Mann Whitney test (dichotomous versus quantitative variable), the Kruskal-Wallis test (quantitative versus qualitative variable with more than two categories), and Spearman's correlation (two quantitative variables), as appropriate, depending on the type of variables involved in each case.

To answer RQ4, the publications of the Audit Institutions (30 publications from each Twitter account, the tool with the highest level of adoption, as shown below) were classified, depending on the type of content published, adapting the classification proposed by DePaula et al. (2018) to the context of this study (Audit Institutions). Eleven types of publications were differentiated (see Appendix 1.2), which are grouped into 4 main categories: information provision (related with the diffusion of substantive information, i.e. the main activities carried out by Audit Institutions), input seeking and online dialog/offline interaction (publications that look for citizen input or offline engagement) and symbolic presentation (publications aimed at improving the image of the audit institution, complying with social conventions that facilitate interaction, and/or at expressing opinions on political issues). Taking into account the different roles that audit information (in our case, contents published in SM by Audit Institutions) can play (see Johnsen et al., 2019), the above mentioned categories can also be grouped into three: instrumental or conceptual information, by providing new knowledge and/or new insights for the public to be better informed (i.e. provision of substantive information); interactive impacts, which means that the content is intended to be used by stakeholders to interact with the Audit Institutions (input seeking and online dialog/offline interaction) and political-legitimizing or tactical information (symbolic presentation).

Finally, in order to answer RQ5, the two following metrics were also collected for Twitter: 1) number of followers, to know what is the level of monitoring of these accounts and the potential number of stakeholders that will receive announcements of their publications; and 2) awareness level (N° followers/population), multiplying the final result by 1000 due to the low number of followers.

1.4 Results

1.4.1 Level of adoption of online communication platforms among Audit Institutions

Half of the institutions analyzed do not use any Web 2.0 or SM tool, and the average number of tools used is 1.3 (see Table 1-1). The level of use is higher among SAIs: 72% of the SAIs use at least one SM tool, versus 43% of the RAIs, and the average number of tools used is 2.6 and 0.9, respectively.

The most used SM are Twitter, Facebook and RSS for both SAIs and RAIs, although with large differences: their use is close to 50% for SAIs, but much lower for RAIs, as can be seen in Table 1-1. The use of YouTube and LinkedIn among SAIs is also relatively high. The presence of Audit Institutions in the rest of the platforms is residual.

Table 1-1. Presence of Audit institutions in Web 2.0 and SM.

	EU			US			Total		
	SAI	RAI	Total	SAI	RAI	Total	SAI	RAI	Total
Twitter	51.7%	17.5%	28.3%	100.0%	50.0%	51.0%	53.3%	31.9%	36.4%
Facebook	44.8%	3.2%	16.3%	100.0%	42.0%	43.1%	46.7%	20.4%	25.9%
RSS	48.3%	15.9%	26.1%	100.0%	12.0%	13.7%	50.0%	14.2%	21.7%
YouTube	37.9%	3.2%	14.1%	100.0%	16.0%	17.6%	40.0%	8.8%	15.4%
LinkedIn	27.6%	7.9%	14.1%	100.0%	16.0%	17.6%	30.0%	11.5%	15.4%
Blog	6.9%	3.2%	4.3%	100.0%	2.0%	3.9%	10.0%	2.7%	4.2%
Flickr	10.3%	0.0%	3.3%	100.0%	4.0%	5.9%	13.3%	1.8%	4.2%
Instagram	3.4%	0.0%	1.1%	0.0%	6.0%	5.9%	3.3%	2.7%	2.8%
Google+	6.9%	0.0%	2.2%	0.0%	0.0%	0.0%	6.7%	0.0%	1.4%
SlideShare	3.4%	0.0%	1.1%	0.0%	0.0%	0.0%	3.3%	0.0%	0.7%
Dailymotion	3.4%	0.0%	1.1%	0.0%	0.0%	0.0%	3.3%	0.0%	0.7%
Pinterest	0.0%	1.6%	1.1%	0.0%	0.0%	0.0%	0.0%	0.9%	0.7%
Widgets	0.0%	0.0%	0.0%	100.0%	0.0%	2.0%	3.3%	0.0%	0.7%
N	29	63	92	1	50	51	30	113	143
Mean	2.4	0.5	1.1	8	1.5	1.6	2.6	0.9	1.3
Min	0	0	0	8	0	0	0	0	0
Max	7	6	7	8	5	8	8	6	8

The adoption of SM among Audit Institutions is higher in the US than in the EU (1.6 versus 1.1 tools used, on average). As regards SAIs, the GAO (General Audit Office in the US) has the greatest presence in SM as it uses 8 tools. The use of SM in European SAIs is lower, in general terms, with 2.4 tools used, on average. The SAI with the highest level of adoption in Europe is the "Cour des Comptes" in France with 7 tools. The use among European RAIs is limited, with an average number of 0.5 tools. The most common SM tools for RAIs in Europe are Twitter and RSS, but the level of adoption is just 17.5% and 15.9%, respectively. RAIs in the US have a higher level of presence in SM, with 1.5 tools used, on average, Facebook and Twitter being the most adopted tools (50% and

42%, respectively). The RAIs with the greatest presence in SM are "Audit Scotland" (6 tools), "Wales Audit office" and the "Office of State Auditor" of Mississippi (5 tools each).

1.4.2 Patterns of adoption of online communication platforms

Cluster analysis identifies 5 groups of Audit Institutions (see Appendix 1.3), depending on their level of adoption of SM. The last column in Appendix 1.1 indicates the group in which each Audit Institution is included. The identified groups differ in the use of the most frequent communication platforms (Twitter, Facebook and RSS) and in how they complement their use with less common SM. Groups 1 and 2 have the highest level of adoption of SM, with an average of 4 tools used, on average (see Table 1-2).

Table 1-2. Groups of Audit Institutions depending on SM adoption.

	Group 1	Group 2	Group 3	Group 4	Group 5	Total
Twitter	100.0%	95.7%	85.0%	12.5%	0.0%	36.4%
Facebook	100.0%	69.6%	50.0%	0.0%	0.0%	25.9%
RSS	18.2%	56.5%	0.0%	100.0%	0.0%	21.7%
YouTube	100.0%	34.8%	0.0%	18.8%	0.0%	15.4%
LinkedIn	9.1%	87.0%	5.0%	0.0%	0.0%	15.4%
Instagram	36.4%	0.0%	0.0%	0.0%	0.0%	4.2%
Blog	0.0%	26.1%	0.0%	0.0%	0.0%	4.2%
Flickr	27.3%	8.7%	0.0%	0.0%	1.4%	2.8%
Google+	9.1%	0.0%	0.0%	6.3%	0.0%	1.4%
SlideShare	0.0%	4.3%	0.0%	0.0%	0.0%	0.7%
Dailymotion	0.0%	4.3%	0.0%	0.0%	0.0%	0.7%
Pinterest	0.0%	4.3%	0.0%	0.0%	0.0%	0.7%
Widgets	0.0%	4.3%	0.0%	0.0%	0.0%	0.7%
N	11	23	20	16	73	143
No. of tools adopted						
Mean	4.0	4.0	1.4	1.4	0.0	1.3
Min	3	2	1	1	0	0
Max	5	8	2	4	1	8
SAI	5	9	2	6	8	30
RAI	6	14	18	10	65	113
Anglo-American	6	14	12	1	23	56
Eastern	5	2	0	9	12	28
Germanic	0	0	1	1	25	27
Napoleonic	0	1	3	5	11	20
Nordic	0	5	4	0	2	11
ECA	0	1	0	0	0	1

Group 1 includes 11 Audit Institutions (6 from the US and 1 each from Slovakia, Poland, Lithuania, Latvia and Bulgaria). All of them use Twitter, Facebook and YouTube and the 4 institutions of the sample that use Instagram are included in this group. According to We are social (2018), Facebook,

YouTube and Instagram are the tools with the largest number of active users. Therefore, Audit Institutions in Group 1 are at the forefront of SM adoption.

Group 2 is composed of 23 Audit Institutions (10 from the US, 4 from the UK, 3 from the Netherlands and 1 each from Sweden, Slovenia, France, Finland and Estonia, and the ECA) that use Twitter and/or Facebook and are differentiated from the rest by a high presence in LinkedIn (87%) and, to a lesser extent, RSS (56.5%). As can be seen in Table 1-2, some Audit Institutions in this group are also present in other minority SM.

Group 3 includes 20 Audit Institutions (12 from the US, 4 from Netherlands, 2 from Spain, and 1 each from Malta and Austria) whose most important characteristic is that they do not use any SM tool to complement their activity in Twitter and/or Facebook, where the average presence is 85% and 50%, respectively. This causes an important difference in the average number of tools used in comparison with the two previous groups (1.4 versus 4).

Group 4 includes 16 Audit Institutions (7 from Poland, 3 from Spain and 1 each from the US, Italy, Hungary, Germany, Czech Republic and Belgium). They are characterized by a more traditional use of online communication platforms. All of them use RSS and the use of the other tools is residual. Therefore, they are mainly interested in one-way communication, in most cases without any possibility for stakeholders to interact in SM.

Group 5 is the largest, with 73 Audit Institutions (51% of the 143 institutions in the sample). They do not use SM, except for one entity (the Office of State Auditor in Alabama) that uses Flickr.

The highest levels of adoption of SM correspond to Anglo-American, Nordic and Eastern European countries (with a mean of 1.8, 1.8 and 1.4 tools used, respectively). All the entities in Group 1 are Anglo-American or Eastern European. Groups 2 and 3 are mostly made up of Anglo- American and Nordic Audit Institutions (83% of the entities in these groups belong to these two styles). Audit institutions from Germanic and Napoleonic countries have a lower presence in SM (with a mean of 0.1 and 1 tools). 92.6% of the Germanic Audit Institutions belong to Group 5 as they hardly use SM, and 80% of the Napoleonic Audit Institutions are in Groups 4 and 5. SAIs are overrepresented in Groups 1 and 2: they represent 45% and 64% of the Audit Institutions in these groups, respectively, but only 21% of the whole sample.

1.4.3 Factors related to the adoption of online communication platforms

Table 1-3. Factors related to SM adoption by Audit Institution.

Panel A: Factors related to the adoption of at least one tool (N=142).

	% of Audit Institutions that use at least one tool	
Anglo-American	60.7%	
Eastern	57.1%	Kruskal-Wallis
Germanic	7.4%	27.2**
Napoleonic	45.0%	
Nordic	81.8%	
SAIs	72.4%	Chi-square
RAIs	43.3%	27.4**

	Do not use any tool(1)	Use at least one tool(2)	U-MW
Ln (inhab.)	14.70	15.44	1,702.5**
Internet	80.77	79.45	2,357.0
SM	56.99	62.84	1,848.5**
Corruption	71.29	70.53	2,464.0
OBI(3)	68.11	70.57	1,298.0
OSI(4)	93.03	93.48	2,880.5

Panel B: Factors related to the number of tools adopted (N=142).

	Average No. of tools adopted	
Anglo-American	1.8	
Eastern	1.4	Kruskal-Wallis
Germanic	0.1	26.2**
Napoleonic	1.0	
Nordic	1.8	
SAIs	2.6	U-MW
RAIs	0.9	3.8**

Spearman correlation	Ln (inhab.)	Internet	SM	Corruption	OBI(3)	OSI(4)
No. of tools adopted	0.351**	- 0.043	0.270**	0.012	0.240*	0.161

Notes: *p-value<0.05; **p-value<0.01. N=142 because the ECA has not been included in these analyses.
(1) Average value of the following variables for those Audit Institutions that do not use any Web 2.0 or SM tool: number of inhabitants (Ln) of the country/region, percentage of individuals using the Internet, percentage of individuals using SM tools, corruption perception index, open budget index (OBI) and online service index (OSI).
(2) Average value of the same variables for those Audit Institutions that use at least one Web 2.0 or SM tool.
(3) N=113 because data for Austria, Belgium, Cyprus, Denmark, Estonia, Finland, Greece, Ireland, Latvia, Lithuania, Luxembourg, Malta and Netherlands was not available.
(4) N=141 because data for Cyprus was not available.

Table 1-3 shows the results obtained for the bivariate tests carried out to analyze the factors related to the adoption of at least one communication platform and the number of tools adopted. As can be seen, the factors statistically related to the adoption of at least one tool (Panel A) are practically the same as for the number of tools adopted (Panel B). The only difference is for the OBI, which does not explain differences in the adoption or non-adoption of SM, but is positively related to the number of tools adopted. The results for the public administration style and type of Audit Institutions confirm the general impressions obtained in the previous subsection: these two variables are related to the

adoption of Web 2.0 and SM tools. Particularly, the percentages of adoption of at least one tool are higher for Nordic, Anglo-American and Eastern European countries (81.8%, 60.7% and 57.1%), versus 7.4% for Germanic Audit Institutions. 45% of the Audit Institutions in Napoleonic countries have adopted at least one tool. As can be seen, 72.4% SAIs have adopted at least one of the tools versus 43.3% RAIs. As regards the number of tools adopted, the differences among public administration styles and type of Audit Institutions are also statistically significant. Regarding countries/regions characteristics, the number of inhabitants and the level of SM adoption among the population are positively related to the adoption of at least one tool and the number of tools adopted (in this last case, the OBI is also statistically significant). Conversely, Internet penetration, the corruption perception index and the OSI are not related to the adoption of Web 2.0 or SM tools by Audit Institutions.

1.4.4 Contents published through SM

Table 1-4. Type of publications in Twitter (N=1,380 tweets).

	Total
Information Provision	**86.7%**
Audit reports	52.5%
Events and other activities	31.2%
Public interest information	3.1%
Input Seeking	**2.4%**
Citizen information	2.3%
Fundraising	0.1%
Online dialog/offline interaction	**4.1%**
Online dialog	0.0%
Offline discussion	0.0%
Job offers and competitive exams	4.1%
Symbolic presentation	**6.7%**
Favorable presentation and marketing	4.9%
Symbolic act	1.4%
Political positioning	0.4%
Total	**100.0%**

Note: Examples of each type of tweets can be found in Appendix 1.2.

As can be seen in Table 1-4, most of the publications in Twitter (86.7%) aim at transmitting substantive information to stakeholders. The information communicated is mostly related to the activity of the Audit Institutions: audit reports represent 52% of the tweets and 31% refer to press releases, conferences, meetings and other activities. The second objective, according to publication frequency (6.7%), is related to the improvement of the image of the Audit Institutions. Most of the tweets classified as symbolic presentation seek to attribute merits to the Audit Institutions or present promotional content and those that express opinions on political issues are rare.

Publications that aim at promoting interaction with stakeholders (input seeking and online dialog/offline interaction categories) are the least frequent. Within these categories, the most common tweets relate to job offers or competitive exams (4.1%). This shows that Audit Institutions are using SM mostly for one-way communication related to their main fields of activity.

1.4.5 Number of followers and levels of citizen awareness

Table 1-5. Level of follow-up in Twitter

Followers	Mean	7,115.7
	Median	827.5
	Max	133,000.0
	Min	10.0
	SD	22,168.7
Awareness	Mean	0.3
	Median	0.2
	Max	2.0
	Min	0.0
	SD	0.4

Note: Followers data refer to June, 2018.

The average number of followers in Twitter is around 7,100 (see Table 1-5). However, there are large differences between Audit Institutions as shown by the minimum, maximum and standard deviation figures. In these cases, the median value is more representative than the average value, and this figure is much lower (827 followers). Some institutions have a very high level of followers, such as the GAO (43,200) and the UK "National Audit Office" with 133,000. The smallest number of followers (10) corresponded to the "Office of the Auditor" in Hawaii.

The levels of awareness (number of followers divided by the number of inhabitants of the country/region) are very low. On average, only 3 people per 10,000 inhabitants are following these Twitter accounts. Indeed, only 4 Audit Institutions have more than 1 follower per 1000 inhabitants. These results are lower than those presented by other institutions, such as local or national governments (Bonsón et al., 2017; Mickoleit, 2014), as their target audience is probably smaller than all the population in the region/country.

1.5 Discussion and conclusions

SM are becoming a more and more common source of information that people use to receive direct updates and content on general topics or personal interests, by following different organizations or people. Therefore, SM could be another adequate channel for Audit Institutions to promote transparency and citizen engagement, and to improve their visibility and change their perception as closed and distant institutions in the eyes of citizens. However, the use of Web 2.0 tools and SM by

Audit Institutions is still at an initial stage. Half of the Audit Institutions analyzed do not use any of these tools. Others only use RSS to keep Institutions do not allow any type of interaction with stakeholders through SM, suggesting that media attention is considered as a potential source of conflict for a considerable percentage of Audit Institutions, as previous research has found (van Acker & Bouckaert, 2019), and that environmental pressures for SM adoption result in different configurations of the "same" reform. These results contradict the idea of "diffusion as imitation" (mimetic isomorphism) and confirm that the adoption of public management reforms by Audit Institutions are conditioned by contextual factors (Torres et al., 2019).

The Audit Institutions that have adopted SM mainly use Twitter or Facebook and only few Audit Institutions complement the use of these tools with other SM. However, having a SM account does not imply that Audit Institutions are reaching and engaging in dialog with stakeholders. As our results show, the number of followers and citizens' awareness of the official Twitter accounts is low, in general terms. Most of the tweets refer to the audits they perform, trying to increase legitimacy by increasing stakeholder levels of awareness and perceived value about the main activities they carry out. However, the contents published rarely aim at encouraging stakeholder participation, which corroborates the results obtained for other public sector organizations (DePaula et al., 2018; Golbeck et al., 2010; Zheng & Zheng, 2014). It seems that Audit Institutions are using SM to increase their visibility and legitimacy by using what Mergel (2013) defines as a "push strategy". There are some exceptions, such as the campaign "Shape our audits" in the Audit Office of Wales (UK), which consists in an online public consultation about the themes and topics that stakeholders think the audit office should analye (see Appendix 1.2). The lack of publications seeking bidirectional communication means that the possibility of using SM to achieve the goal of gaining legitimacy through responsiveness ("networking strategy") is being wasted.

These results are more consistent with the traditional view of Audit Institutions as isolated and technocratic entities (having little to do with citizens and broader governance issues) than with more recent approaches advocating higher levels of stakeholder engagement. Two decades ago, Pollitt and Summa (1997) already indicated that, because of their meta-bureaucratic nature, Audit Institutions are presumably among the most resistant institutions towards the adoption of public management reforms. This is also evident in the adoption of SM tools. According to the diffusion of innovations theory, the low rate of adoption of SM suggests that Audit Institutions do not perceive great advantages for the use of these tools or believe that their use is in conflict with existing patterns and values as regards disclosure, accountability and relationships with citizens and other stakeholders– the compatibility issue, as described by Reichborn-Kjennerud (2013). The low adoption rates, especially for RAIs, also suggest that Audit Institutions, in general terms, do not feel a real urgency

to adopt these tools in spite of the recommendations of INTOSAI and other international organizations.

Overall, our results point to the existence of a certain dependence on institutional pressures (institutional theory), contextual factors (public administration styles and open budget index) and citizen demand (size of the population and SM use among citizens) for the adoption of Web 2.0 and SM tools by Audit Institutions. Cultural influences and contextual factors seem to march hand-in-hand with SM adoption by Audit Institutions. Although previous research at the local level found no differences between SM adoption depending on the public administration style (Bonson et al., 2012), this is not the case in our research for Audit Institutions. The Audit Institutions that have more presence in SM usually belong to the Anglo-American, Nordic, or Eastern-European public administration styles. Similarly, higher open budget indexes are also related to higher levels of adoption of SM. The higher level of adoption in Anglo-American and Nordic countries is consistent with the more open, egalitarian and less formal cultures of these countries and their greater tradition of public sector reforms, transparency, e-government developments and citizen engagement (Pina et al., 2010; Pollitt & Summa, 1997; Yetano et al., 2010). However, the more hierarchical, formal and status-oriented administrative cultures of Germanic and Napoleonic Audit Institutions are less favorable to the adoption of these tools. These findings are also consistent with previous research analyzing the use of SM to engage citizens in spending review processes (Agostino et al., 2017). Similarly, the analysis of the websites of RAIs in Spain (Garde, Rodriguez, & Alcaide, 2014) also showed that the main weakness of these websites was the lack of possibilities for stakeholders to interact. In spite of that, some exceptions have been found, such as the "Cour des Comptes" in France that is using a high number of Web 2.0 tools, which is consistent with its recent innovative experiences in control methods, external communication and open data (EUROSAI, 2019). Furthermore, as it is one of the most prestigious institutions in the French system of government (Pollitt & Summa, 1997), it might have felt more pressure to adopt these tools. Furthermore, Audit Institutions from the five public administration styles can be found in the group of non-adopters. This suggests that the public administration style provides a more favorable or unfavorable context but is not a decisive factor and, most probably, political will plays a key role.

The higher levels of adoption among SAIs are very probably explained by INTOSAI (2009a, 2010, 2013b) recommendations regarding effective communication with stakeholders and appropriate levels of transparency and accountability, confirming that coercive and normative isomorphism (institutional theory) are also important factors to explain SM adoption. A higher number of inhabitants and a higher SM penetration rate are also related with more presence in Web 2.0 tools and SM, in contrast with previous research in municipalities (Bonsón et al., 2012). Audit institutions

serving a larger population receive a greater amount of attention from a variety of stakeholder groups and the general public alike. Similarly, Audit Institutions in countries with higher rates of SM use among citizens will feel more pressure and/or a higher justification for SM adoption. These factors seem to play a key role in the initial stages of SM adoption, which is the present situation of Audit Institutions. In the case of SM use by the biggest local governments in Western Europe (Bonsón et al., 2012), where the use was generalized, these contextual factors lost their relevance.

These results have important theoretical and practical implications. As regards theoretical implications, our results confirm that contextual factors play a main role for the adoption of SM and Web 2.0 tools by Audit institutions. The importance of these factors is not properly addressed by institutional theory or the diffusion of innovations theory. Therefore, these theories have to be complemented with additional variables or logics (e.g. the public administration style) in order to understand varieties in the adoption of transparency and engagement tools. Furthermore, the high percentage of non-adopters (laggards, using the terminology of the diffusion of innovations theory) and the compatibility issue (i.e. the extent to which the innovation is expected to disrupt the main functions of organizations) deserve special attention and further research in the case of SM adoption by Audit Institutions.

As regards practical implications, the significantly lower levels of adoption among RAIs also point out that, for the sake of homogeneity, recommendations about SM use should be extended beyond SAIs. Audit Institutions need to work to increase their follower base if they really want to improve communication with stakeholders through Web 2.0 and SM tools. The low number of followers and awareness levels for most of the Twitter accounts also suggests that Audit Institutions should be present on several platforms to try to reach to the highest number of stakeholders and improve communication and engagement. Publishing more content that seeks two-way communication in order to incorporate stakeholder input and to improve responsiveness and the activities carried out by Audit Institutions also seems to be a pending task.

The exploratory nature of this work does not allow causality relationships to be established. It is, however, necessary to point out that this is the first study aimed at describing the adoption of SM by Audit Institutions and should, therefore, be useful to Audit Institutions, academics and the general public. Further studies to deal with other matters not analyzed in this research are necessary. For example, further research is required about the benefits, costs and risks (e.g. compatibility issues) of SM use by Audit Institutions. These analyses are necessary in order to justify the use of these tools and will be particularly useful for Audit Institutions not using these tools yet in order to make an informed decision about whether to jump on the bandwagon or not. Future research should also

analyze in greater depth SM use by Audit Institutions, extending the analysis beyond Twitter and looking at the real interactions taking place in these platforms, how stakeholders are being engaged and which are the most effective platform(s). This research has been carried out in the EU and US but, taking into account that the greatest presence in Web 2.0 and SM is in SAIs, subsequent research could extend to all the institutions belonging INTOSAI, since this organization has actively recommended its use. Further research should also take into account the capacities and resources of Audit Institutions, but these data were not easily available at the time this analysis was carried out (see also Cordery & Hay, 2019, p. 11).

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Appendix 1-1. Audit Institutions analyzed

Country	Name	SAI/RAI	Website	Group (cluster)
-	European Court of Auditors	SAI	www.eca.europa.eu	2
Austria	Rechnungshoft Österreich	SAI	www.rechnungshof.gv.at	3
Austria	Kärntner Landesrechnungshof	RAI	www.lrh-ktn.at	5
Austria	Oberösterreichischer Landesrechnungshof	RAI	www.lrh-ooe.at	5
Austria	Salzburger Landesrechnungshof	RAI	www.salzburg.gv.at/pol/lt-rechnungshof	5
Austria	Steiermärkischer Landesrechnungshof	RAI	www.landesrechnungshof.steiermark.at	5
Austria	Landesrechnungshof Tirol	RAI	www.tirol.gv.at/landtag/landesrechnungshof	5
Austria	Burgenländischer LandesRechnungshof	RAI	www.blrh.at	5
Austria	Niederösterreichischer Landesrechnungshof	RAI	www.lrh-noe.at	5
Austria	LandesRechnungshof Vorarlberg	RAI	www.lrh-v.at	5
Austria	Stadtrechnungshof Wien	RAI	www.stadtrechnungshof.wien.at	5
Belgium	Rekenhof Cour des Comptes Rechnungshof	SAI	www.courdescomptes.be	4
Bulgaria	Сметна палата на Република България	SAI	www.bulnao.government.bg	1
Croatia	State Audit Office	SAI	www.revizija.hr	5
Cyprus	Audit Office of the Republic of Cyprus	SAI	www.audit.gov.cy	5
Czech Republic	Nejvyšší Kontrolní úřad	SAI	www.nku.cz	4
Denmark	Rigsrevisionen	SAI	http://uk.rigsrevisionen.dk	5
Estonia	Riigikontroll	SAI	www.riigikontroll.ee	2
Finland	Valtiontalouden Tarkastusvirasto	SAI	www.vtv.fi	2
France	Cour des Comptes	SAI	www.ccomptes.fr	2
Germany	Bundes Rechnungshof	SAI	www.bundesrechnungshof.de	4
Germany	Rechnungshof Baden Württemberg	RAI	www.rechnungshof.baden-wuerttemberg.de	5
Germany	Landesrechnungshof Brandenburg	RAI	www.lrh-brandenburg.de	5
Germany	Hessischer Rechnungshof	RAI	https://rechnungshof.hessen.de	5
Germany	Landesrechnungshof Mecklenburg Vorpommern	RAI	www.lrh-mv.de	5
Germany	Rechnungshof Rheinland Pfalz	RAI	www.rechnungshof-rlp.de	5
Germany	Sächsischer Rechnungshof	RAI	www.rechnungshof.sachsen.de	5
Germany	Landesrechnungshof Sachsen Anhalt	RAI	https://lrh.sachsen-anhalt.de	5
Germany	Landesrechnungshof Schleswig Holstein	RAI	www.landesrechnungshof-sh.de	5
Germany	Thüringer Rechnungshof	RAI	http://thueringer-rechnungshof.de	5
Germany	Bayerischer Oberster Rechnungshof	RAI	www.orh.bayern.de	5
Germany	Rechnungshof von Berlin	RAI	www.berlin.de/rechnungshof	5
Germany	Rechnungshof der Freien Hansestadt Bremen	RAI	www.rechnungshof.bremen.de	5
Germany	Rechnungshof der Freien und Hansestadt Hamburg	RAI	www.hamburg.de/rechnungshof	5
Germany	Niedersächsischer Landesrechnungshof	RAI	www.lrh.niedersachsen.de	5
Germany	Landesrechnungshof Nordrhein Westfalen	RAI	www.lrh.nrw.de/	5
Germany	Rechnungshof des Saarlandes	RAI	www.rechnungshof.saarland.de	5
Greece	Ελεγκτικό Συνέδριο	SAI	www.elsyn.gr/el	5
Hungary	Állami Számvevöszék	SAI	https://asz.hu/	4
Ireland	Office of the Comtroller and Auditor General	SAI	www.audgen.gov.ie	5
Italy	Corte dei Conti	SAI	www.corteconti.it	4
Latvia	Valsts Kontrole	SAI	www.lrvk.gov.lv	1
Lithuania	Valstybës kontrolë	SAI	www.vkontrole.lt	1
Luxembourg	Cour des Comptes	SAI	www.cour-des-comptes.lu	5
Malta	Ufficcju Nazzjonali tal Verifika	SAI	http://nao.gov.mt	3
Netherlands	Algemene Rekenkamer	SAI	www.rekenkamer.nl	2
Netherlands	Noordelijke Rekenkamer	RAI	www.noordelijkerekenkamer.nl	3
Netherlands	Rekenkamer OostNederland	RAI	http://rekenkameroost.nl	2

Netherlands	Randstedelijke Rekenkamer	RAI	www.randstedelijke-rekenkamer.nl	3
Netherlands	Rekenkamer Zeeland	RAI	www.rekenkamerzeeland.nl	3
Netherlands	Zuidelijke Rekenkamer	RAI	www.zuidelijkerekenkamer.nl	2
Netherlands	Rekenkamer Amsterdam	RAI	www.rekenkamer.amsterdam.nl	3
Netherlands	Rekenkamer Rotterdam	RAI	https://rekenkamer.rotterdam.nl	5
Poland	Najwyższa Izba Kontroli	SAI	www.nik.gov.pl	1
Poland	Regionalna Izba Obrachunkowa w Bydgoszczy	RAI	www.bydgoszcz.rio.gov.pl	4
Poland	Regionalna Izba Obrachunkowa w Katowicach	RAI	www.katowice.rio.gov.pl	5
Poland	Regionalna Izba Obrachunkowa w Krakowie	RAI	www.krakow.rio.gov.pl	5
Poland	Regionalna Izba Obrachunkowa w Łodzi	RAI	www.lodz.rio.gov.pl	5
Poland	Regionalna Izba Obrachunkowa w Poznaniu	RAI	www.poznan.rio.gov.pl	5
Poland	Regionalna Izba Obrachunkowa w Szczecinie	RAI	www.szczecin.rio.gov.pl	4
Poland	Regionalna Izba Obrachunkowa w Warszawie	RAI	http://bip.warszawa.rio.gov.pl	4
Poland	Regionalna Izba Obrachunkowa we Wrocławiu	RAI	http://bip.wroclaw.rio.gov.pl	4
Poland	Regionalna Izba Obrachunkowa w Zielonej Górze	RAI	www.zielonagora.rio.gov.pl	5
Poland	Regionalnej Izby Obrachunkowej w Białymstoku	RAI	http://bialystok.rio.gov.pl	5
Poland	Regionalna izba Obrachunkowa w Gdansku	RAI	www.bip.gdansk.rio.gov.pl	4
Poland	Regionalna izby Obrachunkowej w Kielchach	RAI	http://bip.kielce.rio.gov.pl	5
Poland	Regionalna Izba Obrachunkowa w Lublinie	RAI	www.lublin.rio.gov.pl	4
Poland	Regionalna Izba Obrachunkowa w Olsztynie	RAI	www.olsztyn.rio.gov.pl	5
Poland	Regionalnej Izby Obrachunkowej w Opolu	RAI	http://rio.opole.pl	4
Poland	Regionalna izba Obrachunkowa w Rzeszowie	RAI	www.rzeszow.rio.gov.pl	5
Portugal	Tribunal de Contas	SAI	www.tcontas.pt	5
Romania	Curtea de Conturi a României	SAI	www.curteadeconturi.ro	5
Slovakia	Najvyšší Kontrolný Úrad	SAI	www.nku.gov.sk	1
Slovenia	Računsko Sodišče Republike Slovenije	SAI	www.rs-rs.si	2
Spain	Tribunal de Cuentas de España	SAI	www.tcu.es	4
Spain	Cámara de Cuentas de Aragón	RAI	www.camaracuentasaragon.es	4
Spain	Cámara de Cuentas de Andalucía	RAI	www.ccuentas.es	3
Spain	Sindicatura de Cuentas del Principado de Asturias	RAI	www.sindicastur.es	5
Spain	Sindicatura de Comptes de les Illes Balears	RAI	www.sindicaturaib.org	5
Spain	Audiencia de Cuentas de Canarias	RAI	www.acuentascanarias.org	5
Spain	Consejo de Cuentas de Castilla y León	RAI	www.consejodecuentas.es	4
Spain	Sindicatura de Comptes de Catalunya	RAI	www.sindicatura.org	5
Spain	Consello de Contas de Galicia	RAI	www.consellodecontas.es	5
Spain	Cámara de Cuentas de la Comunidad de Madrid	RAI	www.camaradecuentasmadrid.org	5
Spain	Cámara de Comptos de Navarra	RAI	http://camaradecomptos.navarra.es	3
Spain	Sindicatura de Comptes de la Comunitat Valenciana	RAI	www.sindicom.gva.es	5
Spain	Tribunal Vasco de Cuentas Públicas	RAI	http://web.tvcp.orges	5
Sweden	Riksrevisionen	SAI	www.riksrevisionen.se	2
UK	National Audit Office	SAI	www.nao.org.uk	2
UK	Audit Scotland	RAI	www.audit-scotland.gov.uk	2
UK	Wales Audit Office	RAI	www.audit.wales	2
UK	Northern Ireland Audit Office	RAI	www.niauditoffice.gov.uk	2

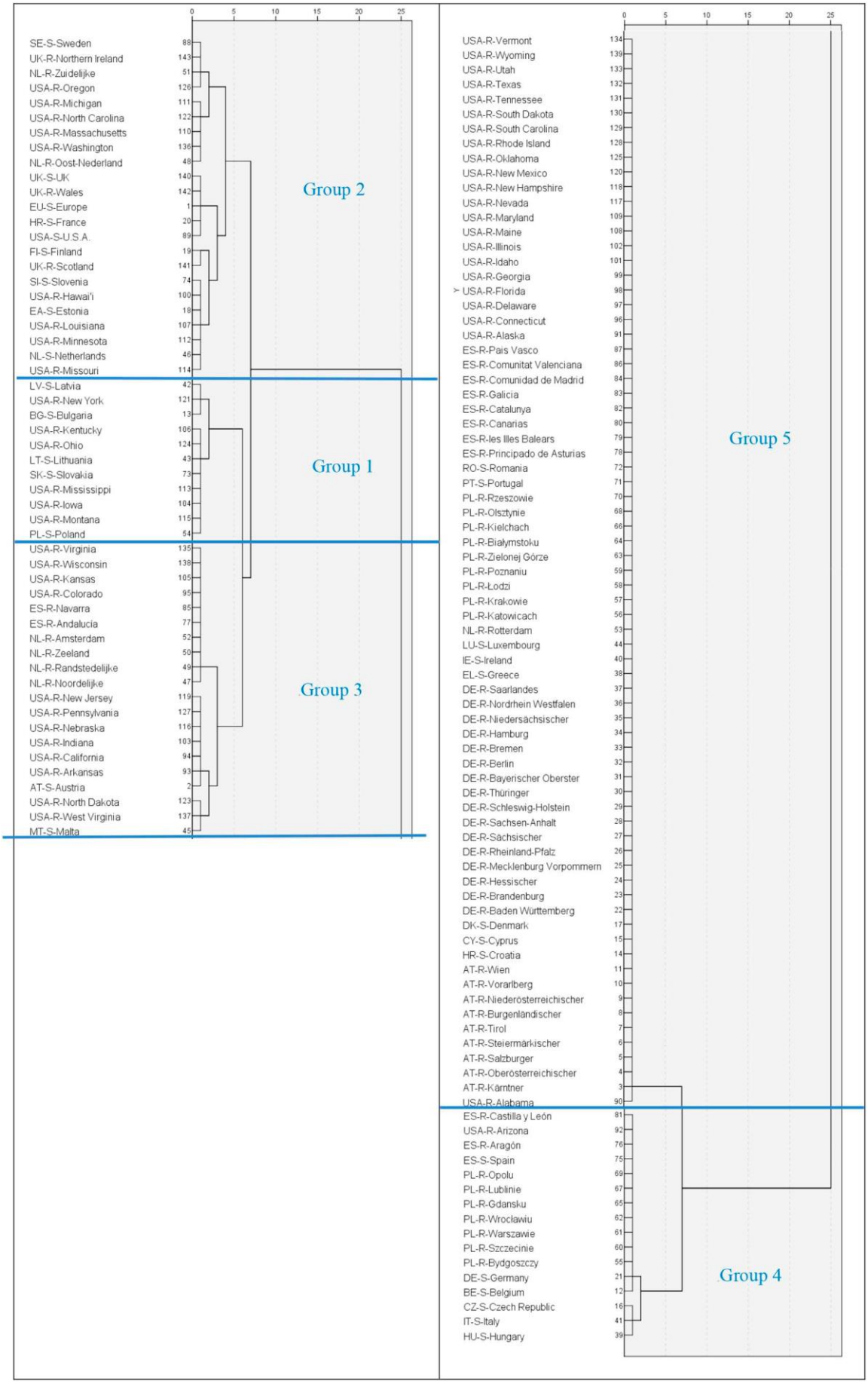
US	U.S. Government Accountability Office	SAI	www.gao.gov	2
US	Alabama - Office of State Auditor	RAI	http://auditor.alabama.gov	5
US	Alaska - Division of Legislative Audit	RAI	www.legaudit.state.ak.us	5
US	Arizona - Office of the Auditor General	RAI	www.azauditor.gov	4
US	Arkansas - Auditor of State	RAI	www.arkansas.gov/auditor/	3
US	California - Bureau of State Audits	RAI	www.bsa.ca.gov	3
US	Colorado - Office of the State Auditor	RAI	https://leg.colorado.gov/agencies/office-of-the-state-auditor	3
US	Connecticut - Auditors of Public Accounts	RAI	www.cga.ct.gov/APA/default.asp	5
US	Delaware - Office of Auditor of Accounts	RAI	https://auditor.delaware.gov	5
US	Florida - Auditor General	RAI	www.myflorida.com/audgen/	5
US	Georgia - Department of Audits and Accounts	RAI	www.audits.ga.gov	5
US	Hawai'i - Office of the Auditor	RAI	http://auditor.hawaii.gov	2
US	Idaho - Office of the State Controller	RAI	www.sco.idaho.gov	5
US	Illinois - Auditor General	RAI	www.state.il.us/auditor	5
US	Indiana - Auditor of State	RAI	www.in.gov/auditor	3
US	Iowa - Auditor of State	RAI	https://auditor.iowa.gov	1
US	Kansas - Legislative Division of Post Audit	RAI	www.kslpa.org	3
US	Kentucky - Auditor of Public Accounts	RAI	www.auditor.ky.gov	1
US	Louisiana - Legislative Auditor	RAI	www.lla.state.la.us	2
US	Maine - Department of Audit	RAI	www.maine.gov/audit	5
US	Maryland - Office of Legislative Audits	RAI	www.ola.state.md.us	5
US	Massachusetts - Office of the State Auditor	RAI	www.mass.gov/sao	2
US	Michigan - Office of the Auditor General	RAI	http://audgen.michigan.gov	2
US	Minnesota - Office of the Legislative Auditor	RAI	www.auditor.leg.state.mn.us	2
US	Mississippi - Office of the State Auditor	RAI	www.osa.state.ms.us	1
US	Missouri - Office of the State Auditor	RAI	www.auditor.mo.gov	2
US	Montana - Legislative Audit Division	RAI	http://csimt.gov	1
US	Nebraska - Auditor of Public Accounts	RAI	www.auditors.state.ne.us	3
US	Nevada - Legislative Counsel Bureau	RAI	www.leg.state.nv.us/Division/Audit	5
US	New Hampshire Office of the Legislative Budget Assistant	RAI	www.revenue.nh.gov	5
US	New Jersey - Office of the State Comptroller	RAI	www.nj.gov/comptroller	3
US	New Mexico - Office of the State Auditor	RAI	www.saonm.org	5
US	New York Office of the State Comptroller	RAI	www.osc.state.ny.us	1
US	North Carolina Office of the State Auditor	RAI	www.ncauditor.net	2
US	North Dakota Office of the State Auditor	RAI	www.state.nd.us/auditor	3
US	Ohio - Auditor of State	RAI	www.auditor.state.oh.us	1
US	Oklahoma Office of the State Auditor and Inspector	RAI	www.sai.ok.gov	5
US	Oregon Audits Division	RAI	http://sos.oregon.gov/audits	2
US	Pennsylvania Department of the Auditor General	RAI	www.paauditor.gov	3
US	Rhode Island - Office of the Auditor General	RAI	www.oag.state.ri.us	5
US	South Carolina - Office of the State Auditor	RAI	http://osa.sc.gov	5
US	South Dakota State Auditor	RAI	www.sdauditor.gov	5
US	Tennessee Comptroller of the Treasury	RAI	www.comptroller.state.tn.us	5
US	Texas State Auditor's Office	RAI	www.sao.state.tx.us	5
US	Utah - Office of the Legislative Auditor General	RAI	https://le.utah.gov/audit/olag.htm	5
US	Office of Vermont the State Auditor	RAI	http://auditor.vermont.gov	5
US	Virginia - Auditor of Public Accounts	RAI	www.apa.state.va.us	3
US	Office of the Washington State Auditor	RAI	www.sao.wa.gov	2
US	West Virginia State Auditor's Office	RAI	www.wvsao.gov	3
US	Wisconsin - Department of Administration	RAI	https://doa.wi.gov	3
US	Wyoming - State Auditor's Office	RAI	http://sao.state.wy.us	5

Appendix 1-2. Type of publications made on Twitter (definitions and examples)

Information Provision	
Audit reports	Audit reports made and published by Audit Institutions. "The EU's current long-term plan for high-speed #rail is unlikely to be achieved and there is no solid EU-wide strategic approach, according to a new report from the @EUauditors". Source: ECA.
Events and other activities	Events, conferences, press releases, appearances in parliamentary sessions. Other activities of the Audit Institution, such as changes of address, telephone, contact emails. "Our experience is evaluated internationally: a memorandum of cooperation between the Latvian and the Laos Supreme Audit Institutions has been signed today for the exchange of experiences and professional development. http://ejuz.lv/aosa". Source: Valsts kontrole (SAI of Latvia).
Public interest information	Campaigns from other institutions and recommendations of topics not related to the institution's activities (E.g. public health, elections). "Very exciting news for our State. @amazon has picked Indianapolis as one of the 20 finalists to be home to the company's 2nd headquarters. #NextLevel #HQ2". Source: Indiana Auditor of the State.
Input Seeking	
Citizen information	Requests for participation in surveys, campaigns against fraud or timely information on any subject related to the activity of the Audit Institution. "To help us choose future topics, we want you to tell us what you think we should focus on by completing our #ShapeOurAudits consultation". Source: Wales Audit Office.
Fundraising	Posts that ask for donations to different causes not necessarily related to the activity of the institution (e.g., child poverty). "Our Office, together with 34 other state and local agencies, participate in the #WellFedWellRead campaign headed by the Thurston County Food bank. The goal? To get backpacks full of food and books to kids in need for breaks from school. Only a week left to participate!". Source: Washington State Auditor's Office.
Online dialog/offline interaction	
Online dialog	Response by the Audit Institutions to user comment in SM. *No examples found in the 30 tweets per Audit Institutions analyzed.*
Offline discussion	Promotion of face-to-face events to discuss the activity of the institution, to know its mission and functions or collaborate with it. *No examples found in the 30 tweets per Audit Institutions analyzed.*
Job offers and Competitive exams	Promotion of job offers and announcement of competitive exams carried out by the institution. "Become a financial magistrate! A competition is organized in 2018 by the Court of Auditors for the recruitment of eight advisers for the regional chambers of account from 1 January 2019. Registrations are open until 18 May inclusive." Source: Cour des Comptes.
Symbolic presentation	
Favourable presentation and marketing	Milestones achieved or prizes won, images or promotional videos, internal information with the clear objective of improving the external image of the audit institution. "Czechs are contributing to the European space programme not only with parts for space rockets, but also with our auditors. They are auditing budget and financial management of ESA. Lubos Rokos is the chair of the Audit Commission, Regina Charyparová is working for it in Paris". Source: Nejvyšší kontrolní úřad (SAI of the Czech Republic).
Symbolic act	Celebration of significant days or anniversaries of events, express condolence or gratitude (e.g. celebration of workers' day, armed forces' day or Christmas holidays). "The weather may have been cold but celebrating Dr. Martin Luther King Jr's legacy of civility with so many Hoosiers was worth it. @INCivilRights #MLKJR50". Source: Indiana Auditor of the State.
Political positioning	Express the opinion of the Audit Institution/General Auditor on a political issue. "We want companies holding NY state pension fund investments to ensure board diversity. That's why we're voting against all incumbent board directors at companies with #zerowomen directors". Source: New York Office of the State Comptroller.

Source: Classification adapted from DePaula et al. (2018). Examples of publications collected by the authors.

Appendix 1-3. Dendrogram



Chapter 2: Decide Madrid: A Critical Analysis of an Award-Winning e-Participation Initiative

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Abstract

This chapter analyzes the award-winning e-participation initiative of the city council of Madrid, *Decide Madrid*, to identify the critical success factors and the main barriers that are conditioning its performance. An exploratory case study is used as a research technique, including desk research and semi-structured interviews. The analysis distinguishes contextual, organizational and individual level factors; it considers whether the factors or barriers are more related to the information and communication technology (ICT) component, public sector context or democratic participation; it also differentiates among the different stages of the development of the initiative. Results show that individual and organizational factors related to the public sector context and democratic participation are the most relevant success factors. The high expectations of citizens explain the high levels of participation in the initial stages of *Decide Madrid*. However, the lack of transparency and poor functioning of some of its participatory activities (organizational factors related to the ICT and democratic dimensions) are negatively affecting its performance. The software created for this platform, Consul, has been adopted or it is in the process of being implemented in more than 100 institutions in 33 countries. Therefore, the findings of this research can potentially be useful to 1improve the performance and sustainability of e-participation platforms worldwide.

Keywords: E-participation, Local government, Information and Communication Technologies (ICTs), Citizen participation, Transparency.

2.1 Introduction

In the last few decades, the public sector has evolved from government to governance, a policy framework with high levels of cooperation with external stakeholders in both policy design and service delivery (Kickert, 2019; Stoker, 2005). Developments in Information and Communication Technologies (ICTs) have contributed to this transformation by promoting higher communication with citizens, informing, educating and empowering citizens and reducing the costs of the decision-making process (Thomas, 2005; Vragov & Kumar, 2013).

E-participation can be defined as the use of ICTs to involve citizens and other stakeholders in public decision-making processes and policy deliberation to make public administrations participatory, inclusive, collaborative and deliberative for intrinsic or instrumental ends (United Nations, 2014). The adoption of e-participation has increased in the last decades at the worldwide level. From 2003 to 2018, the percentage of countries with an e-participation index higher than 75% has grown from 3% to 32%, whereas those with an index below 25% have reduced from 77% to 18% (United Nations, 2003, 2018).

E-participation is supposed to have multiple benefits, such as communicating with a wider audience, increasing the knowledge of participants about public issues, allowing a more informed and deeper participation and improving the quality of public policies and citizens' trust in government (OECD, 2003). However, empirical analyses show that e-participation initiatives have usually failed to deliver these benefits (Bonsón et al., 2013; Brainard & Mcnutt, 2010; Criado & Rojas-Martín, 2016; Norris & Reddik, 2013; Royo, Yetano & Acerete, 2014). Achieving engagement and meaningful collaboration through digital technologies requires a better understanding of what hinders governments and citizens from being able to effectively collaborate, both online and offline (Falco & Kleinhans, 2018). Barriers to effective citizen participation include poor public knowledge of the issues treated, poor provision of information, poor execution of participatory methods, low adoption, the digital divide, lack of representativeness of participants, lack of political support, failure to influence the decision-making processes, regulatory constraints or the use of these tools for political propaganda (Falco & Kleinhans, 2018; Le Blanc, 2020; Panopoulou, Tambouris & Tarabanis, 2014; Sæbø, Rose & Flak, 2008; Toots, 2019). Moreover, public administrations are often not clear about the objectives of these initiatives. All of this can give rise to different types of

tensions and conflicts, disappointment and reluctance to engage in future processes (Font & Navarro, 2013).

Most previous literature has analyzed e-participation platforms that only allow one type of e-participation activity or occasional participation. Therefore, more research regarding critical success factors for citizen participation platforms aimed at fostering long-term government-to-citizen and citizen-to government relationships is needed. Furthermore, despite the increasing scientific and practical relevance of e-participation, many questions remain open and the understanding of successful e-participation initiatives is very limited (Wirtz, Daiser & Binkowska, 2016). Current good practice should be highlighted in order to ensure there is wider take-up and inspiration (Panopoulou, Tambouris & Tarabanis, 2014). In addition, a reduced number of studies have analyzed individual level factors (as compared to contextual and organizational factors) and/or the institutionalization stage of e-participation (as compared to its adoption and implementation) (Steinbach, Sieweke & Süß, 2019).

To fill these gaps, this research analyzes an a priori exemplary e-participation initiative to identify the critical success factors and the main barriers that are conditioning its performance. The analysis is carried out by taking three different approaches: (1) distinguishing among contextual, organizational and individual level factors; (2) considering whether they are more related to the ICT component, public sector context or democratic participation; and (3) differentiating among the different stages of development of the initiative (adoption, implementation and institutionalization). The performance of the platform is assessed in terms of participation levels, democratic legitimacy, transparency, influence on decision-making processes and continuity. This comprehensive analysis will allow a more complete discussion about success factors and barriers for effective e-participation.

The e-participation initiative chosen is the Decide Madrid platform (Madrid city council, Spain), launched in 2015. Decide Madrid was one of winners of the 2018 United Nations Public Service Award. This award assessed, among 111 nominates, (1) the introduction of an innovation, (2) the fight against discrimination and the encouragement of equality, (3) the promotion of a robust legal framework and (4) participatory decision-making (United Nations, 2018). This platform is also listed in the OECD Observatory of public sector innovation (see https://oecd-opsi.org/case_type/opsi/). This initiative includes some of the most popular e-participation tools (e-forum, e-consultation, e-voting and

online participatory budgets) in a single platform created and managed by the city council. Until the end of 2018, more than 400,000 users were registered, being participatory budgets the tool that has attracted the highest level of participation. The software created for this platform, Consul, has been adopted—or it is in the process of being implemented—in more than 100 institutions from 33 countries that build a collaboration network. Porto Alegre, the first city in the world that implemented participatory budgets in 1989, adopted Consul in August 2018 in order to implement its first online participatory budgets and online polls. So, this research focuses on an example that could be considered a good practice in e-participation and a source of inspiration for practitioners worldwide. However, as the critical analysis carried out in this research shows, some areas for improvement also exist that should carefully managed to improve its performance and sustainability.

2.2 Background, Theoretical Framework and Analytical Model

2.2.1 Background and Theoretical Framework

2.2.1.1 Background

Research in e-participation can be classified as (1) barriers and facilitators and (2) strategies for the adoption, implementation and/or institutionalization of e-participation (Steinbach, Sieweke & Süß, 2019). Both dimensions are covered in this research. The methodologies most used in e-participation research are surveys and content/discourse analyses (Medaglia, 2012). The methodology used in this chapter, the case study, is a third approach. According to Reddick and Norris (Reddick & Norris, 2013), e-participation research should consider the use of qualitative methods, such as case studies, to gather more in-depth information about e-participation and its impacts. Most of the case studies published to date refer to a particular e-participation activity (e.g., references (Sæbø, Flak & Sein, 2011; Sæbø, Rose, Molka-Danielsen, 2010; Sjoberg, Mellon & Peixoto, 2017; Toots, 2019), e-forums being the most common one. The analyses of e-participation platforms that allow different types of e-participation activities are testimonial (Meneses et al. 2017).

Overall, research in e-participation shows that several factors may determine the success or failure of e-participation initiatives, such as the legal framework, funding, organizational structure and culture, commitment by politicians, administrators and staff, the complexity of e-tools, security and privacy issues, the combination with offline

activities, the communication and promotion plan, the moderation of debates, the degree of inclusiveness and transparency-related issues (e.g., references Falco & Kleinhans, 2018; Medaglia, 2012; Panopoulou, Tambouris & Tarabanis, 2014; Toots, 2019). However, their importance in the different stages of development of e-participation initiatives has not been considered. Panopoulou, Tambouris & Tarabanis (2014) list the factors that should be considered to ensure the proper implementation and operation of an e-participation initiative and to maximize its potential for success. Furthermore, Toots (2019) highlights the need to manage three types of challenges: those typical to ICTs projects, those emerging from the public sector context and those related to democratic participation. All these factors and challenges are considered in this research.

Theories explaining the adoption and institutionalization of e-participation. Citizen participation initiatives can be adopted due to legal requirements or on a voluntary basis. Therefore, the adoption of e-participation can be explained by using institutional theory. According to this theory, institutions tend to adopt similar structures through three types of isomorphism (DiMaggio & Powell, 1983): coercive (pressure imposed on an organization by legal, hierarchical or resource dependence), mimetic (imitation of practices of leading organizations in an attempt to achieve greater recognition) and normative (environmental pressure for transformation from stakeholders). Mergel (2013) found that best practice examples and comparisons with other entities were used by government organizations to adopt social media and Pina, Torres & Royo (2017) that local governments implement e-participation to strengthen the ties among the local community rather than to achieve actual improvements in environmental programs (mimetic isomorphism). The diffusion of citizen participation in local governments has also been explained by the need to comply with legislation (coercive isomorphism) (Royo, Yetano & Acerete, 2011).

2.2.1.2 Theories explaining the adoption and implementation of e-participation

Stakeholder theory can also explain the adoption and development of e-participation initiatives (Sæbø, Flak & Sein, 2011; Royo, Yetano & Acerete, 2011). According to this theory, organizations should identify their different stakeholders and fulfil their needs and expectations in order to succeed. Previous literature has found that most citizens do not use e-participation tools or mainly use them to access information, whereas those who seek to influence decision-making processes usually reduce their participation over time (Sæbø, Flak & Sein, 2011). Voluntary participants have high expectations about their

participation and the same reasons that mobilized them can lead to disappointment (Font & Navarro, 2013). The commitment to e-participation from other stakeholders usually depends on their role. For example, politicians show more levels of participation before elections, whereas civil servants and private companies are more committed before the initiative is launched, because they participate to a greater extent in its development and implementation (Sæbø, Flak & Sein, 2011).

The behavior of citizens in e-participation can be also explained by networked individualism, which describes how people connect and communicate in the new social system of online relationships (Rainie & Wellman, 2012). Networked individualism describes a "new pattern of sociability" where people build and manage multiple sets of personalized, mutable networks and identities to meet their needs (Castells, 2001). According to this theory, people tend to participate in many different groups, but with reduced levels of commitment to any of them, in general terms (Rainie & Wellman, 2012). Its application to e-participation anticipates that citizens would be easily involved in different e-participation initiatives. However, sustaining citizen commitment to long-term e-participation processes will be more difficult than in offline processes and there is a real risk that levels of participation will decrease over time (Pina, Torres & Royo, 2017; Yetano & Royo, 2017).

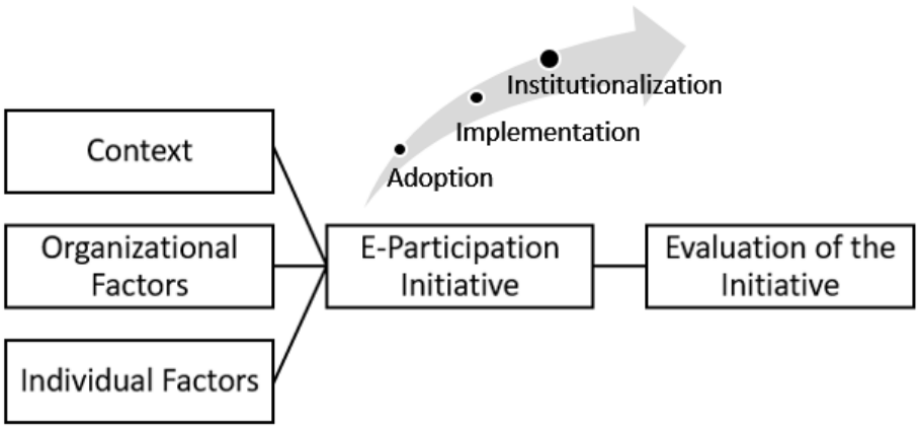
2.2.2 Analitical Model

Previous e-participation research has identified several success and failure factors, but well-developed explanatory frameworks and more systematic evaluation of e-participation initiatives are needed (Le Blanc, 2020; Toots, 2019). Different analytical frameworks have been proposed to analyze citizen participation and e-participation initiatives. Gelders et al. (2010) propose an analytical framework with conditions for successful citizen participation classified in seven areas: participation and collaboration (constructive relationship between all parties), resources (staff and other), policy involvement (support of the municipality), communication, context, method (choice of the right method and its proper implementation) and continuity.

Porwol, Ojo, & Breslin (2016) propose three not mutually exclusive perspectives to analyze e-participation initiatives: democratic (assessment of the democratic context of e-participation initiatives, such as transparency, political utility and objectives), project (assessment of project management issues, such as organizational change, stakeholders and outcomes) and sociotechnical (information about participatory activities on the

platform, such as topics, tools, timelines and monitoring). Kubicek & Aichholzer (2016) propose a generic input–activities–output–outcome–impact model (project and sociotechnical perspectives) to evaluate e-participation processes. Inputs, activities and outputs refer to the evaluation of the offer and resources by the organizing entity; outcomes cover the demand side component (number, profile and activities of the participants and the characteristics of the contributions made, for example) and impacts are the final consequences of the participatory process (e.g., changes of attitudes or behavior, higher trust in political institutions, learning, building of social capital and so on). Toots (Toots, 2019) presents a model of four factors (context, e-participation system, project organization and stakeholders) to explain the failure of e-participation systems that also covers the three perspectives defined by Porwol, Ojo & Breslin (2016).

Figure 2-1. Analytical model



Note: Adapted from Randma-Liiv & Vooglaied (2019) (p. 16).

The analytical model used in this case study (see Figure 2-1) is based on the model designed by Randma-Liiv & Vooglaied (2019), which also covers the factors identified in the three above-mentioned perspectives and avoids the overlapping of factors among different categories. It is made up of five main elements of analysis: context, e-participation initiative, organizational factors, individual factors (actors) and evaluation of the initiative. Some other models introduce more complicated interactions among the constructs to be analyzed. For example, for Toots (2019) the effect of contextual factors on information systems is not direct, but mediated by organizational factors and stakeholders' reaction. However, given the exploratory nature of research, with no hypothesis or theoretical statements to test, the analytical model refers to the elements to be analyzed, without going into the details of possible mediating effects among the constructs.

An exploratory case study has to specify what is to be explored, the purpose of the exploration and the criteria by which the exploration will be judged successful or not (Yin, 2014, p. 29). The first four elements of analysis (context, organizational factors, individual factors, and e-participation initiative) define what is to be explored to identify the critical success factors and main barriers. The context analyzes the following aspects: cultural-historical framework, socio-economic, digital governance and politico-administrative factors, legal requirements and civil society. The e-participation initiative analyzes the goals, scope, chronology, legal framework and technical features of Decide Madrid. Organizational factors include aspects related to the ownership and administration of the platform, partners, internal collaboration arrangements, funding, human resources and organizational processes and culture. Individual factors (actors) cover the analysis of both internal (leaders and administrators) and external (other formal or informal actors outside the city council structure) actors. As the evaluation of whether e-participation is successful or not cannot be judged in absolute terms (Kubicek & Aichholder, 2016), five criteria are used. Four of them (performance indicators, democratic legitimacy, transparency of the process and influence on decision-making processes) were taken from Randma-Liiv & Vooglaied (2019). The continuity condition from Gelders et al. (2010) was added as it is important to look beyond the actual project and focus in the long term. Examples of successful practices and failures are also provided in the last unit of analysis. Lastly, a contribution of this work, that is not included in the analytical model designed by Randma-Liiv & Vooglaied (2019), is the discussion of the importance of each of the identified success factors and barriers in the different stages of development of the initiative (adoption, implementation and institutionalization) and whether they are more related to the ICT component, public sector context or democratic participation.

2.3 Methodology

This study uses an exploratory case study as main research technique. A case study is appropriate when examining contemporary phenomena within its real life context, especially when the boundaries between phenomenon and context are not evident and the intervention being evaluated has no clear, single set of outcomes (Yin, 2014). The main strength of this method is its ability to deal with multiple sources of evidence, such as documents, interviews and observation, allowing the researcher to mix qualitative and quantitative evidence. The data and information used in this case study were obtained

through desk research and semi-structured interviews with politicians, civil servants and users of the platform. The combination of different data sources has allowed us to triangulate data and assess the success of the initiative according to different points of view. The disadvantage of this methodology is that the results are not statistically generalizable. Notwithstanding this, they provide insights to inform theory and guidance to practitioners (Toots, 2019; Yin 2014).

Table 2-1. Interviewees

Politician 1 Politician 2	Politicians of the governmental area in charge of *Decide Madrid*
Civil Servant 1	Senior civil servant of the general directorate in charge of *Decide Madrid*
Civil Servant 2 Civil Servant 3	Technical staff of the general directorate in charge of *Decide Madrid*
Citizen 1	User of *Decide Madrid* and member of a municipal association
Citizen 2	User of *Decide Madrid* affiliated to the political party which promoted this initiative
Citizen 3 Citizen 4	Users of *Decide Madrid*

Note: Contacting with users of Decide Madrid was a main difficulty. Data protection legislation did not allow the city council to provide us with users' contact data and most users of Decide Madrid do not disclose their complete name. In order to find citizens' contact data, we looked for complete names in the accounts of the most active users in the last six months. Then, we searched on the Internet for the email addresses or social media accounts of these users to ask for their cooperation and arrange an interview. In any case, the number of citizens interviewed does not intend to be representative of all the users the platform, but proportional to the other interviewees.

Desk research included the analysis of the Decide Madrid platform (main website and related data provided in the open-data and transparency portals of the Madrid city council), statistical data from Eurostat, the Spanish Institute of Statistics (INE) and the Spanish Centre for Sociological Research, relevant legal documents at national and local level (such as "Law 57/2003, on Measures for the Modernization of Local Governments" and "the Organic Regulation of Citizen Participation of the Madrid City Council") and other related reports issued by international organizations and governmental bodies (such as the "E-government survey" from the United Nations or the "E-government in Spain" report from the European Commission).

To understand citizen participation processes, we cannot simply examine the tools or rely on document analysis; we must understand the role of citizens, stakeholders and public

administrators who are the tool makers and tool users (Bingham, Nabatchi & O'Leary, 2005). So, in December 2018, nine semi-structured interviews (see Table 2-1) were carried out following the structure of the analytical model presented in Figure 2-1. The interviews lasted for around 1.5 h and were recorded for further analyses.

The importance of each source of information is different in the analysis of each dimension of the analytical model. The information needed to describe the e-participation initiative was obtained mainly from Decide Madrid and Consul websites. Information about contextual factors was obtained mainly from desk research. Information about organizational and individual factors was obtained from the interviews to politicians and civil servants and desk research (legal documents about the organizational structure of the city council and competences of different departments and units, human resource reports and the city council website). Citizen interviews are relevant in the qualitative evaluation of the initiative (together with the interviews to politicians and civil servants) and data from the open-data portal in the quantitative evaluation (i.e., number of users, activity in the platform and so on).

In order to analyze the external institutionalization of the Consul software, the links to all the initiatives listed in the Consul website (http://consulproject.org/en/) were checked. Fifty-one e-participation platforms were active by mid-January 2020 and they were analyzed to determine the e-participation options they have adopted. This has allowed us to assess whether full mimetic isomorphism in the institutionalization of this software has taken place or whether subsequent adopters are using only certain e-participation options depending on their needs or local circumstances.

Lastly, the limitations of this study should be acknowledged. The purpose of this chapter is not to produce generalizable results for all e-participation initiatives in the public sector. Rather, the objective is to contribute with some additional findings to the limited literature on citizen participation platforms aimed at fostering long-term government-to-citizen and citizen-to-government relationships. Case studies are a commonly adopted form of obtaining information but they are not intended to achieve any kind of representativeness, so any generalization of the results must be carried out with caution, particularly in regards to citizens' opinions, due to the reduced number of citizens that could be interviewed. However, as the results of the case study will show, citizens opinions were rather similar, which strengthens their validity.

2.4 Case Study

2.4.1 Context

Since the 1990s, the digitalization of administrative processes has been a priority in Spain (European Commission, 2018). Spain occupies high positions in e-government (16th position in 2002 and 17th in 2018) and e-participation indexes (5th position in 2018) (United Nations, 2018; UN/ASPA, 2001). Spain has also been a member of the Open Government Partnership (OGP) since its inception in 2011.

The use of ICTs by citizens in Madrid exceeds the national average (INE, 2018). Data for 2017 show that 91.7% of the households in Madrid have broadband internet connection. Furthermore, Madrid has traditionally ranked above the average in e-government empirical studies (e.g., reference Pina, Torres & Royo, 2007). Madrid has also long experience in neighborhood-based associations that collaborate with the municipality in the co-production of public services (Sánchez & Pastor, 2018).

In Spain, the possibility of direct citizen participation in public affairs and individual or collective petitions is recognized in the 1978 Constitution (art. 23 and 29). Law 57/2003 introduced specific ICT procedures to facilitate the effective participation of citizens in local public life matters and Law 40/2015 introduced the requirement for local governments to carry out online public consultations. The minimum support needed for citizens' initiatives in Spanish municipalities with more than 20,000 inhabitants is 10% of the citizens (art. 70bis of Law 57/2003). The participation of citizens in Madrid is regulated by an Organic Regulation approved in 2004 and subject to subsequent modifications. Some previous municipal regulations (1988 and 1992) about citizen participation existed even before the legal requirement established by Law 57/2003. This regulation established the right of citizens, entities and collectives to participate in local governance, with no specific mention to e-participation. In regards to individual citizens, it includes the right of citizens to information, public consultation, public audience, participation in the formulation of public policies as well as to make petitions and proposals, among others.

The worldwide financial crisis, the governmental austerity policies, and the cases of corruption lowered citizen trust in politics. This situation led to the protest of thousands of people in many countries. In Spain, the greatest was the "15M movement", which evolved into new political parties, "Podemos" being the most representative. In Madrid, it formed a coalition with other political parties under the name of "Ahora Madrid" that governed the city from May 2015 to May 2019. "Ahora Madrid" included in its electoral

program a commitment to "*implement tools for citizen participation through the Internet [. . .]",* and created *Decide Madrid* to implement this commitment. Moreover, Madrid city council, that joined the Subnational Government Pilot Program of the OGP in 2016, has been a formal member of this organization since 2017, promising to develop participatory budgets and collaborative and efficient legislative mechanisms, and to expand the policy of citizen participation (OGP, 2018). Madrid also participates in other networks that foster citizen participation at local level such as Sustainable Cities Platform, Local Governments for Sustainability and the Covenant of Mayors.

2.4.2 Decide Madrid e-Participation Platform

Decide Madrid was launched in September 2015. Its objective is "to encourage the participation of citizens in the management of the city, involving them in the generation of innovative and viable ideas and proposals, in order to improve their quality of life. It is a strong commitment to a management closer to citizens that allows the city council to receive citizens proposals and to create direct communication channels with citizens, helping managers to make the most appropriate decisions for the general interest" (translated from the Spanish version available at: https://decide.madrid.es/condiciones-de-uso). *Decide Madrid* is implemented only at Madrid city level, but the open source software developed, Consul, has been implemented or is in the process of being implemented in more than 100 organizations around the world, most of them in Europe (especially in Spain) and Latin America (see http://consulproject.org/en/). To create this platform, some examples of citizen participation were reviewed, especially Better Reykjavik (Iceland), Brazil (Porto Alegre) and Switzerland.

Participation in *Decide Madrid* can be carried out through five sections (debates, proposals, polls, processes and participatory budgeting, see Table 2-2). Citizens can participate in three moments of the policy cycle: (1) agenda setting, (2) policy analysis and preparation, (3) policy formulation and, to some extent, policy monitoring. In all cases, the topics eligible are only those under Madrid council competences.

The platform is open to everyone without registering, but participation is limited according to the different types of activities. Everyone, including associations, NGOs and companies, can be registered in the platform, create debates or proposals and make comments in all sections. However, only registered individual citizens of Madrid over 16 can verify their accounts and then they can create proposals for participatory budgeting and support and vote proposals. *Decide Madrid* is accessible to people with disabilities

and the verification processes and almost all participatory activities can also be done offline in any of the 26 citizen attention offices, including the use of printed signature forms to collect support for the projects.

The guidelines and procedures that support the working of this platform have been approved by different agreements of the city council since October 2015. However, the existence of *Decide Madrid* is not guaranteed by any law and depends on political will.

The Consul code, freely available on the Internet, allows any organization, public or private, to use and adapt the platform to its own needs. The improvements made by any organization or individual user can be exploited by the rest, fomenting collaboration between them. Madrid is the most significant driver of Consul but, according to Politician 2, it is expected to be more decentralized in the future.

Table 2-2. Types of participation in *Decide Madrid*

Debates	E-forum where users can post topics, comment or state agreement or disagreement. The city council can also create debates.
Proposals	Users make a request which can be complemented by audio-visual materials and/or supporting documents. Verified users can support the proposals and those proposals with the support of 1% of the people over 16 registered as residents in Madrid (27,662 inhabitants at 2018) are voted on.
Polls	Polls are carried out when a proposal receives 1% support or when the city council wants citizens to decide on an issue. Polls can be open to all citizens or to the citizens of one district.
Processes	This tool is used by the city council to seek different types of input (e.g., to develop or modify regulations, to request proposals for an activity). The way in which the processes are carried out depends on the information that the city council needs (e.g., debates, provision of documents in text format so that citizens can propose changes).
Participatory Budgeting	Annually, citizens can decide directly on how a part of the next year's budget will be spent. The projects can be for the whole city or for specific districts and they may affect current expenditures, subsidies or public investments. Citizens can vote on projects for the whole city and/or projects for only one district of their choice.

2.4.3 Actors

2.4.3.1 Internal actors

The Mayor Manuela Carmena was the main political leader of this initiative. She played an important role in the promotion of the initiative and the coordination of the areas involved. The city council decided that the results in polls and participatory budgets were binding, but this decision has no legal coverage, so the adoption of the results obtained is only ensured because all areas depend directly on the Mayor's Office, which acts in cases

of disagreement. "*[. . .] The Mayor [. . .] ensures that the rest of the areas are always committed to the project [. . .] it would not be the same without the Mayor commitment*" (Politician 1).

The second political leader was the councilor responsible for the Citizen Participation, Transparency and Open Government Area. This person has wide experience in programming and has created and managed software companies. Another important political leader is the executive advisor and director of *Decide Madrid*. The executive advisor was one of the creators of Incoma, a software that allows debates between lots of people. According to the interviews, these three political leaders were those who decided the creation of *Decide Madrid* and the selection of the managers and staff. "*The political level influences a lot [. . .]. The executive advisor pays a lot of attention to the details [. . .] he likes to be involved in the details because he has the capacity to do it [. . .]*" (Civil servant 2).

Finally, the General Director of Citizen Participation, the administrative leader, is responsible for the day-to-day operations. This person has been a civil servant since 1981 and was an executive advisor in positions related to higher education and technology in the central government and in different public administrations.

2.4.3.2 External actors

Decide Madrid has no significant relationships with non-governmental leaders, media or international consultants. Promotors of *Decide Madrid* were only advised by Citizens Foundation (the non-profit organization that manages Better Reykjavik) about technical issues at the beginning of the initiative. The interviewees (Politician 1 and Civil servants 1 and 2) state that during the setting up of the platform and the development of the participatory processes, the platform has had two main detractors: the most important media in terms of audience (*"[. . .] there has been a clear rejection and an attempt to very strongly delegitimize it on the part of the media [. . .] not in an objective way because we have a fairly open policy of communication [. . .]"*, Politician 1) and the two center-right political parties in the opposition. One of these political parties was against "direct democracy", so it opposes everything related to this platform, and the other criticized some of the methods of participation. For example, they question the reliability of the method to obtain support in the proposals section due to the speed with which some proposals get a lot of support and the confidentiality of the postal vote (Europa Press, 2017).

2.4.4 Organizational Factors

Decide Madrid was managed by the General Directorate of Citizen Participation (GDCP) whose competences were citizen participation and social innovation programs. This directorate belonged to the Citizen Participation, Transparency and Open Government Area, which depended directly on the Mayor's Office (Ayuntamiento de Madrid, 2015).

2.4.4.1 Actors that contribute to the functioning of the platform

At international and national level, the most important informal partners are the organizations using Consul, as they collaborate in improving the software and in the implementation of this platform around the world. Within the city council, all government areas and administrative units contribute to *Decide Madrid* by proposing topics and evaluating proposals made by citizens. The Service of Inclusion, Neutrality and Privacy is a particularly relevant actor to promote the participation of groups at risk of social exclusion (Ayuntamiento de Madrid, 2015). Another relevant actor is "Medialab Prado" (https://www.medialab-prado.es/en/medialab) (a city council-owned company), a citizens' laboratory where some innovation projects related to *Decide Madrid* are being developed. The city council also contracts external companies for complying with the data protection law (e.g., encryption of votes to ensure anonymity).

2.4.4.2 Internal collaboration

Regulated collaboration with other areas of government occurs (1) for the verification process of the users' accounts, with the register of inhabitants; (2) for promotion tasks, the communication unit of the GDCP collaborates with the General Directorate of Communication, and (3) for offline activities related with *Decide Madrid*, with the Area of Government of Territorial Coordination and Public-Social Cooperation, which coordinates and promotes offline participation (Ayuntamiento de Madrid, 2015). Other types of collaboration depend on the will of each area, staff motivation and the accountability structure.

Other services and departments collaborate by proposing topics for the processes/consultations and evaluating the proposals made by citizens. "*The evaluation of the projects proposed by citizens is carried out by different government areas and districts [...] because they have the technical skills [...] those interconnections are needed so that everything works well*" (Civil servant 2). This collaboration is particularly important for cost assessments. Costs evaluation in participatory budgets is very

important: "*[. . .] there are many proposals in the first positions, but when people find out their cost they say no to them, it's not worth it, I prefer other things*" (Civil servant 1). In response to citizen concerns about delays in the execution of participatory budgets, the city council is setting up a Participatory Budget Execution Office to improve the monitoring of approved projects, so the collaboration with other areas in the monitoring phase will be more formal.

The huge amount of proposals for participatory budgets to be evaluated increases the workload of other departments. Sometimes, citizens' proposals change their planning, priorities and ways of working. Consequently, according to the politicians and civil servants interviewed, at the beginning of *Decide Madrid* there was some resistance and complaints from the other units and services but now they are adapted to the new organizational culture: "It has supposed more workload for many civil servants [. . .] Initially, they did not anticipate that citizen participation would imply additional work and there were some problems, but these have been solved now [. . .] and there is a smooth collaboration" (Civil servant 1).

2.4.4.3 Financial resources

The development, implementation and the operational costs associated with *Decide Madrid* are funded by the city council's budget, so *Decide Madrid* is free for users. *Decide Madrid* also receives funds for its participation along with three other Spanish city councils in an open government project, funded with FEDER grants, which aims to improve the platform and create new modules.

Politicians 1 and 2 and Civil servant 1 state that the funding has been sufficient in all the phases of development of *Decide Madrid* ("*[. . .] this general directorate has a budget [. . .] in line to what we need [. . .]*", Civil servant 1), although Civil servant 2 thinks they need more funds: "the financial resources are not enough [. . .] but that always happens in public administration [. . .]". All the politicians and civil servants state that financial sustainability is guaranteed.

2.4.4.4 Human resources

The GDCP has approximately 40 civil servants, including administrative staff, lawyers, social workers, computer scientists and communications staff, together with three senior managers and advisors with different backgrounds (software companies, universities and public administration). However, according to Politician 1, "[. . .] they are not only

dedicated to the day-to-day operations of the city council projects; many people work in the external development, in connections with other countries or in more innovative or transversal projects. Such large teams are not needed [for running the platform]". The staff of the GDCP came from other governmental areas because the Citizen Participation, Transparency and Open Government Area was new. In order to recruit them, an open process for the city council personnel was established and individual interviews were carried out to ensure that the candidates were motivated and could adapt smoothly to the organizational culture that the managers wanted to develop. Furthermore, according to the interviewees (Politician 1 and Civil servants 1, 2 and 3), around 130 civil servants from other areas participate occasionally in the analysis and evaluation of proposals and approximately 10 interim civil servants, with different competences, depending on the projects in implementation phase, work temporarily in this area for the Participatory Budget Execution Office.

The interviewees highlight the importance of the knowledge of legal matters, advanced technologies and languages and of skills in dealing with citizens, indicating that the most lacking aspects are those of languages and advanced technologies. Sometimes, occasional staff are contracted for specific aspects, such as social media or platform developments. However, this is an unusual practice because the contracting process is slow and there are many restrictions on these types of contracts.

2.4.4.5 Organizational processes and culture

The GDCP and area of government in charge of *Decide Madrid* must follow the regular organizational processes as a part of the city council. *Decide Madrid* is embedded in the overall formal policy-making processes because other departments use the platform to carry out public consultations and public audiences. However, the GDCP shows some differences in decision-making processes, as the staff have more autonomy than in other areas. "We are between the citizens and the areas of government [. . .]" (Civil servant 2). According to Politician 2 and Civil servant 1, *Decide Madrid* has made a progressive change in the perception of the staff of other areas about direct citizen participation and the use of open-source software. Indeed, within the possibilities allowed by local and national regulation, the GDCP has generated a particular subculture within the city council, given the greater autonomy of its staff, the looser definition of jobs, more teamwork than in other departments and the staff commitment to citizen participation.

2.4.5 Evaluation

2.4.5.1 Performance indicators

Decide Madrid discloses aggregated statistics (number of supports and votes, percentage of participation by gender, age group, district, and via web or offline, when appropriate) both for the first polls (up to 2017, inclusive) and for the participatory budgets. For participatory budgets, the platform also provides data about which projects are technically unfeasible, under study/analysis, in processing, in execution or ended. Until July 2017, the GDCP published reports where the results of citizen participation in polls and participatory budgets were analyzed and the results of satisfaction surveys and suggestions and claims systems were included. Interviewees said that the GDCP has more information and has their own indicators, revised monthly for internal purposes. According to Politician 1, they focus on the number of users and participants, participation growth and impacts on the decisions of the city council (e.g., money spent on participatory budget projects).

Table 2-3. Statistics about activities carried out through *Decide Madrid*

		2015	2016	2017	2018
Proposals	Registered	6984	8074	5500	4860
	Reach enough support	0	2	0	0
Polls	Number of polls	0	0	19	15
Participatory Budgets	Number of participants		45,529	67,132	91,032
	Number of votes in final phase		32,725	38,866	53,891
	Projects initially presented		5814	3215	3323
	Final projects		206	311	328
	Budget (millions €)		60	100	100
	% of the municipal budget		1.2%	1.8%	1.8%
	Euros per inhabitant		18.9	31.3	30.9
Debates	Debates started per day	37.8	1.5	1.1	0.7
	Comments per day	151.5	21.9	7.2	6.5
Processes	Processes started	6	5	36	23

Source: Open-data platform of the city council of Madrid (Ayuntamiento de Madrid, 2019) and *Decide Madrid* website.

All the politicians and civil servants interviewed agree that there is a growing trend in terms of users, participation and impact of the participatory budgets, although some of the citizens interviewed think that the participation in proposals has decreased, which is consistent with the data reported in Table 2-3. The number of debates started per day and comments on those debates also present a decreasing trend. Up to the end of 2018, 25,418 proposals were made and only two of them reached the voting phase. In total, 13 polls at city level and 21 polls at district level have been carried out in three voting periods

(February 2017, October 2017 and July 2018). In the first voting period, 214,076 citizens participated and 963,887 votes were counted (one citizen could vote on more than one issue), there were more participants by mail (54.0%) than through *Decide Madrid* (35.1%) and ballot boxes (10.9%), but more votes were cast through the platform (49.3%). In the second and third voting periods, participation decreased and there were only 92,829 and 9854 votes, respectively. The third voting period was only at district level and not all districts had projects. The reduction in the number of votes can also be explained by the fact that voting was only allowed through *Decide Madrid* and ballot boxes, the topics were less important and the polls were initiated by the city council.

2.4.5.2 Democratic legitimacy

Even though the platform provides detailed information about how the different sections work, one of the citizens interviewed thinks that the methodology of participation through the platform does not allow the citizens an effective form of direct participation: "*[. . .] It does not achieve its objectives [. . .] because a lot of citizens get lost in the website*" (Citizen 1). All citizens interviewed agree that the most important motivation is the possibility of seeing their contributions implemented or taken into account. However, they note that they do not have enough information about the effect of their contributions and the progress of the projects already approved: "*there should be a section with the actions carried out based on citizen participation [...]; there is a lack of feedback*" (Citizen 2). The monitoring of citizen participation through the platform only covers participatory budgeting. In the other sections, citizens can only see other users' reactions (supports, assessments and votes).

2.4.5.3 Transparency

The users of *Decide Madrid* decide what is discussed in the platform in most cases, with the exception of the processes section. The politicians and civil servants interviewed give a lot of importance to free communication among users, so there is only a slight moderation to ensure there are no illegal comments (e.g., incitement to violence, insults or discrimination). Citizens can select other citizens' activities as inappropriate and moderators review them. Citizens are provided with information to facilitate their participation (e.g., technical reports, related laws. . .). However, some citizens think that the information provided is not enough or it is not presented in an understandable way.

2.4.5.4 Influence on decision-making processes

According to Politician 1 and Civil servant 1, there have been more than 1000 actions decided by citizens. The proposals in the polls and participatory budgets that go to a vote and win are implemented by the city council if they pass the same controls and additional studies applied to the rest of the projects of the city council. Sometimes the actions carried out may differ from those initially proposed by citizens, as some projects need to be defined in detail, further developed or limited in order to be under the competences and capabilities of the city council. For the other sections (debates and processes), the respective area analyzes citizens' comments and decides what to do, but no feedback to citizens is usually provided. However, the technicians interviewed indicate that some contributions of citizens to processes have resulted in changes in proposed policies and legislation (e.g., articles 9.6 and 15 of the Organic Regulation of the Observatory of the City and some commitments for the Second Open Government Action Plan of the City of Madrid). According to Citizen 1, *Decide Madrid* has increased citizen participation in Madrid (online and offline) and the platform has channeled associations' initiatives towards online participation. However, Citizens 2 and 4 think they can put less pressure on the municipal government online than offline and one of them thinks that the integration of associations in *Decide Madrid* is not enough.

2.4.5.5 Continuity and institutionalization of the Consul Software

Decide Madrid is still being used after the change of government in Madrid municipality that took place in June 2019; seven processes have been carried out from mid-June 2019 to mid-January 2020 and although the information about the participatory budget for 2020 is not yet available in the website at the time of writing this chapter, the approved budget for 2020 foresees its execution. As said above, *Decide Madrid* is embedded in the city policy-making processes, has made a progressive change in the perception of the staff of other areas about direct citizen participation, internal collaboration with other departments has been high and all of them are adapted to the new organizational culture. Therefore, the institutionalization at internal level has been high and its continuity seems to be guaranteed for the time being.

As regards external institutionalization, the analysis of the 51 e-participation platforms carried out (see Table 2-4) shows that participatory budgeting is the most adopted tool (64.7%). Proposals and polls have also been adopted by a relatively high percentage of entities (56.9% and 45.1%, respectively). Only 4 entities (7.8%) have adopted the five e-participation options available in *Decide Madrid*, whereas six entities have developed

new sections, mainly to provide information about offline citizen participation activities (such as events or volunteering options), but also to tailor the original e-participation options (by combining debates, proposals and processes that only the local government can initiate, in the case of Gran Canaria, Spain), or include other e-participation tools ("interview the governor" in the State of Jalisco, Mexico). The most common adoption pattern is to implement just one of the e-participation options (35.3% of the entities opt for this), and almost 80% of the entities have adopted 1–3 of the e-participation options.

Table 2-4. E-participation tools adopted by other users of the Consul software (N=51)

Debates	Proposals	Polls	Processes	Participatory Budgeting	Other
20 (39.2%)	29 (56.9%)	23 (45.1%)	16 (31.4%)	33 (64.7%)	6 (11.8%)
Number of tools adopted (considering only the 5 basic tools)					
1	2	3	4	5	
18 (35.3%)	11 (21.6%)	11 (21.6%)	7 (13.7%)	4 (7.8%)	

Source: Own elaborated based on the initiatives listed in the Consul website by mid-January 2020 (http://consulproject. org/en/).

2.4.5.6 Successes and failures

Two examples of successful participatory activities are the proposals of "Madrid 100% sustainable" and "Single ticket for public transport", which obtained enough support to reach the voting phase and won. Other successful practices are the participatory budgets and the poll initiated by the city council to refurbish which eleven squares, including "Plaza de España". The first poll and participatory budget had more participation than expected and more resources for the offline participation were needed, according to the technicians interviewed. As these were the first processes with visible results in the city, their good results were critical to gain the confidence of citizens in subsequent processes.

Civil servants 1 and 3 and Citizens 1 and 2 state that there is a problem with proposals: only two of them have reached the voting phase and a lot of them expire after receiving a lot of support (e.g., "Massive planting of trees in Madrid" with 20,602 supports of 27,662 required). Furthermore, some citizens seem to be using participatory budgets to present previous proposals that were unsuccessful in order to avoid the minimum support required for proposals. Regarding debates and processes, Citizens 1, 2 and 4 express the difficulty of following the dialogues and indicate that they are often just a confrontation of opinions without any real contribution or argumentation. Some citizens indicate that

many of the debates and proposals are used by citizens to make a punctual criticism when they are angry about a public service or issue, but without greater implications. In addition, there are processes with no comments (e.g., "Project for the regulation of the organization and operations of the San Ildefonso school").

Citizens 1, 2 and 3 indicate that they do not perceive any gratitude for their participation, that they do not see the impact of their contributions in decision-making processes, or that it often takes a long time to see the result of their participation. Some citizens also indicate that, in some cases, the low participation and the possibility of external influences raise questions around the legitimacy of the results and demotivate their participation. Citizens 1 and 2 also express their concern about the high cost of some participation processes.

2.5 Discussion

Based on the case study findings, the relevant success factors and barriers are summarized in Table 2-5, by using a triple classification: (1) distinguishing among contextual, organizational and individual level factors; (2) considering whether they are more related to the ICT component, public sector context or democratic participation; and (3) differentiating among the different stages of development of the initiative (adoption, implementation and institutionalization). As can be seen, a mix of success factors has been present in all the stages of *Decide Madrid*. This initiative had a smooth adoption, with no significant barriers in this stage. This smooth adoption was mainly due to a mix of strong political support, favorable ICT-related factors and environmental pressure for transformation from stakeholders (normative isomorphism). The implementation has been the most critical stage, based on the number of success factors and barriers found. Its institutionalization was also favored by a good mix of success factors, the slow process of organizational change being the only significant barrier found.

The politicians and civil servants interviewed indicate three factors as being particularly relevant for the success of *Decide Madrid*: the high level of implication of the city council towards citizen participation, the method used to recruit the workers for that general directorate and the background of senior managers about citizen participation and ICTs. Therefore, individual and organizational factors, related to the public sector context and democratic participation dimension seem to have been the most important, as compared to contextual or ICT-related factors. The role of the Mayor was crucial in launching *Decide Madrid*, improving the coordination of the council areas and ensuring there was enough financial, political and managerial support to develop and run the platform. This

confirms the importance of political leaders' support (Panopoulou, Tambouris & Tarabanis, 2010; Toots, 2019) and the need to integrate citizen engagement with traditional structures and processes in local governments (Nalbandian et al., 2013).

As for the barriers, organizational factors are the most critical in *Decide Madrid*. Most of them are related to the need to improve how the city council deals with some basic aspects related to democratic participation (e.g., transparency-related issues and feedback) and the slow process of organizational change inherent in the public sector context, although some barriers related to the ICT and democratic dimensions (lack of moderation or other mechanisms to organize debates and proposals and security concerns) have been found.

Table 2-5. Summary of success factors and barriers conditioning the performance of *Decide Madrid*

Panel A: Success Factors		
Adoption	Implementation	Institutionalization
Contextual factors - Citizen demand for more direct citizen participation (15M movement) (D) *Organizational factors* - Financial resources (ICT) - Human resources (ICT, PS) - Learning from forerunners (ICT) *Individual factors* - Strong political support (PS)	*Contextual factors* - Internet penetration *Organizational factors* - Previous e-government experience (ICT) - Previous experience in citizen participation (D) - Financial resources (ICT) - Human resources (ICT, PS) - Staff recruitment process (PS) - Creation of a particular subculture of work (PS) - Detailed guidelines and procedures (PS, D) - Coordination and collaboration with other council areas (PS) - Platform accessibility (ICT) - Possibilities for offline participation (D) - Provision of relevant information before the participation (D) -Integration with the policy-making process (D) - Influence on decision-making for proposals and	**Internal institutionalization** *Organizational factors* - Integration in the policy-making process (D) - Coordination and collaboration with other council areas (PS) - Progressive change in the perception of staff of other areas of government about direct citizen participation (PS) *Individual factors* - Strong political support (PS) **External institutionalization** *Contextual factors* - Country good positions in e-government and e-participation rankings (ICT) *Organizational factors* - OGP Membership (PS) - Open source software (ICT) - Human resources (ICT,

	participatory budgets (D) *Individual factors* - Strong political support (PS) - Knowledge of senior managers and staff (ICT, D)	PS) - Promotion (PS) *Individual factors* - Strong political support (PS)

Panel B: Barriers conditioning the performance of *Decide Madrid*		
Adoption	Implementation	Institutionalization
	Contextual factors - Decreasing citizen interest (D) *Organizational factors* - Lack of transparency (information about the internal working of the city council and offline activities) (D) - Lack of feedback (D) - Associations not properly engaged (D) - Lack of moderation or other mechanisms to organize debates and proposals (D, ICT) - Concerns about the security of the platform and verification processes (ICT)	**Internal institutionalization** *Organizational factors* - Slow process of organizational change (PS)

Notes: ICT: factor/barrier related to information and communication technologies (ICTs); PS: factor/barrier related to the public sector context; D: factor/barrier related to democratic participation.
Source: Own elaborated based on the case study findings.

The high level of Internet use in Madrid itself and the possibility of offline participation in the most significant activities carried out through the platform reduce the digital divide and related issues found in other initiatives (e.g., reference Meneses et al., 2017) that could otherwise reduce participation and delegitimize the initiative. The restrictions of the legislative framework for citizen participation in Spain (e.g., the minimum support needed for citizens' initiatives in Spanish municipalities with more than 20,000 inhabitants is 10% of the citizens) were avoided by the commitment of the city council to take the results of the polls and participatory budgets as binding, independently of the number of participants, which has been key to its implementation and internal institutionalization. This commitment and the strong political support have also been

important in the transformation of the organizational culture of the city council (internal institutionalization) in order to take into account citizen proposals in decision-making processes. The transformation of the organizational culture is a positive outcome that has been previously observed in some e-participation initiatives (e.g., reference Tambouris et al., 2012). However, the managers interviewed agreed that the transformation of the organizational culture is a slow process that may cause some delays in the implementation of winning projects, insufficient communication with citizens, lack of coordination among different services and units and insufficient collaboration of some of them with *Decide Madrid*.

The features of the Consul software and promotional activities carried out by the city council have resulted in an active international network of public sector entities interested in e-participation that collaborate to improve the platform and in a positive image of *Decide Madrid*. This wide adoption of the software by other institutions (external institutionalization) could be considered an example of institutions imitating leading organizations practices to achieve recognition (mimetic isomorphism) (DiMaggio & Powell, 1983) or be the result of an informed and rational decision to adopt a proven and freely available technology rather than develop a new one. The analysis of the tools adopted by these entities suggest that the second option is the most feasible, as only a limited number of entities have copied the full structure of *Decide Madrid*. Most of them have implemented 1–3 of the tools, and even 6 entities have created additional new modules, depending on their needs. Furthermore, participatory budgeting, which according to the analysis carried out is the most successful tool, has been the most widely adopted one. Further qualitative research analyzing the e-participation experiences of these institutions would be quite interesting.

Transparency and communication seem to be the most important problems of *Decide Madrid*. All citizens interviewed agree that their most important motivation is the possibility of seeing their contributions implemented or taken into account, although they note that they do not have enough information about the effect of their contributions, the results of public consultations, the progress of the projects already approved or the cancelation of debates and proposals. In fact, the monitoring of citizen participation through the platform only covers participatory budgeting. The lack of feedback is a failure previously reported in other initiatives (Royo & Yetano, 2015; Toots, 2019) that could easily be solved, for example, by publishing a list of the comments received with an

indication of whether or not they have been taken into account and the reasons for not incorporating them. Moreover, citizens interviewed think that there is not enough information about the internal working of the city council (organization, procedures and competences) for a correct evaluation of the impact of their contributions. The lack of transparency makes it difficult to legitimate e-participation initiatives and could also negatively influence citizens' future participation levels (Font & Navarro, 2013; Sjoberg, Mellon & Peixoto, 2017) which is a main issue for long-term e-participation initiatives.

Traditionally, citizen participation in Madrid was offline through associations, while *Decide Madrid* is focused on individual online citizen participation. Although associations can participate in most sections, only individual citizens are allowed to vote for proposals or participatory budgets. The lesser role attributed to the traditional participation stakeholders in Madrid municipality may be the reason behind less continued participation, because online participants are less committed than offline participants, according to the networked individualism theory (Rainie & Wellman, 2012).

Moreover, although most of the activities carried out through the platform can also be carried out offline, offline participation is not integrated into the platform. Including information about activities carried out offline in the platform, as some of the adopters of the Consul software have done, could also be a useful measure to ensure continued participation. The lack of a habit among citizens of participating in online forums and the lack of moderation or other mechanisms to organize debates and proposals seem to have had some negative effects in the debates and processes sections of *Decide Madrid*. This pushes many citizens to participate only on an ad-hoc basis when polls and participatory budgets are carried out. The proposals section needs a minimum threshold of participation for the citizens' proposals to reach the voting phase and only two proposals have achieved this number as of November 2019. The high expectations of citizens combined with the lack of transparency they perceive in some e-participation activities causes the feeling of "a waste of time" in both users that create a proposal and those who support it and contribute to explaining the decreasing citizen interest, as noted by previous research (Font & Navarro, 2013; Yetano & Royo, 2017). The reduction in the number of participants is an important threat, as some e-participation platforms have been closed down because of that (Sæbø, Flak & Sein, 2011; Toots, 2019). However, we have to bear in mind that, because of the complex dynamics in public engagement, public expectations can sometimes rise so fast that even successful initiatives can lead to disappointment

(Mulgan, 2015).

2.6 Conclusions

The purpose of this research is to identify the critical success factors of the award-winning e-participation initiative *Decide Madrid* and the main barriers that are conditioning its performance. This case study corroborates that the success of an e-participation initiative cannot be judged in absolute terms. Evaluations vary according to the role of the person making the assessment (internal actors usually being more positive than external stakeholders) and the criteria being used (e.g., participation levels, democratic legitimacy, transparency, influence on decision-making processes or continuity). Therefore, different criteria and perspectives need to be considered to achieve a more balanced assessment of e-participation initiatives, which validates the analytical model proposed in this research. In addition to the United Nations award, *Decide Madrid* can be considered successful, or at least as a benchmark e-participation initiative, because of its continuity after a change of government in the municipality and its internal and external institutionalization (the last stage of e-participation initiatives). However, as the analysis has shown, some areas for improvement also exist that should be carefully managed to improve its performance and sustainability.

This study evidences that ICT-related factors are not decisive for the success of e-participation initiatives, but can pose problems if not carefully managed. Organizational and individual factors and issues related to democratic participation seem to be more important for the success of e-participation initiatives. As the barriers found in this research are not new, there seems to be a need for practitioners to take advantage of research findings as regards success and failure factors (e.g., references Panopoulou, Tambouris & Tarabanis, 2014; Toots, 2019) when designing and deploying an e-participation initiative in order to maximize the chances for success. Furthermore, the elaboration, publication and/or diffusion of good practice e-participation guidelines should be actively promoted.

Although the citizens interviewed have been critical and sometimes have questioned the levels of participation and the effectiveness of *Decide Madrid*, both citizens and municipal staff consider that *Decide Madrid* is necessary, which supports the success of this initiative. This agreement among interviewees evidences the high motivation for e-participation and direct citizen participation for both the city council and the citizens, although it seems that both citizens and the city council need more time to adapt to online

direct participation. Improvements in *Decide Madrid* based on the feedback and lessons learned from the first experiences could help increase citizen trust, participation levels, and the legitimacy of this platform among citizens. The way in which these challenges are tackled and the maintenance of the commitment to e-participation of future government teams will determine future levels of citizen participation and the viability of the initiative.

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- Chapter 2: Decide Madrid: A Critical Analysis of an Award-Winning e-Participation Initiative -

Section 2:

Co-production with users for Innovation

Chapter 3: Users' Involvement in Collaborative Projects: Their Perspective in Digital Health Innovation Projects

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Abstract

The importance of users' involvement in digital health initiatives has increased as it helps to overcome barriers for the successful adoption of technology innovations. This research analyses the roles of users in innovative digital health collaborative projects from the perspective of the user, and by considering three dimensions: their motivation, project activities and the support of the partnership for their effective involvement. We use Q-methodology to unravel patterns among 24 statements on user involvement, in a sample of 44 individual users from 16 projects. We obtained two discourses that advocate active participation of users, though with a different degree of involvement. One of them supports the role of users as 'advisors' of their preferences and needs, and the other indicates a higher involvement of users as 'co-creators' of the innovation, with the same contribution and responsibility as the other partners.

Keywords: Co-creation, User involvement, Innovation projects, Digital health, Q-methodology.

3.1 Introduction

Information and Communication Technologies (ICTs) have caused a profound change in the way individuals relate to each other and to the organisations that provide them with goods and services. In health services, the relationship between service provider and patient is essential and healthcare systems use ICTs to change service delivery methods (Oliveira Hashiguchi, 2020). However, the impact of such technologies on healthcare systems is wider. The World Health Organization (2016) defines digital health as "The use of digital, mobile and wireless technologies to support the achievement of health objectives", a broad term that includes, for example, telemedicine, health worker decision support, and data collection, management and use.

Digital health initiatives have been increasing for some time (Ahern, 2007; Marcolino et al., 2018) and the COVID-19 pandemic has pushed the healthcare systems to rapidly develop and introduce these technologies (Duckett, 2020). The pandemic has challenged healthcare systems, showing a lack of some physical resources and clinicians to deal with increased demand for services (Scott et al., 2020). Digital health tools have been used to respond to these challenges, allowing a rapid COVID-case identification, digital contact tracing, evaluation of public health interventions, public communication and online clinical care (Budd et al., 2020).

Despite the general agreement about the relevance of digital health in the future of healthcare systems, digital health innovations do not usually reach the implementation stage (Zanaboni and Wootton, 2012). Several organizations (e.g. WHO) from different fields have endorsed the Principles for Digital Development as a guideline to achieve successful digital initiatives (Digital Development Principles Working Group, 2021). Three of those principles are especially relevant for our research: Organizations have to (1) "design with the user" to ensure the innovation satisfies "the specific context, culture, behaviours and expectations" of users; (2) "design for scale" to spread the innovation by collaborating with partners to ensure its validity in other contexts, and (3) "be collaborative" to "pool resources and expertise" among projects, organizations and sectors to increase efficiency and impact (Digital Development Principles Working Group, 2021).

These three principles are the basis of the underlying concept of open innovation and are essential for the success of innovations. For Chesbrough (2003, pp. 14), open innovation is a paradigm that "assumes that firms can and should use external ideas as well as internal

ideas, and internal and external paths to market, as firms look to advance their technology". Open innovation is closely related to co-creation as both deal with collaboration, even though the former is focused on a specific process, while co-creation includes different ways and/or stages of collaboration (co-innovation, co-design, co-production…) and focus on the relationship between an organization and a specific stakeholder (Loureiro et al., 2020). Co-creation is "the process by which stakeholders and organisations jointly create value from products (either goods or services) and brands", and current co-creation research is expanding from organisational to network level (Loureiro et al., 2020, p. 391-392).

Our research focuses on an analysis of users' involvement in the development of digital health innovation projects through partnerships between public and private stakeholders. Users of these technologies include health professionals who use the technologies to carry out the service (e.g., physicians, nursing staff, social workers and ICT staff), and patients who use the technologies as part of their overall consumption needs. The idiosyncrasies of healthcare systems imply additional difficulties for the inclusion of users in innovation projects because of the security requirements of such projects, the required knowledge of the users and other partners, and the need for strong legitimacy for the implementation of new technologies. Our purpose therefore is to analyse users' perspectives about their involvement in digital health collaborative projects, and define their roles in those projects, considering (1) the motivation for their involvement, (2) the activities they think they should carry out, and (3) the support of the partnership that is needed for effective user involvement. Previous research has analysed user involvement in innovation projects, but without differentiating between projects carried out by an individual organization and those conducted by a partnership (Cui and Wu, 2016, 2017; Fang, 2008; Nambisan and Baron, 2010). This research contributes to the literature on innovation projects by revealing users' expectations about their involvement and about how they think they will fit in with the dynamics of collaborative projects.

The rest of the chapter is organised as follows. First, the background and theoretical framework are provided, then the methodology and research design are explained, and in the fourth section the results are presented. Finally, a discussion is provided in the last section.

3.2 Background

3.2.1 Users participation in co-creation projects

In the current highly complex societies, external knowledge is an essential input for projects to obtain a high innovation performance and strategic competitive advantage (Chen et al., 2009; Quintane et al., 2011), but knowledge is widespread and organizations must integrate it fast (Chesbrough, 2003). To face this challenge, organizations seek to establish collaborations to obtain external resources, improve the innovativeness of the new product, enhance decision-making and reduce costs (Morgan et al., 2018). Therefore, the creation of networks of heterogeneous collaborating partners/stakeholders is seen as important to obtain and integrate resources, and increases the performance of the innovation strategies (Faems et al., 2005; Urueña et al., 2016).

Users play a crucial role in the search for collaboration (Prokop et al., 2019). Users can provide unique information about their preferences, and their valuable and original ideas might help to increase users' acceptance, improve new product outcomes, and obtain process innovations (Cui and Wu, 2016; Mahr et al., 2014). However, to obtain the benefits of user participation, organizations need high levels of absorptive capacity (Cohen and Levinthal, 1990), otherwise they cannot properly acquire, transform, assimilate and exploit users' external knowledge (Morgan et al., 2018; Zahra and George, 2002). Organizations need to consider the activities users carry out and their responsibilities in the project in order to avoid a misalignment with the organizational learning approach that can cause ineffective collaboration (Cui and Wu, 2017).

The development of new ICTs has opened up the possibility for new interaction opportunities with users to create value (e.g., online communities) by improving user knowledge of organizations, user trust and by support collaboration (Kroh et al., 2018; Piller et al., 2005). Indeed, technological breakthroughs present opportunities for organizations to co-create with users (Payne et al., 2008). In this context, relations between organizations and users in innovation projects have also evolved: from the organization that takes care of users' needs and preferences without their involvement to collaboration with the users in which the user may even lead the innovation process (Desouza et al., 2008). For instance, user-innovators are more likely to lead new trends and ideas in the market, and are highly incentivized to innovate (Hippel et al., 2011). Identifying and working together with these user-innovators is one method to achieve effective innovation (Cooper, 2019). This approach means that companies/partnerships

should not confront them. They may even need to reorganize in order to give support to users during every stage of their project (Hippel et al., 2011). It could be considered the maximum level of user involvement in co-creation projects: users carry out all the activities by themselves with the assets provided by the organizations. However, this new role of users could also be a challenge for the organizations because it would need strong strategic flexibility (Cui and Wu, 2016) and the organizations do not fully control the innovation process (Desouza et al., 2008). Indeed, Storey and Larbig (2018) found that high levels of customer involvement in innovation service projects may cause resistance from project partners to user input.

The motivations that drive users to participate may differ across industries, as well as organisations' needs from them. Therefore, the form of participation and its intensity for a successful engagement may also vary among industries. For Greer and Lei (2012), users' motivations to be involved in innovation processes can be classified as extrinsic (payments, access to future services, use of a beta product, expectations of more valuable services) or intrinsic (more capability to make decisions about the product, learning, recognition or other hedonic benefits such as enjoyment). Kristensson et al., (2008) analyse user involvement at new mobile phone services in development and found that if users are motivated by personal benefits, it is more likely that the involvement is successful, because users tend to propose ideas that may give them benefits. Fernandes and Remelhe (2016) analyse users' motivations to participate in collaborative innovation in virtual communities and found that the main motivation was knowledge acquisition. Sjödin and Kristensson, (2012) found that users in a service innovation project were encouraged to participate by the possibility of making decisions regarding the services that will benefit them or other users.

3.2.2 Co-creation in healthcare system ICT projects

Healthcare systems are under pressure to respond to changing population needs, integrating services inside (primary and hospital services) and outside the health care system (e.g. social services), improving their efficiency (Medeiros and Schwierz, 2015), user experience and quality (safety, effectiveness, patient-centredness, timeliness, efficiency, and equity), and enhancing quality measurement (Kruk et al., 2018; Shrank et al., 2021). To respond to these challenges, ICT has been shown to be a factor in the improvement of the population's health (Lewis et al., 2012; Majeed and Khan, 2019). Indeed, for Haluza and Jungwirth (2015), ICT-based health promotion improves living

standards, quality of health care, and patient's knowledge about the treatment and illness. For Kvedar et al. (2014) telemedicine can help to address the mismatching between the supply and demand of health care providers, caused by increased access by the population to healthcare services. However, the implementation of ICTs in health innovation processes is increasing more slowly than expected because of multiple barriers (Zanaboni and Wootton, 2012). Some of these barriers are related to the lack of user incentives for their adoption and caused by different reasons such as low applicability and impact on service quality, their time-consuming nature, increased user workload and lack of information about the innovation, trust in these technologies, and the technology skills of the potential users (Gagnon et al., 2012; Harst et al., 2020; Jang-Jaccard et al., 2014). According to the systematic review by Harst et al. (2020), perceived usefulness is the most important factor for acceptance of these technologies, but performance expectancy is an important factor too. The inclusion of the point of view of the users, in order to increase the perceived usefulness, ease of use, and familiarity with the innovation, could help to solve user barriers to these technologies for physicians and patients (Gagnon et al., 2012; Jang-Jaccard et al., 2014; Urueña et al., 2016). To do so, it is necessary to incorporate users experience and have a proactive attitude towards users' advice (Staggers et al., 2013). Indeed, project managers of successful telemedicine projects pay more attention to users' perceptions in the implementation phase than those of other stakeholders, as the success of the innovation depends on their collaboration (Obstfelder et al., 2007).

In most cases, user involvement regarding digital health innovation processes has been analysed as part of wider research on factors leading to the success and adoption of innovations. However, how to involve users has received limited attention, while it is one of the keys for successful innovation. Ghulam and Robinson (2006) conducted a literature review of users that were involved in health technology and found that users are more involved in testing and trial phases, but also participate in concept definition and design phases. However, the authors do not explain their possible roles in those phases of the projects. Bjørkquist et al. (2015) show that user involvement in innovation projects can help increase the legitimacy of the innovation, and the most important role for the users and service providers is as a source of information. Glomsås et al., (2020) analyse user involvement in the implementation of home welfare technology in home care services and reveal that health care professionals wanted more involvement, more information in

all parts of the process, better response to their feedback, and the possibility of seeing the benefits of the technology.

3.2.3 Theoretical framework

In the last two decades, Service-Dominant Logic (S-D logic) has been developing and replacing the traditional Good-Dominant Logic (G-D logic) (Vargo et al., 2020). S-D logic focuses on service exchange as the application of knowledge and skills to benefit other actors in a network and themselves (Vargo and Lusch, 2004). From this point of view, the firm is not only the creator of value, nor is it just the producer and consumer, value is created among multiple actors interacting and exchanging in networks (Vargo and Lusch, 2008). This paradigm sees users as actors in the network that can not only destroy or use value, but they may also be potential innovators and co-creator of value (Lusch and Nambisan, 2015), as actors participating in the network are dissociated from their predesignated role (Vargo et al., 2020). Therefore, we not only based our research framework on user involvement in customer/user roles defined by previous research, but also on stakeholder roles.

Different approaches have been used regarding the possible roles of stakeholders. Mitchell et al., (1997) and Wagner Mainardes et al. (2012) produced a general classification of users according to the priority of their claims for the organizations. Achterkamp and Vos (2008) argue that stakeholder classifications should be adjusted to the situation where they are applied in order to be more useful, as do innovation projects (Callan et al. 2006; Turner 2006; Vos & Achterkamp 2006). Other research focuses on the analysis of the roles of one stakeholder, the customers, in new product development (Blazevic and Lievens, 2008; Cui & Wu, 2016, 2017; Nambisan, 2002). Nambisan (2002) based the classification of customers on their use as a source of knowledge and their possibilities regarding participation in new product development (design and development or testing and support). Blazevic and Lievens (2008) develop a similar characterization of the roles of customers. However, their approach is related to the passive or active role of consumers as a source of information and the type of relationship with the organization (unidirectional or bidirectional). Fang (2008) evaluates the impact on two variables and two possible roles of customers: as a source of information, and co-developers in new product innovativeness and speed to market. Cui & Wu (2016) evaluate these roles in new product performance, adding to this classification the possibility of

user innovators who take on responsibility in the innovation process with the support of the firms, and thus the role of organizations in each circumstance.

Taking these models as a reference, we evaluate the role that individual users think they should have in innovation health care collaborative projects, considering three dimensions that define the role of users in these projects: 1) activities conducted by the users in the innovation process, 2) the support of the partnership for the involvement of users, and 3) motivations for user involvement. The main consideration of all the classifications is the contribution of users. Hence, we include the activities they carried out in the project as one dimension. We also include the support of the partnership as a dimension because it reflects the extent to which the partnership is open to the participation of users and the activities they carry out during the process. Most of the classifications described above include how the organizations should deal with each type of user, with different approaches: the phase of a project in which users can participate (Achterkamp and Vos, 2008), the tasks the organization should do for the effective involvement of users (Nambisan, 2002) and the role/responsibility of the organization in the innovation development (Cui and Wu, 2016). The last dimension, motivations for user involvement, has been included from the user's perspective in the Nambisan (2002) model and from the organization's perspective in Cui and Wu (2016). We decided to include the motivations as a dimension because if the motivations for the involvement of users are not aligned with their activities in the project and the support of the partnership, users' expectations won't be achieved and their involvement will be ineffective. Moreover, this dimension is more important in digital health innovation projects because the lack user incentives for the adoption of the innovation can also affect their participation in the project.

Below we elaborate on the methodology we used to analyse the roles of users in co-creative innovation processes. We used Q-methodology to carry out the research because it allows us to establish relationships within and between the three dimensions to define the different perspectives of users regarding their involvement. In the description of the Q-set in the following section, we describe how we evaluated these dimensions.

3.3 Methodology and Sample

Q-methodology was developed by Stephenson (1953) to collect and analyse the subjectivity of the individual's perception on an issue. This methodology allows us to group individuals together, not variables, according to common attitudes, beliefs and perspectives (Brown, 1980). From these groups, it is possible to draw general conclusions about the viewpoints of the individuals in an inductive way. Indeed, the purpose of this methodology is to analyse the individual's perception of an issue, not to extrapolate the results. The number of studies in Business and Management that use this methodology have increased in the last few years. We found only 11 research articles in these fields in the WOS between 2000 and 2009 and 66 between 2010 and 2019[1], none of which were related to co-creation.

The Q-methodology begins by designing a sample of statements (Q-sample) that are representative of the issues studied (concourse). Then, a diverse sample of individuals (P-sample) that could be representative of the different points of view in the issue studied is selected for interviewing. The respondents must rank these statements in a forced (the number of statements with same value is restricted) or an unforced distribution. In this research, the respondents did the Q-sorts in a forced distribution, a quasi-normal distribution with seven array positions (from -3 to 3, see Appendix 3-1), because an unforced distribution is not more reliable and may suffer from the Barnum effect (Block, 1961). The resulting pattern of statements by each respondent is called a Q-sort. Once the distributions are obtained, a factor analysis is performed to form groups of respondents with the same patterns of opinions and beliefs, and which are represented by ranking the statements. The respondents did Q-sorts using Q method software and we used Ken-Q software to carry out the factor analysis.

3.3.1 The Q-sample

Table 3-1 shows the statements from the Q-sample classified by dimensions and the level of involvement. We have included 24 statements based on the background previously described. Statements at the bottom of Table 3-1 represent a lower level of involvement, where users have a passive involvement, and those at the top show a higher level of involvement as leaders of the innovation process.

[1] The code use for the search in WOS was: ALL= (q-sort or q-methodology) AND WC= (Management OR Business). We restricted the search to research articles between 2000 and 2019. After the search the articles were revised to discard those that are not related to Q-methodology.

Table 3-1. Statements by dimension

	Motivations		Activities		Support from the partnership
Level of Involvement ↑	1 Users should tackle user issues themselves instead of waiting for others to do it	9	Users should set and guard the direction for the innovation process	17	The main role of the partnership is provide the resources to develop proposals of the users
	2 Users know best how to develop and organize service delivery	10	Users can best define problems and solutions	18	The partnership should maximally give room to the involved users to develop their own proposals for the innovation
	3 Involved users especially want to be recognized as partners	11	Equal contributions of users and other partners is the only way to create relevant innovations	19	The partnership should primarily align the different goals of the involved users and the other partners
	4 Users should be involved because they can have alternative views, useful for the other partners	12	Users and the other partners should jointly define the problem and the solution	20	A crucial task of the partnership is to ensure joint decision making between the involved users and the other partners
	5 Users want to be involved primarily to indicate what they perceive as an exquisite end product	13	Involved users have to advise the partnership about how to increase user satisfaction	21	The principal concern of the partnership is letting involved users voice what quality they expect from the innovation
	6 Involved users should above all check how user-oriented the innovation is	14	Just like a company asking its customers about its products, the partnership needs to consult the users about their preferences	22	The partnership should enable the involved users to see how the innovation works in reality
	7 Users are especially involved to check whether the rights of those they represent are guaranteed	15	The majority of users is there predominantly to listen to what the partners have to say	23	The partnership actors are there to make sure that the input of the users and other actors certainly does not go against the regulative framework (e.g., legislation)
	8 Users should be involved primarily to create support for the innovation	16	Users best leave development of innovations to others	24	The users should be well-informed by the partnership because the innovation can then be easily accepted

The first of these dimensions is the motivation to participate, which can be considered by looking at the needs and the supposed capabilities and knowledge of the users. The motivation and capability that represent the highest level of involvement is represented in statements 1 and 2 that cover the possibility of a user innovator (Desouza et al., 2008). In the next level of involvement, if users have a high level of involvement in the partnership, they should feel a strong sense of partnership and be considered like another partner (statement 3) (Nambisan and Baron, 2010) and their perspective should be of overall importance in the project (statement 4). Their mere inclusion therefore to show their preferences and ensure user orientation of the innovation (statements 5 and 6) has been related with the lowest level of participation (Cui and Wu, 2016), but we decided to consider a lower level of participation. Innovation in healthcare systems must comply

with high standards of proven usefulness and safety which might encourage users to participate just to check their compliance (statement 7). Moreover, lots of these innovations are lacking proper support from users, so it is possible to have an interest in involving them only to give legitimacy to the innovation (statement 8).

The second dimension is related to the activities of users in the project. Users might think they shouldn't participate at all (statement 16), be passive participants and only be informed of the innovation (statement 15) or be active participants. There are different levels of user activities and responsibilities in an innovation project: providing information about their preferences and needs (Cui and Wu, 2016; Vos and Achterkamp; 2006), working together with partners on the project solution with shared responsibilities (Cui and Wu, 2016; Nambisan, 2002) and being the users who design and direct the project (Cui and Wu, 2016). We separate the possibility of users being the main voice in the design of the project (statement 10) from their actually directing the innovation process (statement 9) because the latter is related to a coordination and leadership capability in a project that may not be related to only having the knowledge to design the process.

The last dimension is the support from the partnership that also defines the level of user freedom in their participation in the project. The Q-set considers statements ranging from a closed project where the partnership only informs the users (statement 24) or gives a reactive response to user's contributions (statement 23) to a partnership that does not control the process and just provides resources and advises users so they can carry out the innovation project (statements 17 and 18). This classification is similar to the roles for an organization in a collaborative project (Desouza et al. (2008) and the role of the organizations for customer involvement as innovators (CIN) in the Cui and Wu model (2016).

3.3.2 The P-sample

We use a non-probabilistic purposive sampling because we want to obtain a sample that enriches the perspectives about user participation, not a representative sample. We select individuals that participate as users in digital health innovation projects in the healthcare system. There are users with different backgrounds involved in 16 projects in five different countries of the European Union (see Table 3-2). The users in the sample participated in partnerships coordinated by a private or public organization and composed

of both types of organizations (hospitals, primary care centres, technology organizations, research centres, etc.).

Table 3-2. P-sample sorted by country and respondents' background

Country		Background	
Belgium	9	Nursing Staff	10
Denmark	7	Social Worker	10
Estonia	2	Physician	19
Netherlands	10	Other*	5
Spain	16	Total	44
Total	44		

*Pharmacy staff (2), ICT staff (2) and Technician of Health-care system (1)

3.4 Results

Seven factors were extracted from the correlation matrix of the responses by using centroid factor extraction, the most common method in Q-methodology research (Brown, 1980). Table 3-3 show the five criteria for the selection of the factors (Brown, 1980). All factors have an eigenvalue higher than 1, so all of them comply with the Kaiser-Gutmann criterion. The first four factors have more than two factor loadings (f_{xy}) that exceed the limit. However, the highest square factor loading of factor 3 does not explain more than half of the common variance. Moreover, factors 3 and 4 explain less percentage of the variance and their inclusion for the factor rotation does not give consistent results, which means that we have only retained the first two factors.

Table 3-3. Factor extraction criteria

	F. 1	F. 2	F. 3	F. 4	F. 5	F. 6	F. 7
Eigenvalues	11.782	3.218	2.591	2.651	2.304	1.803	1.733
% Explained Variance	27	7	6	6	5	4	4
Cumulative % Exp. Var.	27	34	40	46	51	55	59
$f_{xy} > 0.40$*	32	4	3	5	1	1	1
Max. f_{xy}^2	0.700	0.422	0.246	0.320	0.291	0.223	0.186
$h_x^2/2$**	0.371	0.408	0.378	0.287	0.339	0.308	0.322

Number of factor loadings > 1.96(1/square-root(24)), a significance level of 0.05

**h_x^2 = common variance calculate as the sum of the square f_{xy} of the Q-sort x

Factor 1 and 2 are extracted and rotated using the varimax method and the respondents for each factor are selected using a significance level of 0.05 (See Appendix 3-2). The rotated factors explained 34% of the variance (Factor 1 and Factor 2 explains 18% and 16% respectively) and the correlation between them is 0.5293. It is a medium correlation

that could be explained by respondents' support for both factors in the relatively 'active' participation of all the users in our sample.

Factor 1 is endorsed by more respondents in the sample than Factor 2, 19 and 14 respondents respectively, a normal result in factor analysis. There are differences in the sample between the professional backgrounds of the respondents in each factor (See Table 3-4). Regarding healthcare system users, most physicians in the sample support factor 1, and nursing staff do not prevail in any factor. On the other hand, there are more respondents in the sample from social services aligned with factor 2 than factor 1.

Table 3-4. Composition of factors by respondents' background

Background	Factor 1	Factor 2	None	Total	N
Nursing Staff	10.0%	30.0%	60.0%	100%	10
Social Worker	20.0%	60.0%	20.0%	100%	10
Physician	63.2%	26.3%	10.5%	100%	19
Other	80.0%	0.0%	20.0%	100%	5
Total	43.2%	31.8%	25.0%	100%	44

3.4.1 General description of the discourses

Each factor gives a different ranking for the statements, which shapes a discourse about user involvement endorsed by the respondents of the factor. Both discourses advocate an active participation of users because of their unique perspective as users. However, there is a difference in the intensity of involvement. Respondents from Discourse 1 believed that the importance of user participation is to ensure the satisfaction of future users so they have to participate as advisors in the partnership. These users advise the partners about their preferences and the user orientation of the innovation. On the other hand, respondents from Discourse 2 endorse the idea of co-creation. They consider that project users and partners should contribute equally to the project and the users in the partnership should participate from the moment the project is designed and thus in the decision-making throughout the project.

3.4.2 Discourse 1: Users as Advisors

Discourse 1 shows the role of users as advisors in innovation projects. Indeed, respondents grouped in this discourse believe that users should not leave the development of innovation to others (s:16, v:-2) and that users should not just listen to what the other partners in the partnership have to say (s:15, v-3), but should instead advise the partnership on how they could increase user satisfaction (s:13, v:2).

According to this discourse, users are motivated to participate in the innovation process because of the different viewpoints they can contribute to the partnership (s:4, v:3). Their practical experience with using similar services provides the partners with knowledge about quality standards and demands that need to be met. This is why users involved in this discourse expect to be consulted by the partnership, so the partners can obtain more information about their preferences (s:14, v:1). The partnership should therefore also enable the involved users to see how the innovation works in reality (s:22, v:2) in order to improve their feedback and ensure that the innovation is user-oriented (s:6, v:1). Moreover, users should be well-informed to increase acceptation of the innovation (s:24, v:2). Statements 24 and 22 reflect the importance of transparency for the collaboration of user respondents in this discourse.

Statement 6 shows that testing the user orientation of the innovation is important, although its value shows that it is not the main concern of users. The same is true for statement 5, which shows how important it is for the users to "indicate what they perceive as an exquisite end product" (s:5, v:1) even though it may not be the main reason to be included. These statements do in any case present users' roles as advisors and the other motivations and tasks are valued lower by the respondents in this discourse.

The respondents in this discourse also expect the partnership to ensure joint decision-making between the involved users and the partners (s:20, v:1). However, they do not think that users are capable of developing and organizing service delivery (s:2, v:-2) and they are unable to define problems and solutions better than the partners (s:10, v:-1). For these respondents, users should not set and guard the direction for the innovation process (s:9, v:-1). The ranking of these last statements indicates that, even when the respondents expect joint decision making, they do not believe in extensive empowerment of users or co-creation of innovation with the other partners. Indeed, they think there may be other ways to create relevant innovations (s:11, v:-1).

3.4.3 Discourse 2: Users as co-creators

Respondents grouped in Discourse 2 also advocate the active participation of users but with more direct involvement than those whose answers are included in Discourse 1. They support the role of users as co-creators of the innovation, with a similar activity and responsibilities as the other partners in the project. Indeed, these respondents disagree strongly with excluding users from development of the innovation (s:16, v:-3) and a passive participation limited to listening to the partners (s:15, v:-2) or protecting user

rights (s:7, v:-1). The strong support for co-creation of this discourse is shown in the high value of statement 11. This discourse states that equal contributions by users and other partners (co-creation) is the only way to create relevant innovations (s:11, v:3).

The motivation for this support of equal participation is that the alternative views the users have are useful for other partners (s:4, v:2). This discourse points out that users and other partners should jointly define the problem and the solution (s:12, v:2) because both are better defined by users (s:10, v:1). Furthermore, the partnership should align the objectives of users and partners (s:19, v:1) and should ensure there is joint decision-making in the project (s:20, v:1). However, the low values given to statements 19 and 20 do not show the alignment of objectives and the joint decision-making as huge priorities. Other tasks of the partnership are more important for the respondents in this discourse, such as transparency towards the involved users regarding how the innovation works (s:22, v:2), and informing users to enhance the acceptation of the innovation (s:24, v:1).

However, the respondents in this discourse do not believe that users know best how to develop and organize service delivery (s:2, v:-1). These differences between users and partners' views and capabilities may be the reason why the respondents in this discourse see the need for collaboration as a unique way to achieve an outstanding innovation. Indeed, this discourse does not advocate users taking care of users' issues by themselves (s:1, v:-2) and questions the possibility of collaboration where the partnership just gives resources to develop users' ideas (s:17, v:-1).

3.5 Discussion and Conclusions

This chapter has analysed the role of users in collaborative projects for digital health innovations. Their motivations, activities in the project and the support of the partnership for their involvement have been evaluated by applying Q-methodology to a sample of individual users who participate in digital health innovation projects.

Two user roles were found. The first group of users preferred to be actively involved in the innovation process, but without a very intensive level of user involvement. These users were satisfied with an advisory role, and were not looking for co-creative contributions to the innovation process. The latter characteristic of this user group is however very differently rated by the second group of users. In fact, statement 11 (i.e. 'equal contributions of users and other partners is the only way to create relevant innovations') is the highest rated statement for the second user group, while it is

negatively rated in the first user group. The second user group also wanted to be actively involved during the innovation process. In contrast to the first user group, this user group expected users and partners to jointly define the problem and the solution, as real 'co-creators'.

Our analysis displays a rather nuanced depiction of user involvement. Both of the user groups expect to be actively involved, but the level of user involvement is slightly different (advisory role vs co-creation role). We did not find any evidence of a distinct user group that includes passive users who do not want to actively participate in the innovation process (i.e. just receive information, give support or provide information), as some theoretical models predict (Blazevic & Lievens, 2008; Nambisan, 2002; Vos and Achterkamp, 2006). Neither did we find support for the possibility that users want to lead the innovation process (Cui & Wu, 2016; Desouza et al., 2008). The users in our cases clearly do not identify themselves with these two extremes.

Both roles match Nambisan' idea (2002) of a customer as a co-creator that participates in the design and development of an innovation. However, users participating as advisors are involved to ensure the user-orientation of the innovation, and to provide information about their preferences. In contrast to the CIS described by Cui and Wu (2016), these users would be partly involved in decision-making to some extent, moving them away from the passive role. Users as co-creators reflects the need for equal participation of users and partners in the project, which not only means an exchange of responsibilities (Cui and Wu, 2016) but also an equal contribution. Although users want to have similar participation to the partners, we do not find that 'being considered a partner' is a strong motivation to participate. This does not support the relation between the sense of partnership and the level of contribution indicated by Nambisan and Baron (2010).

The motivations of users to participate are closely linked with the barriers found in the adoption of digital health technologies. The discovered relevance of the communication between the partnership and the users could be explained by the lack of information about a digital health innovation being a barrier for its adoption (Harst et al., 2020; Jang-Jaccard et al., 2014) and the active involvement of users requires more information exchange to be successful (Nambisan, 2002). Indeed, seeing how innovation works in reality is also a motivation for users to participate, to learn about the innovation, which will eventually be used by them (Nambisan, 2002), and is necessary for the users to come up with new ideas (Kristensson et al., 2008).

Considering the two uncovered roles, partnerships who want to carry out a digital health innovation project have to seriously consider the involvement of users in the project as an active part in the process, and to avoid the barriers that cause innovation to be blocked in the pilot phase. Partnerships have to evaluate possible user candidates to participate as other partners or to give their perspective as advisors according to their motivations and capabilities. The partnership then has to promote their participation in the design of the project and decision-making or limit it to their advice and participation in decisions about innovation characteristics.

We have shown the two roles that users want to have in partnerships for the development of innovation, one as co-creators together with the rest of the partnership and the other as external advisors to give their knowledge as consumers. We have found differences in the backgrounds of respondents in each discourse sample that point to differences in the opinions of physicians, social workers and other staff. Further research could extrapolate these results to link the discourses with users' backgrounds and facilitate managerial decisions about how to involve each type of user.

3.6 References

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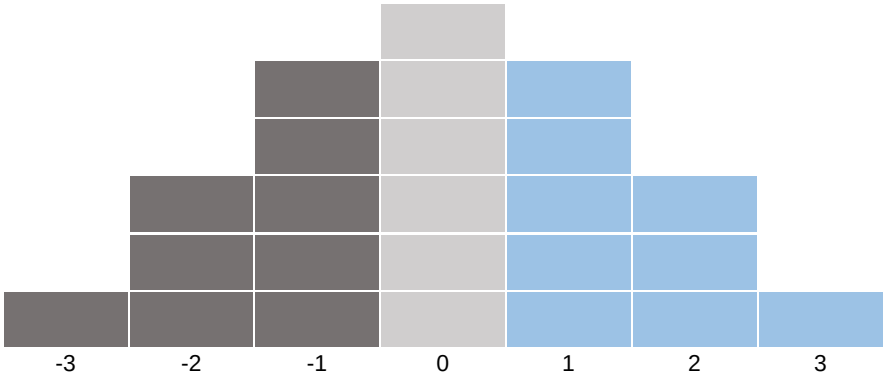
Appendix 3-1. Q-sort Structure



Appendix 3-2. Rotated matrix and respondents by discourse and country

Part.No.	Factor 1	Factor 2	Discourse	Country	Background
1	0.8093*	0.3359	1	Spain	Other
2	0.5685*	-0.0498	1	Spain	Physician
3	0.4081	0.2484	1	Belgium	Physician
4	0.4391	0.4068	1	Spain	Physician
5	0.444	0.4086	1	Netherlands	Social worker
6	0.482	-0.0813	1	Belgium	Other
7	0.6993*	0.2742	1	Spain	Physician
8	0.5956*	0.5886	1	Netherlands	Physician
9	0.4028	0.2222	1	Belgium	Social worker
10	0.4321	0.4314	1	Spain	Physician
11	0.6*	0.3078	1	Spain	Physician
12	0.6063*	-0.0271	1	Spain	Physician
13	0.7363*	0.0968	1	Spain	Physician
14	0.4492	0.2276	1	Denmark	Nursing staff
15	0.595*	0.0422	1	Spain	Physician
16	0.7167*	0.1631	1	Spain	Other
17	0.5463*	0.5097	1	Spain	Other
18	0.6*	0.2653	1	Spain	Physician
19	0.5257*	0.2036	1	Belgium	Physician
20	0.146	0.5989*	2	Netherlands	Social worker
21	0.1802	0.4283	2	Denmark	Social worker
22	-0.2453	0.6574*	2	Belgium	Physician
23	0.2662	0.5572*	2	Denmark	Social worker
24	0.1761	0.735*	2	Denmark	Social worker
25	0.1355	0.62*	2	Belgium	Physician
26	0.1344	0.6997*	2	Netherlands	Physician
27	0.0335	0.5012	2	Denmark	Nursing staff
28	-0.0794	0.4876	2	Netherlands	Nursing staff
29	0.0702	0.5403*	2	Estonia	Physician
30	0.3557	0.5706*	2	Estonia	Nursing staff
31	0.2951	0.4055	2	Spain	Physician
32	0.4139	0.563*	2	Denmark	Social worker
33	0.4415	0.6201*	2	Spain	Social worker
34	0.3721	0.1875	None	Netherlands	Social worker
35	0.3578	0.3684	None	Netherlands	Social worker
36	-0.054	0.1465	None	Belgium	Physician
37	-0.343	0.1458	None	Netherlands	Nursing staff
38	-0.0292	0.3353	None	Netherlands	Nursing staff
39	0.3822	0.3798	None	Spain	Nursing staff
40	0.1944	-0.0121	None	Spain	Physician
41	0.3422	0.235	None	Belgium	Nursing staff
42	0.2108	0.3261	None	Belgium	Other
43	0.2856	-0.0499	None	Denmark	Nursing staff
44	0.2313	0.1379	None	Netherlands	Nursing staff
% Exp. Var.	18	16	Total % Exp. Var.		34

Note: All Respondents of Discourses 1 and 2 are flagged with a significance level of 0.05; Those with * were also flagged with a significance level of 0.01.

Appendix 3-3. Value of statements by discourse

N	Statements	D. 1	D.2	C/D
1	Users should tackle user issues themselves instead of waiting for others to do it	0	-2	D
2	Users know best how to develop and organize service delivery	-2	-1	C
3	Involved users especially want to be recognized as partners	-2	-2	-
4	Users should be involved because they can have alternative views, useful for the other partners	3	2	-
5	Users want to be involved primarily to indicate what they perceive as an exquisite end product	1	-1	D
6	Involved users should above all check how user-oriented the innovation is	1	0	D
7	Users are especially involved to check whether the rights of those they represent are guaranteed	0	-1	D
8	Users should be involved primarily to create support for the innovation	0	0	C
9	Users should set and guard the direction for the innovation process	-1	0	D
10	Users can best define problems and solutions	-1	1	D
11	Equal contributions of users and other partners (co-creation) is the only way to create relevant innovations	-1	3	D
12	Users and the other partners should jointly define the problem and the solution	0	2	D
13	Involved users have to advise the partnership about how to increase user satisfaction	2	0	D
14	Just like a company asking its customers about its products, the partnership needs to consult the users about their preferences	1	0	D
15	The majority of users is there predominantly to listen to what the partners have to say	-3	-2	C
16	Users best leave development of innovations to others	-2	-3	D
17	The main role of the partnership is provide the resources to develop proposals of the users	-1	-1	D
18	The partnership should maximally give room to the involved users to develop their own proposals for the innovation	0	0	C
19	The partnership should primarily align the different goals of the involved users and the other partners	0	1	-
20	A crucial task of the partnership is to ensure joint decision making between the involved users and the other partners	1	1	C
21	The principal concern of the partnership is letting involved users voice what quality they expect from the innovation	-1	1	D
22	The partnership should enable the involved users to see how the innovation works in reality	2	2	C
23	The partnership actors are there to make sure that the input of the users and other actors certainly does not go against the regulative framework (e.g., legislation)	1	-1	D
24	The users should be well-informed by the partnership because the innovation can then be easily accepted	2	1	D

Note: C: Consensus statement with a level of significance of 0.01; D: Distinguishing statement for both factors with a level of significance of 0.01

Section 3:

Impact of Collaboration on Efficiency

Chapter 4: Bigger is better? Efficiency of collaboration in local service delivery

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Abstract

The objective of this chapter is to assess the effects and impact of collaborative practices on public sector efficiency. To achieve this purpose, the chapter analyzes collaboration in policy design and service delivery between public to public and public to private actors, focusing on the provision of waste collection services. We analyze the efficiency of the waste management service in municipalities from all regions of Spain by using Data Envelopment Analysis (DEA). Based on previous literature, we include as output indicators the total waste collected, the number of containers and frequency of collection (quality indicator). We study the relationship between the efficiency of the service provided and features of the collaboration. We subsequently analyze the changes in efficiency between 2014 and 2018 due to modifications in the legal framework. The results indicate that the efficiency of municipal solid waste collection is higher in medium-sized municipalities, whether they provide the service on an individual basis or in collaboration. Smaller and large municipalities improve their efficiency when they provide this service in collaboration with other public or private organizations. Larger municipalities are more open to collaboration with the private sector because they have more resources to minimize these transaction costs.

Keywords: Efficiency, Local Governments, public/public collaboration, public/private collaboration, *Scale efficiency* and Spain.

4.1 Introduction

Various proposals for governance reforms in the public sector began to emerge over the 1990s, aimed at facilitating greater collaboration in public action. These proposals were given the name New Public Governance (Osborne 2010), and came to replace the New Public Management approach as a hegemonic paradigm in public sector reforms. Nowadays, collaboration is a central issue in public administration and management research (Christensen et al. 2016; Lægreid et al. 2015; McGuire 2006). It is defined in previous research as a relationship between organizations to achieve different goals in government policy-making or public service delivery (Boston & Gill 2011; Christensen & Lægreid 2015). Many comparative studies on public administration and management seek to answer the question of whether greater collaboration enables governments to "work better and cost less" (Hood & Dixon 2015). This broad academic debate argues that collaborative structures and processes can lead to cost savings, as a result of increased economies of scale, joint investments and professionalization (Hood & Dixon 2013, 2015).

The objective of this chapter is to assess the effects and impact of collaborative practices on the efficiency of public service delivery. To do this, the chapter analyzes collaboration in public service delivery between local authorities, and/or between local authorities and private organizations, focusing on municipal solid waste collection (MSWC) management. In doing so, it will examine collaborative practices and their impact on the efficiency of the MSWC will be assessed through quantitative and qualitative indicators. This 'collaborative efficiency' requires the definition and measurement of appropriate indicators before assessing what would be feasible to achieve (outputs) in relation to the inputs for the selected collaborative practice. A number of exogenous factors must also be considered, such as the population to be served, its dispersion or the political party (conservative or socialist) in charge. We argue that contextual characteristics may also influence the efficiency and/or collaboration practices by enhancing or limiting their efficiency.

Our findings will contribute to better collaboration practices between local authorities, and/or between local authorities and private organizations to improve government efficiency.

The rest of the chapter is organized as follows. First, the background where we reviewed previous research on the scale and efficiency of MSWC and the Spanish context for

municipal collaboration. We then explain the methodology applied. In the fourth section, we present the results. Finally, in the last sections, we provide the discussion and conclusions.

4.2 Background

4.2.1 Scale and efficiency in municipal public service management: the case of MSWC

During the last decade, public administrations have faced various budgetary constraints. Therefore, the measurement of the efficiency of public sector service delivery has attracted increasing attention and is also a major concern among many public authorities worldwide. The focus therefore is increasingly on assessing and monitoring the efficiency and effectiveness of the actions and services provided by public authorities (Fusco et al., 2020). In a context of limited resources, the challenge for public authorities is to ensure public service delivery remains as unchanged as possible, by minimizing expenditure overruns due to inefficiency in the optimal size of local authorities providing services.

Several studies have dealt with analyzing the effect of scale on the efficiency of public service delivery. In the case of small municipalities, different kinds of collaboration between public organizations and private operators in service provision is widespread in EU countries such as France, The Netherlands, Italy, Norway and Spain. The underlying assumption is that collaboration can achieve economies of scale with lower transaction costs (Bel et al., 2013).

Pina & Torres (1996) studied the efficiency of the hospital network in the Basque Country and Navarra and found diseconomies of scale in the largest hospitals, with medium-sized hospitals being the most efficient.

Byrnes & Dollery (2002) analyzed the amalgamation programs in Australian local government in order to reduce the number of local authorities. The rationale underlying local amalgamation was the economies of scales, i.e., the belief that larger municipalities would reveal greater economic efficiencies because large municipalities have lower administrative costs, lower representation costs, increased purchasing power and improved use of depots, plant and equipment. They found that given the mixed results which emerge from their national and international evidence, and conclude that considerable uncertainty exists as to whether economies of scale do or do not exist.

Bel et al. (2013) studied intermunicipal cooperation in MSWC. The results showed that scale economies can be achieved through cooperation with lower transaction costs. Notwithstanding, Sørensen (2007) and Garrone et al. (2013) show that principal-agent problems may arise when services are managed by multi-governing bodies and/or monopolization of contracts which can lead to increased transaction costs associated with these contracts (Brown & Potoski, 2003).

Carvalho et al. (2015) studied economies of size and economies of output density in the municipal waste collection sector in New South Wales (NSW). They conclude that 'bigger is not better', estimating that the optimal size of waste utilities lies in the range of 12,000-20,000 inhabitants.

Fahey et al. (2016) reach the same conclusion when analyzing municipal mergers in Australian local government. They studied amalgamation programs in New South Wales (NSW) based on the approach that larger local government organizations will generate cost savings through scale economies. In the NSW case, they found no empirical evidence in support of the claim that size leads to economies of scale.

Dong et al. (2017) analyzed a total sample of 736 water plants from across China, concluding that the size of plant and overcapacity have a significant influence on the mean efficiency, concluding that bigger does not mean more efficient, but rather that it identifies an average optimal size of decision-making.

To analyze the effect of size on public service delivery we chose the MSWC service because it is a typical public service provided by local authorities all over the world and, together with urban transport and street cleaning, is the most resource-intensive service at local level. In Spain, all municipalities, regardless of their size, are required by law to provide a solid waste collection service, while urban transport, for instance, should only be provided by municipalities with more than 50,000 inhabitants.

In Spain, therefore, there is a huge difference between the sizes of municipalities (from less than 100 to more than 1,000,000 inhabitants) providing waste collection services, so that size may reveal itself to be an essential efficiency factor. In this context, the search for different forms of collaboration to gain efficiency and save public resources has become an essential element and a common practice. However, the key question that still needs to be answered is "bigger is better?" or "is there an optimal decision unit size for MSWC?"

4.2.2 Spanish context of municipal collaboration

The legal framework for public sector activity in Spain has been modified in the last decade in order to ensure its sustainability and improve the transparency and efficiency of the public sector (e.g. Law 39/2015 of October 1 on the Common Administrative Procedure of Public Administration; Law 40/2015, of October 1, on the Legal Framework of the Public Sector; and Law 27/2013, on the rationalization and sustainability of Local Administration). Some of the modifications encouraged internal and external collaboration with the private sector and citizens. As for the municipalities, Law 27/2013 on the rationalization and sustainability of Local Administration facilitates the amalgamation of municipalities and also gives priority to collaboration for the provision of mandatory services by small municipalities, such as waste collection management. If small and medium-sized municipalities (less than 20,000 inhabitants) want to provide the MSWC themselves, they must prove that they can provide it more efficiently. However, the impact of these modifications on the efficiency of the public sector has not been analyzed.

4.3 Methodology

To analyze the efficiency of municipalities in MSWC service provided in collaboration, we use Data Envelopment Analysis (DEA). The DEA methodology constructs the efficient frontier through the relationship between inputs and outputs and their efficiency is assessed by comparing the results of each Decision Making Unit (DMU) with the frontier. One of its major advantages is that it allows the simultaneous inclusion of multiple inputs and outputs without giving a predefinition of the importance of each input and output in the efficiency measure. Seiford (1995) collected approximately 700 references on empirical applications of the DEA technique. Liu et al. (2013) documented 4,500 JCR journal articles on empirical applications of DEA, from 1978 to 2010.

This method is especially suitable to evaluate the efficiency of non-profit organizations that operate outside the market, because traditional measures of efficiency - income, profitability - do not work satisfactorily in this framework because these organizations are not focused on obtaining profits and the main sources of finance do not come from the sale of goods and services. The results of the DEA model will depend on the inputs and outputs chosen. It is important to take special care in choosing the indicators best suited to the objectives of the analysis. In our case, the DMUs are the municipalities that

carry out the MSWC, the inputs are the resources spent by the municipalities to produce the service, while the outputs refer to the quantity and quality of the service provided.

Two approaches can be used in DEA: input-oriented, when calculating how much inputs can be reduced without reducing outputs, and output-oriented, which analyses how many outputs can be increased without increasing inputs. The input-oriented model is used in this research, because the main MSWC outputs cannot be changed by the managers, while they can change the inputs. This orientation is commonly used in research into the efficiency of waste collection services.

Different DEA models can be applied depending on the assumption regarding the Returns to Scale (RTS) of the service activity. A DMU can produce with constant or variable returns to scale. If it produces with Variable Returns to Scale (VRS), there are two possibilities. It produces with Increasing Returns to Scale (IRS), when an increase in input causes an equal or higher proportional increase in outputs, and it produces with Decreasing Returns to Scale (DRS) when an increase in inputs causes a lower proportional increase in outputs.

The following decision rule is used to define how a DMU is assumed to produce:

- A DMU produces with CRS when $\theta CRS(x,y) = \theta VRS(x,y)$.
- A DMU produces with VRS when $\theta CRS(x,y) \neq \theta VRS(x,y)$, then:
    - If $\theta VRS(x,y) = \theta IRS(x,y) \neq \theta DRS(x,y)$, it produces with IRS and,
    - If $\theta VRS(x,y) = \theta DRS(x,y) \neq \theta IRS(x,y)$, it produces with DRS.

In our analysis we also decompose *Global Technical Efficiency* into *Pure Technical Efficiency* and *Scale Efficiency*.

Global Technical Efficiency = *Pure Technical Efficiency* x *Scale Efficiency*

Global Technical Efficiency ($\theta CRS(x,y)$) is obtained by using the Constant Returns to Scale (CRS) model developed by Charnes et al. (1978) and does not take into account the effects of the scale at which the service is provided. Therefore, the level of efficiency jointly measures the performances of managers in the management of resources and the appropriateness of the scale at which the service is produced. *Pure Technical Efficiency* ($\theta VRS(x,y)$) is obtained by using the VRS model devised by Banker et al. (1984) and only reflects the efficiency in resource management. The *Scale Efficiency* (SE) shows whether the DMU is providing the service at the most productive scale and is calculated as $SE = \theta CRS(x,y)/\theta VRS(x,y)$.

For outlier detection and DEA we use the FEAR (Wilson, 2008) and Benchmarking (Bogetoft and Otto, 2011) packages in R software.

4.3.1 Input and output indicators

A large number of non-parametric DEA studies have been carried out over the last few decades regarding MSWC efficiency, given the importance of solid waste collection in achieving sustainable development goals and environmental sustainability. However, very few have focused on the impact of economies of scale on efficiency and the search for optimal decision unit sizes for MSWC services. Some countries such as the United Kingdom or Australia have carried out studies into local government amalgamation processes in order to increase size and other EU countries such as France, The Netherlands, Italy, Norway and Spain have organized collaborative systems for MWSC.

Previous research carried out by Byrnes & Dollery (2002), Lavee & Khatib (2010), Castellet & Molinos-Senante (2016) and Guerrini et al. (2017) found that smaller cities benefit from economies of scale. So, there seems to be some evidence that size may affect efficiency.

Most previous studies published in the JCR show a certain recurrence in the selection of inputs and outputs, with total cost and total waste collected being the most commonly used. Total cost is used as the sole input indicator for most publications with the highest impact. Other groups of DEA models have in addition been run, desegregating total cost into personnel cost (Simoes et al. 2012, Caldas et al., 2019), current cost (Caldas et al., 2019) and other costs depending on the objective of the study. As output indicators, we use tons of waste collected annually (Fusco et al., 2020; Caldas et al., 2019, Benito-López et al. 2011, Simoes et al. 2012), number of containers and frequency of waste collection (quality indicator) and, as contextual variables, population (Bel & Mur, 2011), population density (Bel & Fageda, 2011; Benito-López et al. 2011; Fusco et al., 2020; Agovino et al. 2018), geographical dispersion, political party in charge (Bel & Fageda, 2011) and the way they provide the service, individually or in collaboration (with public, private entities or both) given that exogenous variables are crucial since they widely influence the performance of waste services (Ronchi et al., 2002). The analysis has been carried out using 2014 and 2018 data extracted from the CESEL (Cost-Effectiveness of Local Authority Services) database at the Spanish Ministry of Finance. There are not enough municipalities that submit itemized costs, and this is why only the total cost of the service is included in the DEA model as an input to enlarge the sample used.

Before starting the efficiency analysis, possible outliers in the sample were ruled out. The Wilson (1993) method for outlier identification is used in this chapter. It has been widely applied for outlier detection in DEA and has been previously used in MSWC analysis (Benito-López et al., 2011; Sarra et al., 2020a; Sarra et al., 2020b).

Firstly, we calculate the efficiency of the municipalities in the sample by considering the inputs and outputs previously explained, and we define the RTS they present (constant, increasing or decreasing) for 2014 and 2018. We then compare the percentage of municipalities that are below, above or on an optimal scale to analyze the effects of the changes in the legal framework that encourage the amalgamation of municipalities. Secondly, we carry out the decomposition of the *Global Technical Efficiency* ($\theta CRS(x,y)$) into *Pure Technical Efficiency* ($\theta VRS(x,y)$) and *Scale Efficiency* (SE). Thirdly, we explain the differences between municipalities' efficiency by using the following external variables: number of inhabitants in the municipality, population density (number of inhabitants/area of the municipality), ruling political party (socialist or conservative) and the way they provide the service (directly or indirectly through collaboration with public or private organizations). The number of inhabitants was obtained from the INE (Spanish National Statistics Institute), the surface area of the municipality was obtained from the Ministry of Finance and Public Administration, the governing political party from the Ministry of Territorial Policy and Civil Service, and the way they provide the service in 2018 was obtained from the CESEL database and directly from the environmental departments at the city councils for those municipalities, which did not provide that information in the database. However, it was not possible to obtain how the service was provided in 2014 for many of the municipalities, so this variable was excluded for the 2014 sample.

Although most efficiency analyses with the DEA model are carried out on the whole sample, in this case it may be difficult because of both the huge differences in the sizes of municipalities and the production technologies. So, they do not operate under the same conditions (Caldas et al., 2019). As a consequence, large differences between efficiency levels and a large number of municipalities with very low levels of efficiency are obtained.

We have divided the sample according to population into small, medium and large municipalities based on the division in Article 26 of Law 7/1985 of 2 April 1985, on Regulating the Bases of Local Governments. The law determines the services to be

provided, grouping the municipalities into 0-5,000, 5,000-20,000 and 2,000-50,000 and over 50,000 inhabitants, MSWC being compulsory for all of them. We decided to divide the sample into three sub-samples: small (less than 5,000 inhabitants), medium (between 5,000 and 20,000 inhabitants) and large (more than 20,000 inhabitants).

In these sub-samples we will calculate and compare efficiency according to the different types of returns to scale of the municipalities (constant, decreasing and increasing). We do in addition perform the previously explained division of *Global Technical Efficiency* (into *Pure Technical Efficiency* and Efficiency of Scale) in order to compare efficiency of scale across sub-samples and to assess the effect of the way they provide the service (directly or in collaboration) on Efficiency of Scale.

4.4 Analysis of results

4.4.1 Analysis of outliers

Before the DEA, the outliers were detected using the Wilson (1993) method. Figure 4-1 shows the log ratios for the first iteration of the sample of small municipalities of 2018. The separation between the smallest ratios reveals possible outliers. In this case, the separation is large for i=1, i=3, i=6, i=7 and i=10. Table 4-1 shows the values of R(i)MIN and the municipalities of each "i". According to this criterion, those municipalities in the i=10 are possible outliers, which should be checked. The data for these municipalities was checked and they were eliminated from the sample. We carried out another iteration of this method to avoid the possible masking effect of those outliers that were already excluded and another 12 outliers were detected and eliminated. This methodology was also applied to the rest of the samples. 6 outliers of the sample of medium municipalities of 2018 were eliminated and none of the municipalities of the sample of the large municipalities of 2018 were eliminated. Regarding the sample of 2014, 13 small, 10 medium and 2 large municipalities were eliminated.

The initial sample for 2018 consisted of 629 municipalities (318 small, 170 medium and 141 large municipalities) and the initial sample for 2014 consisted of 678 municipalities (415 small, 187 medium and 76 large municipalities). After the outlier detection, the remaining sample for 2018 consists of 608 municipalities (303 small, 164 medium and 141 large municipalities) and the remaining sample for 2014 consists of 653 municipalities (402 small, 177 medium and 74 large municipalities).

Figure 4-1. Analysis of outliers

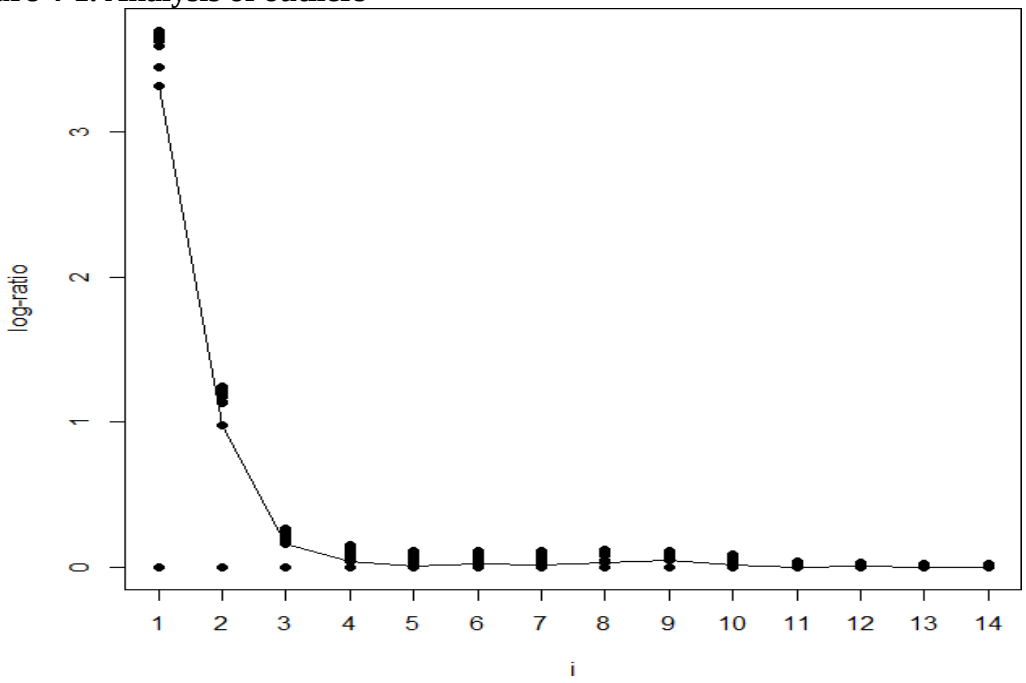

Table 4-1. R^i_{Min} Values and outliers

i	Municipalities														R^iMin
1	43														0,02424531
2	166	43													0,00684205
3	18	166	43												0,00510324
4	29	18	166	43											0,00427296
5	48	29	18	166	43										0,00365007
6	48	309	29	18	166	43									0,00308597
7	317	48	309	29	18	166	43								0,00261322
8	317	312	48	309	29	18	166	43							0,00220470
9	317	312	48	95	309	29	18	166	43						0,00191521
10	113	317	312	48	95	309	29	18	166	43					0,00173260
11	87	113	317	312	48	95	309	29	18	166	43				0,00158733
12	87	78	113	317	312	48	95	309	29	18	166	43			0,00145419
13	90	87	78	113	317	312	48	95	309	29	18	166	43		0,00133992
14	26	90	87	78	113	317	312	48	95	309	29	18	166	43	0,00123610

Table 4-2 shows input and output statistics according to the size of the municipality's population. The large differences in the dimensions of the service in terms of input and outputs, and between the sub-samples, highlight the need to carry out a DEA for each sub-sample to be able to correctly analyze the efficiency of each type of municipality as in previous research (Caldas et al., 2019).

Table 4-2. Descriptive analysis of inputs and outputs according to population size of 2014 and 2018

	2014			2018		
Inputs	Small	Medium	Large	Small	Medium	Large

Total Cost	Mean	72,484.3	424,598.8	5,046,096.2	77,610.9	438,699.5	3,695,221.1
	Max	608,466.0	1,523,060.2	146,059,430.7	646,092.5	1,676,048.2	28,317,315.2
	Min	1,399.9	17,829.5	153,353.3	1,594.8	8,769.1	29,120.8
	Std. Dev.	76,048.71	315,116.28	17,035,024.31	85,379.50	347,080.22	4,814,009.37
Outputs		Small	Medium	Large	Small	Medium	Large
Tons of Waste Collected	Mean	818.6	4,498.3	42,240.2	808.6	5,180.6	34,094.8
	Max	18,000.0	13,537.0	1,088,690.0	6,187.9	25,000.0	257,611.0
	Min	0.5	1.0	9.0	1.0	26.3	9.0
	Std. Dev.	1,360.00	2,873.26	128,612.97	884.03	3,407.59	37,111.39
Number of Containers	Mean	135.1	499.1	6,655.2	155	570	1974
	Max	1,102.0	1,616.0	353,234.0	1,112	1,826	18,331
	Min	1.0	1.0	225.0	1	30	16
	Std. Dev.	148.12	350.35	40,911.96	170	389	2463
Frequency of Collection	Mean	245.9	354.7	352.7	246.6	339.41	355.9
	Max	365.0	365.0	365.0	365	365	365
	Min	26.1	182.5	182.5	26	26	183
	Std. Dev.	124.22	42.26	46.12	130.95	78.69	39.78
N		402	177	74	303	164	141

Table 4-3 shows the external variable statistics according to population size. All the large municipalities in the 2014 sample delivered the service in collaboration with other public or private organizations, and approximately half of the small and medium-sized municipalities carried out the service in collaboration (48.3% and 53.7% respectively). In the 2018 sample this way of providing the service predominates in small and large municipalities (61.72% and 75.18% respectively), while neither of the above predominate in medium-sized municipalities. With respect to those municipalities who collaborate to provide the service, medium-sized and large municipalities collaborate with private companies much more frequently than smaller municipalities (77.65%, 83.02% and 47.59% respectively), which choose to collaborate with private companies or other public institutions in equal proportions. In 2014 conservative political parties predominate in the sample for small, medium and large municipalities (61.0%, 61.6% and 71.6%). However, socialist political parties predominated in medium-sized and large municipalities (63.41% and 68.09% respectively), the situation being more balanced in smaller municipalities.

Table 4-3. Descriptive analysis of external variables according to population size of 2014 and 2018

		2014			2018		
		Small	Medium	Large	Small	Medium	Large
Population	Mean	1,657.3	10,051.2	106,232.8	1,683	10,789	74,857.38
	Max	4,997.0	19,992.0	3,165,235.0	4,969	19,768	666,880
	Min	26.0	5,001.0	20,613.0	19	5,046	20,035
	Std. Dev.	1,343.54	4,361.94	368,952.4	1,364	4,497	86,830.54
Density	Mean	72.2	313.2	1,421.8	61.12	314.9	1,538.0
	Max	599.5	8,081.1	10,942.2	1,025.7	7,995.4	19,168.0
	Min	1.7	7.6	25.7	0.6	8.4	26.3
	Std. Dev.	76.26	687.97	1,853.71	132.32	737.15	2,403.02
Political party	Conservative	61.0%	61.6%	71.6%	46.5%	36.6%	31.9%
	Socialist	39.1%	38.4%	28.4%	53.5%	63.4%	68.1%
Individual/ Collaborative	Individual				38.3%	48.2%	24.8%
	Collaborative				61.7%	51.8%	75.2%
	Public Collaboration				67.3%	58.5%	28.4%
	Private Collaboration				29.4%	40.2%	62.4%
	Mix				3.30%	1.2%	9.2%
N		402	177	74	303	164	141

4.4.2 Impact of collaboration on efficiency

Table 4-4 shows great differences in the efficiency of the municipalities according to Return to Scale and population size for both years, 2014 and 2018. In 2014, only 6.7% of small municipalities provided the service on an optimal scale, and with an average efficiency of 0.1918, while about half of them provided it below the optimal scale (53.7%) and 39.6% provided it over the optimal scale. In large municipalities the percentage of municipalities providing the service on an optimal scale is also very low (2.7%), and most of these municipalities are producing over the optimal scale (91.9%), with an average efficiency of 0.2376, and 5.4% are providing the service below it. These results contrast greatly with the results of the DEA for medium-sized municipalities, where 41.8% of them are providing the service on an optimal scale, with an average efficiency of 0.2124, and the rest of them are producing over it. With respect to the way they provided the service in 2014, directly by themselves or in collaboration, for those small and medium-sized municipalities with the optimal scale there are no major differences. There were more small-sized municipalities that collaborate to provide the service by producing below the scale (56.0% versus 44.0%) but less producing over the scale (37.7% versus

62.3%). There are more medium-sized municipalities that collaborate to provide the service by producing over the scale (55.7% versus 44.7%).

In 2018, half of the small municipalities in the sample produce over the optimal scale (51.49%), 28.05% of them produce below their optimal scale and 20.46% of them produce at the optimal scale with average efficiency of 0.0975. These results are similar to the larger municipalities where the majority also produce over the optimal scale (57.45%) but 40.43% produce at the correct scale with an average efficiency of 0.0480 and only 3 municipalities are below the optimal scale. The medium size municipalities adapted more to the optimal scale, 71.95% produce at the optimal scale with an average of 0.0638, and only 9.76% and 18.29% produced over and below the optimal scale.

Table 4-4. Efficiency analysis according to Return to Scale of the municipalities and population size

		2014			2018		
		Small	Medium	Large	Small	Medium	Large
CRS	Mean	0.1918	0.2124	1.0000	0.0975	0.0638	0.0480
	Median	0.0407	0.1373	1.0000	0.0471	0.0425	0.0281
	Max	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.0137	0.0260	1.0000	0.0107	0.0099	0.0122
	Std. Dev.	0.3308	0.2097	0.0000	0.1779	0.1266	0.1291
	N	27(6.7%)	74(41.8%)	2(2.7%)	62 (20.5%)	118(72.0%)	57(40.4%)
VRS	Mean	0.1095	0.2541	0.2810	0.1971	0.2990	0.2358
	Median	0.0533	0.2001	0.2417	0.1078	0.1130	0.1257
	Max	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Min	0.0073	0.0341	0.0504	0.0165	0.0134	0.0113
	Std. Dev.	0.1582	0.2247	0.1877	0.2331	0.3562	0.2646
	N	375(93.3%)	103(58.2%)	72(97.3%)	241(79.5%)	46(28.1%)	84(59.6%)
IRS	Mean	0.0908	-	0.1824	0.1318	0.0633	0.2037
	Median	0.0471	-	0.1645	0.0801	0.0431	0.0195
	Max	0.9303	-	0.2920	1.0000	0.1746	0.5800
	Min	0.0073	-	0.1086	0.0165	0.0134	0.0115
	Std. Dev.	0.1197	-	0.0863	0.1595	0.0516	0.3260
	N	216(53.7%)	0(0.0%)	4(5.4%)	85(28.1%)	16(9.8%)	3(2.1%)
DRS	Mean	0.1350	0.2541	0.2376	0.2322	0.4247	0.2370
	Median	0.0621	0.2001	0.2232	0.1223	0.2252	0.1261
	Max	1.0000	1.0000	0.8997	1.0000	1.0000	1.0000
	Min	0.0118	0.0341	0.0479	0.0197	0.0227	0.0113
	Std. Dev.	0.1966	0.2247	0.1260	0.2586	0.3854	0.2645
	N	159(39.6%)	103(58.2%)	68(91.9%)	156(51.5%)	30(18.3%)	81(57.5%)
	N	402	177	74	303	164	141

Table 4-5 shows the percentage of municipalities that provide the service and the returns to scale according to the different ways of providing the service, individually or in collaboration. In the three sizes of municipalities (small, medium and large) in 2018 the percentage of municipalities providing the service on an optimal scale was much higher than in 2014. In small and large municipalities in 2018 the percentage of those

municipalities which provide the service in collaboration on an optimal scale (21.9% and 42.5% respectively) is higher than those who provide it directly by themselves (18.1% and 34.3% respectively). On the contrary, the percentage of medium-sized municipalities in 2018 who provide it directly by themselves on an optimal scale was higher than in the case of those who provide it in collaboration (73.4% versus 70.6%). For those small and medium-size municipalities who collaborate to provide the service, the percentage of those with the optimal scale is higher when the service is provided by the municipality and a private company (mixed production) or just by a private company.

Table 4-5. Percentage of municipalities according to the way they provide the service, Return to Scale of the municipalities and population size in 2018

		CRS	VRS	IRS	DRS	Total	N
Small	Total	20.5%	79.5%	28.1%	51.5%	100%	303
	Individual	18.1%	81.9%	13.8%	68.1%	100%	116
	Collaborative	21.9%	78.1%	36.9%	41.2%	100%	187
	Public	18.2%	81.8%	44.3%	37.5%	100%	88
	Private	24.7%	75.3%	32.6%	42.7%	100%	89
	Mix	30.0%	70.0%	20.0%	60.0%	100%	10
Medium	Total	72.0%	28.1%	9.8%	18.3%	100%	164
	Individual	73.4%	26.6%	10.1%	16.5%	100%	79
	Collaborative	70.6%	29.4%	9.4%	20.0%	100%	85
	Public	58.8%	41.2%	17.6%	23.5%	100%	17
	Private	72.7%	27.3%	7.6%	19.7%	100%	66
	Mix	100.0%	0.0%	0.0%	0.0%	100%	2
Large	Total	40.4%	59.6%	2.1%	57.5%	100%	141
	Individual	34.3%	65.7%	0.0%	65.7%	100%	35
	Collaborative	42.5%	57.5%	2.8%	54.7%	100%	106
	Public	20.0%	80.0%	0.0%	80.0%	100%	5
	Private	43.2%	56.8%	3.4%	53.4%	100%	88
	Mix	46.2%	53.8%	0.0%	53.8%	100%	13

Table 4-6 shows the disaggregation of *Global Technical Efficiency* into Pure Technical and *Scale Efficiency* for each sub-sample, the total figures and according to the ideology of the ruling political party and the type of provision. As in the previous result, medium-size municipalities carry out the service with higher *scale efficiency* than small and large ones (0.8537, 0.5177 and 0.5319 respectively, Kruscal Wallis = 35.351**, p-value<0.01). However, there are differences between those small and large municipalities that carry out their service individually or in collaboration. Small and Large municipalities have less *scale efficiency* than medium-sized ones but they get closer to the optimal scale when they provide the service in collaboration with other public or private organizations. Medium-sized municipalities who provide the service in collaboration have higher *Global Technical Efficiency*, though the results do not show if it is because of better management

performance or a more appropriate scale of production. There are no differences in efficiency levels between the different types of collaboration for small and medium-sized municipalities, which contrast with the previous result on the returns to scale analysis. Those large municipalities who contract a private company to provide the service have a higher level of *Global Technical Efficiency*, though the results do not show if it is because of better management performance or a more appropriate scale of production. There are no differences in any type of efficiency between those municipalities ruled by socialist or conservative political parties.

Table 4-6. Disaggregation of *Global Technical Efficiency*: total mean and according to ruling political party and type of provision of 2018

	Small			Medium			Large		
	CRS	VRS	SE	CRS	VRS	SE	CRS	VRS	SE
Total	0.0654	0.1767	0.5177	0.0617	0.1298	0.8537	0.0356	0.1598	0.5319
Ind.	0.0673	0.2083	0.4626	0.0499	0.1103	0.8539	0.0271	0.2278	0.4267
Colab.	0.0644	0.1570	0.5518	0.0726	0.1479	0.8535	0.0385	0.1374	0.5667
U M-W	2392.00*	2261.00**	3762.00*	2732.00*	3015.50	3265.50	1969.00	1444.50	2280.50*
Public	0.0633	0.2234	0.3856	0.1398	0.1951	0.8743	0.0247	0.1206	0.3453
Private	0.0559	0.1836	0.3841	0.0563	0.1390	0.8437	0.0423	0.1498	0.5706
Mix	0.0360	0.1184	0.4583	0.0403	0.0403	1.0000	0.0177	0.0596	0.6249
K.-W.	4.271	4.477	0.720	0.479	0.188	1.383	6.125*	3.738	1.328
Soc.	0.074	0.1684	0.5422	0.0696	0.1366	0.855	0.074	0.1684	0.5422
Cons.	0.0555	0.1862	0.4895	0.0479	0.1179	0.8514	0.0555	0.1862	0.4895
U M-W	2522.00	2501.00	3304.00	3249.00	3198.50	3179.50	2101.00	1807.00	2501.50

**p-value<0.01; *p-value<0.05

4.5 Discussion

This empirical analysis has sought to determine whether optimal economies of scale may exist in MSWC and whether collaboration may lead to efficiency gains through the achievement of better economies of scale. When local governments have to make a decision on how to deliver local services, they may choose the delivery with or without collaboration. The modifications to the legal framework that encourage amalgamation processes for the purpose of service delivery in municipalities and give priority to providing the service in collaboration seemed to improve the alignment of the municipalities to their optimal scale from 2014 to 2018. Our results also show that, in all cases, municipalities come closer to optimal economies of scale through collaboration.

Although half of the large and small municipalities of the sample are producing over the optimal scale and one-third of small municipalities produce below their optimal scale in 2018, there are differences between those that deliver the MSWV individually or in collaboration. Small and Large municipalities get closer to the optimal scale when they provide the service in collaboration with other public or private organizations. This may be the reason why in the small and large samples of municipalities predominate the municipalities who provide MSWC service collaborating with other public or private entities, while, for instance, none of them predominate in medium size municipalities.

These results contrast with the DEA results for medium-sized municipalities, where 71.95% produce at the optimal scale, having on average a higher *scale efficiency* than small and large municipalities. Notwithstanding, the medium-sized municipalities who provide the service in collaboration have higher *global technical efficiency*.

Small municipalities need to collaborate with other municipalities in order to reduce the costs of providing the service. The need to achieve scale economies, which is not possible for small municipalities, may be one of the main factors driving the decision to cooperate. Medium-sized municipalities seem to show the greatest advantages for efficient service provision, while collaboration seems to be more beneficial for all of them, small, medium and large municipalities. However, the results of the analysis do not show clearly which type of collaboration, with other public or private entities, improve the efficiency.

There are no differences in any type of efficiency between those municipalities rule by labour or conservative political parties.

4.6 Conclusions

In the last few decades, various OECD countries have embarked on processes of top-down concentration of municipalities (Australia and the UK) or initiatives involving collaboration between municipalities in order to provide specific public services and seek a more efficient dimension to provide those services. In this study we aim to find evidence on the reasons why municipalities seek collaborative mechanisms for service delivery.

The results of using the DEA model indicate that the efficiency of MSWC in smaller municipalities improves when it is provided in collaboration with other municipalities and/or with the total or partial collaboration of private organizations. Therefore, the need to find optimal economies of scale is revealed as one of the main factors driving the decision to collaborate, especially in the case of smaller municipalities.

These results are in line with other results found in the literature. Simões et al. (2012) find slight economies of scale among MSWC services (up to 50,000 inhabitants), but did not obtain conclusive results on the optimal population density. Carvahlo et al. (2015) estimated an optimal size of municipalities for MSWC to be in the range of 12,000-20,000 inhabitants and Sarra et al. (2017) pointed out that scale inefficiencies seem to be more widespread among smaller municipalities. In particular, our study observes an inverted U-shaped behaviour in efficiency improvement and in municipality size, with collaboration seeking medium-sized service delivery units being more likely and advantageous.

Our analysis shows that smaller municipalities prefer collaboration with other municipalities in order to benefit from economies of scale, as opposed to collaboration with private organizations. With this approach, they avoid the costs related to moral hazard risks or the complexity of controlling the opportunistic performance of contracts by private operators. Larger municipalities are more open to collaboration with the private sector because they have more resources to minimise these transaction costs.

With respect to the contextual factors that may affect efficiency in MSWC, the results of our study show that population, i.e. size, is an important conditioning factor. There are no differences in the efficiency or tendency to collaborate in MSWC depending on the conservative or socialist ideology of the mayors of the cities studied.

Ultimately, this chapter has sought to explore the rationale and usefulness of multi-municipal collaborations to improve the efficiency of public service delivery in the case of MSWC. The results show that there seems to be a cap and a floor in the average size of the population to be served, between municipalities should position themselves in order to improve efficiency in the provision of MSWC, and also that municipalities collaborate with other municipalities operating both above and/or below their optimal scale, in order to reach a joint optimal size. The regulator could, therefore, have an empirical basis for promoting multi-municipal collaborations as a way to reorganize the size and operation of some public service delivery.

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Main Conclusions

This thesis has analysed four different initiatives involving collaboration and co-production in the public sector in order to measure their degree of adoption, verify the achievement of the expected theoretical benefits and highlight areas of improvement.

As regards the adoption and use of ICTs to promote, transparency and collaboration, this thesis shows that there is an asymmetrical adoption of these tools by public sector institutions, caused by institutional factors (such as public administration styles, traditions of openness or public sector reforms) and contextual factors that increase the benefits perceived by some institutions (e.g., number of inhabitants, social media penetration rates or the influence of supranational organizations). The first chapter of this thesis shows that audit institutions are in an early stage of adopting social media, and they use them mainly to increase their legitimacy through transparency, without seeking interaction with citizens. Other institutions, such as local governments (Agostino, 2013; Bonsón, Royo, & Ratkai, 2015, 2017; UN, 2021, p. 98) show more will to move closer towards an open government and are adopting e-participation platforms to interact with citizens. Indeed, the municipal platform analysed in the second chapter is used by Madrid city council for two-way communications with citizens and some activities allow a high degree of citizen influence on decision-making processes. However, there is room for improvement regarding accountability and the coordination of online and offline participation.

The performance of co-production and collaboration initiatives is affected by several contextual, organizational and individual factors. In the e-participation platform analysed in the second chapter, organizational and individual factors (such as internal coordination and political support) played a crucial role in its performance. In addition, the context of citizen demand for more direct citizen participation boosted the initial levels of participation in the platform. The main barriers to the success of this platform were organizational, the slow organizational change and the lack of transparency and communication with users. Indeed, in the analysis of users' participation in the third chapter, transparency and communication are shown to be essential requirements for successful collaboration. As for collaboration between public-public and public-private organizations analysed in the fourth chapter, its adoption and performance was influenced by contextual factors, the population and the legal framework.

The response of citizens and users to these initiatives differs according to the strategy of the institutions. Most of the audit institutions analysed in the first chapter just spread

information about their activity and they obtained low levels of monitoring and interaction. The analysis of the third chapter shows that users want a more active role in collaborative innovation projects. They think they should participate as equals or at least as advisors on innovation projects that influence the definition of goals and decision-making processes. The platform analysed in the second chapter provides citizens and stakeholders with different forms of participation and they have responded with high levels of participation in those activities aimed at giving more decision-making power to citizens (participatory budgets). Reduced levels of participation in other participatory options reveal the need to respond to citizens' feedback to maintain their motivation and trust.

Overall, the impact of the co-production and collaboration initiatives studied show that they do not seem to have achieved their full potential. As regards initiatives based on the use of ICT, the analysis in the first chapter shows the limited impact of social media in improving transparency. A shift in the audit institutions' strategy towards two-way communication could improve user participation. The e-participation platform analysed in the second chapter has increased citizens' knowledge of policy processes, and citizen participation through the above had a significant influence on city council activity. Nevertheless, the organizational culture transformation to a more open and participatory culture caused by the initiatives of the two chapters seems to be slow. With respect to users' involvement in digital health collaborative innovation projects, some users think that their collaboration is the only way to obtain major innovation and all of them think that their input is necessary for the different perspectives they provide to the project. Finally, collaboration between public and public/private organizations in the provision of public services improves scale efficiency in small and big municipalities.

The initiatives covered in this thesis show different ways in which public sector institutions are entering into collaboration and co-production initiatives and the results of these initiatives. Further research should cover other types of collaboration and co-production initiatives and extend to other institutions and regions, since the most important factors for the adoption and performance of these initiatives were contextual and organizational.

Resumen

El *New Public Management* (NPM) (Aucoin 1990; Ferlie et al., 1996; Hood, 1991, 1995; Pollit, 1993) surgió en los años 70 y 80 en los países anglosajones, y se centró en un mayor énfasis en la eficiencia, la eficacia, la competencia, los enfoques de gestión propios del sector privado (por ejemplo, la medición del rendimiento, introducción de estructuras de incentivos), la descentralización y la satisfacción del cliente. Sin embargo, las reformas del NPM adolecieron de contradicciones, problemas y limitaciones, como la falta de mejoras significativas en los servicios públicos, problemas de coordinación y evasión de responsabilidades, que hicieron disminuir la confianza de los ciudadanos en la Administración, causando cierta pérdida de legitimidad (Pollit y Bouckaert, 2000). A principios del nuevo siglo, la desconfianza en la Administración fue cada vez mayor, ya que las reformas del NPM no lograban los resultados esperados (Kettl, 2000; Pollit y Bouckaert, 2000).

La noción de "buena gobernanza" adquirió mayor relevancia para resolver estos problemas y recuperar la confianza de los ciudadanos, acercando la Administración a la ciudadanía. En consecuencia, se fomentó la transparencia, la participación y la colaboración con los ciudadanos y otros grupos de interés (Banco Mundial, 1997; Kim et al., 2005; OCDE, 2001; Weiss, 2000;). En este contexto surgió el paradigma de la *New Public Governance* (NPG), basado en la teoría institucional y de redes (Klijn, y Koppenjan, 2012; Osborne, 2006, 2010; Pestoff, Brandsen, y Verschuere, 2012). Según este paradigma, en los procesos de elaboración de las políticas públicas y de prestación de servicios públicos participa una red interdependiente de instituciones públicas y privadas, ciudadanos y organizaciones del tercer sector. La participación de estos actores ajenos al sector público se considera necesaria para lograr un sector público eficiente, eficaz y democrático (Pierre y Peters, 2020). A diferencia de los modelos anteriores, la co-producción con los ciudadanos y otros actores es una cuestión esencial (Brandsen y Honingh, 2015; Osborne, Radnor y Strokosch, 2016; Osborne, y Strokosch, 2013; Pestoff, Brandsen, y Verschuere, 2012). Sin embargo, esto no significa que se reduzca la importancia de la Administración, que resulta fundamental en la creación de la arquitectura de gobernanza (Swyngedouw, 2005).

En el paradigma de la NPG, la rendición de cuentas no puede ser sólo jerárquica, porque la Administración colabora estrechamente con diversos actores y redes. Además, los actores que interactúan con la Administración pueden tener objetivos, estrategias y

valores diferentes. La medición del rendimiento y la rendición de cuentas en relaciones que se estructuran en forma de red no sólo se establecen mediante acuerdos formales, como contratos, sino también de manera informal a través de normas compartidas basadas en la confianza y reciprocidad. En las relaciones en red también cobran importancia los comportamientos facilitadores (por ejemplo, la comunicación frecuente y transparencia) y tipos no formales de sanciones y recompensas, que se basan, por ejemplo, en el reconocimiento y reputación, oportunidades futuras de colaboración o posibilidad de recibir información de forma anticipada (Powell, 1990; Provan, y Kenis, 2007; Romzek, Leroux, Blackmar, 2012). No obstante, este modelo también plantea nuevos problemas como (1) la toma de decisiones en un entorno sin reglas de decisión claras, (2) lograr mecanismos de participación activa, equilibrada y continuada de múltiples grupos de interés que reflejen los intereses de la sociedad, (3) lograr una coordinación eficiente entre actores con diferentes objetivos, y (4) mejorar y diseñar nuevos mecanismos de rendición de cuentas que permitan a la Administración ejercer los controles necesarios y la toma de medidas correctoras, en su caso (Koppenjan, y Koliba, 2013; Osborne, 2010, pp.40-42; Torfing y Trianfillou, 2013).

En este contexto, las tecnologías de la información y la comunicación (TIC) han desempeñado un papel importante como facilitadoras de la transparencia, la rendición de cuentas, la interacción y la colaboración entre administraciones, ciudadanos y otros grupos de interés, tanto para el diseño de políticas como para la prestación de servicios públicos. Se han utilizado diferentes herramientas, como sitios web, redes sociales, portales de transparencia y datos abiertos, plataformas de e-participación, *big data* y *wearables*, entre otros (Agostino, Saliterer y Steccolini, 2021; Bertot, Jaeger y Grimes, 2012, 2010; Bonsón et al., 2012; Jaeger y Thomson, 2003; Meijer, Curtin y Hillebrant, 2012; OCDE, 2003; Organización Mundial de la Salud, 2016; Welch, Hinnant y Moon, 2005). La adopción de estas tecnologías en el sector público se ha visto impulsada por acontecimientos críticos, como la pandemia de Covid-19 (Agostino, Arnaboldi y Lema, 2021). Sin embargo, las investigaciones previas muestran que la adopción de estas tecnologías y su éxito no sólo dependen de factores y capacidades relacionados con las TIC (compatibilidades tecnológicas, experiencia y competencias tecnológicas de los ciudadanos y el personal), sino también de factores contextuales, organizativos e individuales, como el apoyo político y a nivel de gestión, entre otros (Gilbert, Balestrini

y Littleboy, 2004; Gil-García y Pardo, 2005; Meijer, 2015; Panopoulou, Tambouris y Tarabanis, 2014; Randma-Liiv, 2021).

Aunque la colaboración y la co-producción se han defendido como una posible solución a la pérdida de legitimidad y a la falta de eficiencia, investigaciones anteriores han demostrado que estas prácticas se adoptan de forma asimétrica y pueden no alcanzar sus supuestos beneficios (Brainard y Mcnutt, 2010; Criado y Rojas-Martín, 2016; Koppenjan, y Koliba, 2013; Howlet y Ramesh, 2014; Norris y Reddik, 2013; OCDE, 2018). Esta Tesis analiza diversas iniciativas de innovación en materia de colaboración y co-producción llevadas a cabo por entidades del sector público europeo y estadounidense en los últimos años, con el fin de medir su grado de adopción, comprobar la consecución de sus beneficios teóricos y poner de manifiesto las áreas de mejora. Este estudio abarca iniciativas para mejorar la transparencia, promover la participación de los ciudadanos y usuarios, fomentar los procesos de innovación en el sector público y mejorar la eficiencia en la prestación de servicios públicos, con el fin de responder a las siguientes preguntas de investigación:

RQ1: ¿Cómo están adoptando y utilizando las TIC las entidades del sector público para promover la transparencia, la participación y la colaboración?

RQ2: ¿Qué factores contextuales, organizativos e individuales influyen en la adopción y el rendimiento de las iniciativas de colaboración y co-producción?

RQ3: ¿Cómo responden los ciudadanos a las prácticas de colaboración y co-producción?

RQ4: ¿Cuál es el impacto de las prácticas de colaboración y co-producción en el sector público?

Esta Tesis se estructura en tres apartados, además de la introducción y las conclusiones finales. La primera sección abarca dos capítulos relacionados con el uso de herramientas digitales para facilitar la transparencia y la participación ciudadana (redes sociales y plataforma de e-participación). La segunda sección consta de un capítulo que trata las iniciativas de co-producción, concretamente de la participación de los usuarios en proyectos de innovación colaborativa en materia de salud digital. La tercera sección analiza la colaboración entre organizaciones públicas y privadas para la prestación de servicios públicos. A continuación pasamos a resumir el contenido de cada uno de los cuatro capítulos empíricos de la Tesis.

El primer capítulo analiza la adopción y el uso de las herramientas de la Web 2.0 y las redes sociales por parte de las instituciones de auditoría pública de Europa y Estados Unidos, a nivel central y regional. Estas instituciones, que tradicionalmente apenas se han relacionado con la ciudadanía y otros agentes sociales por su marcado carácter tecnocrático, están empezando a dar mayor importancia a la comunicación de su actividad con los grupos de interés y a la colaboración con otras instituciones de auditoría (Baimyrzaeva y Kose, 2014). Además, Organizaciones internacionales de instituciones de auditoría centrales, como INTOSAI o EUROSAI, recomiendan que la transparencia, la rendición de cuentas y una comunicación efectiva con los *stakeholders* sean principios básicos de su actividad. Las redes sociales pueden servir de apoyo a la estrategia de comunicación de las organizaciones, ayudando a ofrecer una imagen más completa de las mismas, a eliminar la dependencia de los medios de comunicación tradicionales y a involucrar a los grupos de interés en sus actividades (González-Díaz et al., 2013). La investigación recogida en este capítulo analiza los niveles de adopción de estas herramientas en 143 instituciones de auditoría pública en Europa y Estados Unidos, agrupa a estas instituciones en función de sus patrones de adopción y analiza la relación entre los niveles de adopción de estas herramientas y distintos factores contextuales y organizativos (estilo de administración pública, transparencia y corrupción percibida en la región, índices de adopción de internet y redes sociales, y desarrollo de los servicios electrónicos públicos). A continuación, se analizan los contenidos publicados por estas instituciones en Twitter, la herramienta más adoptada, y la respuesta por parte de los usuarios de esta red, a partir del número de seguidores. Los resultados de esta investigación muestran que más de la mitad de las instituciones de auditoría analizadas no utilizan ninguna red social o sólo utilizan herramientas de sindicación de contenidos (RSS) para mantener a los ciudadanos informados de las últimas novedades. Este resultado sugiere que las instituciones de auditoría no perciben grandes ventajas en la adopción de estas herramientas o creen que su uso entra en conflicto con sus patrones de actividad. En términos generales, las instituciones de auditoría a nivel central y del entorno angloamericano, nórdico y de la Europa del Este presentan mayores niveles de adopción. La presión institucional generada por las recomendaciones de INTOSAI y EUROSAI puede explicar los mayores niveles de adopción de las instituciones de auditoría centrales. Asimismo, la demanda de los ciudadanos (tamaño de la población y mayor uso de las redes sociales) está relacionada positivamente con mayores niveles de adopción. En cuanto al uso que están dando las instituciones de auditoría a las redes

sociales, los resultados de esta investigación muestran que prácticamente solo son utilizadas para transmitir información sobre la actividad que están llevando a cabo, principalmente sobre los informes de auditoría que elaboran. El seguimiento de las cuentas de Twitter de las instituciones de auditoría pública es muy variado. Las que tienen más seguidores son la *General Audit Office* de EEUU y la *National Audit Office* de Reino Unido. Sin embargo, los niveles de concienciación son bastante bajos: de media, solo 3 personas por cada 10.000 habitantes están siguiendo esas cuentas de Twitter.

El segundo capítulo es un caso de estudio de la iniciativa de e-participación del Ayuntamiento de Madrid: *Decide Madrid*, galardonada con un *Public Service Award* por la ONU en 2018. Frecuentemente se atribuyen múltiples beneficios a este tipo de plataformas, como la comunicación con un público más amplio, el aumento del conocimiento de los participantes sobre los asuntos públicos, la posibilidad de una participación más informada y profunda y la mejora de la calidad de las políticas públicas y de la confianza de los ciudadanos en las administraciones (OCDE, 2003). Sin embargo, los análisis empíricos demuestran que las iniciativas de e-participación normalmente no han conseguido todos estos beneficios (Bonsón et al., 2013; Brainard y Mcnutt, 2010; Criado y Rojas-Martín, 2016; Norris y Reddik, 2013; Royo, Yetano y Acerete, 2014). La mayor parte de investigaciones previas han analizado plataformas de e-participación que sólo permiten un tipo de actividad de participación o una participación ocasional. Sin embargo, este capítulo analiza una plataforma que permite una participación continua a través de múltiples métodos de participación. La investigación realizada tiene como objetivo identificar los factores clave de éxito y las principales barreras que determinan el rendimiento de la plataforma analizada. La iniciativa se analiza siguiendo un modelo analítico basado en cinco elementos principales: contexto, características de la iniciativa de e-participación, factores organizativos, factores individuales y evaluación de la iniciativa. Para realizar este caso de estudio se realizó una investigación documental (sobre la plataforma, documentos legales relevantes a nivel nacional y local, datos estadísticos de Eurostat, el Instituto Nacional de Estadística y el Centro de Investigaciones Sociológicas y otros informes de organismos internacionales) y se llevaron a cabo entrevistas con políticos, personal técnico y ciudadanos involucrados en *Decide Madrid*. La participación a través de la plataforma fue alta inicialmente y ha seguido una evolución desigual según la forma de participación, incrementándose en los presupuestos participativos y reduciéndose en el resto. Los resultados obtenidos muestran

que tres factores fueron especialmente relevantes para el desarrollo de iniciativa de e-participación: la implicación del Ayuntamiento con la participación ciudadana, el método de selección de personal y los conocimientos previos sobre TIC y participación ciudadana de los gestores senior de la plataforma. Por otra parte, las principales barreras fueron la falta de transparencia y comunicación con los ciudadanos sobre los efectos de su participación, el lento proceso de cambio organizacional y problemas relativos al funcionamiento de la plataforma, como la falta de moderación y preocupaciones de los ciudadanos sobre la seguridad de la plataforma.

En el tercer capítulo se analiza la participación de los usuarios en iniciativas de colaboración para el desarrollo de proyectos innovadores de salud digital con el objetivo de definir cuál debería ser su rol en este tipo de proyectos en aras a fomentar una colaboración realmente efectiva. La participación de los usuarios se estudia en el contexto de iniciativas de colaboración entre organizaciones públicas y privadas (por ejemplo, hospitales, asociaciones de pacientes, centros de salud, centros de investigación, empresas tecnológicas…) para el desarrollo de proyectos de innovación en el ámbito sanitario mediante el uso de las TIC. Basándose en modelos previos de participación de usuarios, su rol se evalúa y describe en tres dimensiones: la motivación para su participación, tipo de actividades que llevan a cabo y el apoyo prestado por parte de los agentes participantes en la iniciativa de colaboración para facilitar la participación de los usuarios. Los roles se han definido mediante la aplicación de la metodología Q con 24 enunciados (8 por cada dimensión) y una muestra de 44 usuarios individuales que participaron en 16 proyectos distintos pertenecientes a 5 países europeos (Bélgica, Dinamarca, Estonia, Países Bajos y España). Los usuarios son personal médico, de enfermería, de farmacia, de servicios sociales y técnicos del sector sanitario. La gama de proyectos de salud digital en los que participan los usuarios es muy amplia y cubre tanto innovaciones de proceso como de producto mediante el uso de sistemas de rastreo, *wearables, apps*, inteligencia artificial y *big data*, entre otros. Como resultado se obtienen dos discursos sobre el rol de los usuarios en estos proyectos. Ambos discursos abogan por una participación activa de los usuarios, pero con distintos niveles de implicación. Algunos usuarios defienden que su rol en los proyectos colaborativos de innovación en salud digital debe ser el de asesores, participando tanto en el diseño como en el desarrollo de la innovación, pero con menor responsabilidad y actividad que los socios principales o entidades participantes. Como asesores, estos usuarios creen que deben centrarse en asegurar que la innovación está

orientada al usuario e informar sobre sus preferencias. Por otro lado, otros usuarios de la muestra creen que deben participar como co-creadores, participando de forma similar al resto de socios del proyecto, estando involucrados desde diseño del proyecto y tomando las decisiones conjuntamente con los socios. Estos usuarios creen que esta es la única forma de conseguir una innovación relevante. En ambos grupos de usuarios, la razón por la que creen que deben ser incluidos en los procesos de innovación es porque poseen una perspectiva distinta a la del resto de los socios. Para conseguir una participación efectiva, los usuarios creen que el proyecto debe asegurar la transparencia y mostrarles cómo funcionaría la innovación en la realidad.

El cuarto capítulo analiza el impacto de las prácticas colaborativas en la eficiencia de la prestación de servicios públicos. En concreto, esta investigación se centra en el análisis de la eficiencia de los municipios españoles en la gestión del servicio de recogida de residuos sólidos urbanos, un servicio que deben prestar todos los municipios y uno de los que más recursos requiere. En las últimas décadas, varios países de la OCDE se han embarcado en procesos de fusión de municipios (por ejemplo, en Australia y Reino Unido) o en iniciativas de colaboración entre municipios para la prestación de servicios públicos específicos. El objetivo de estas iniciativas es lograr una dimensión más eficiente para la prestación de los servicios públicos. La metodología aplicada en este trabajo para obtener la eficiencia en la prestación del servicio por parte de los municipios es el Análisis Envolvente de Datos (DEA), utilizando como *input* el coste total del servicio y como *outputs* las toneladas de residuos recogidos, el número de contenedores utilizados y la frecuencia en la recogida de los residuos. Se analiza bajo qué rendimientos a escala producen los municipios, considerando tres submuestras según el tamaño de los municipios, para los años 2014 y 2018. A continuación, se realiza el desglose de la *eficiencia técnica global* en *eficiencia técnica pura* y *eficiencia en escala* en 2018. Sobre los resultados obtenidos se analizan el efecto del tamaño de la población, la ideología del partido político gobernante, los cambios en el marco legal de la prestación del servicio y la forma en la que se presta el servicio (individualmente, mediante una colaboración con otras entidades públicas o colaborando con entidades privadas). Los resultados obtenidos muestran que existe una relación entre los niveles de eficiencia y el tamaño del municipio, siendo los que mayor eficiencia en escala presentan los municipios de tamaño medio (entre 5.000 y 20.000 habitantes). En 2018, la mitad de los municipios pequeños (menos de 5.000 habitantes) producen por encima de la escala óptima y un tercio de ellos produce

por debajo de la misma. En cuanto a los municipios más grandes (más de 20.000 habitantes), más de la mitad producen por encima de la escala eficiente. Entre 2014 y 2018 aumentó el porcentaje de municipios que prestaban el servicio en la escala eficiente, lo que indica un efecto positivo del cambio del marco legal que favorece la colaboración entre municipios. Aquellos municipios pequeños y grandes que prestan el servicio en colaboración obtienen una mayor eficiencia en escala, no observándose diferencias significativas para los municipios medianos.

Conclusiones

En esta Tesis se han analizado cuatro iniciativas diferentes de colaboración y co-producción en el sector público con el fin de medir su grado de adopción, comprobar la consecución de los beneficios teóricos esperados y señalar áreas de mejora.

En cuanto a la adopción y el uso de las TIC para promover la transparencia y la colaboración, esta Tesis muestra que existe una adopción asimétrica de estas herramientas por parte de las instituciones del sector público, causada por factores contextuales (como los estilos de administración pública, el número de habitantes, los índices de adopción de redes sociales o la influencia de las organizaciones supranacionales). El primer capítulo de esta Tesis muestra que las instituciones de auditoría pública se encuentran en una fase inicial de adopción de las redes sociales y que las utilizan principalmente para aumentar su legitimidad a través de la transparencia, sin buscar la interacción con los ciudadanos. Otras instituciones, como los ayuntamientos (Agostino, 2013; Bonsón, Royo, y Ratkai, 2015, 2017; ONU, 2021, p. 98) muestran más voluntad de acercarse a un gobierno abierto y están adoptando plataformas de e-participación para interactuar con los ciudadanos. De hecho, la plataforma municipal analizada en el segundo capítulo es utilizada por el Ayuntamiento de Madrid para la comunicación bidireccional con los ciudadanos y algunas actividades permiten un alto grado de influencia de los ciudadanos en los procesos de toma de decisiones. Sin embargo, hay margen de mejora en cuanto a la rendición de cuentas y la coordinación de la participación *online* y *offline* en esta iniciativa.

El rendimiento de las iniciativas de co-producción y colaboración se ve afectado por varios factores contextuales, organizativos e individuales. En la plataforma de e-participación analizada en el segundo capítulo, los factores organizativos e individuales (como la coordinación interna y el liderazgo y apoyo a nivel político) desempeñaron un papel crucial en su rendimiento. Además, el contexto de demanda por parte de los

ciudadanos de una participación más directa impulsó los niveles iniciales de participación en la plataforma. Las principales barreras para el éxito de esta plataforma fueron organizativas, la lentitud del cambio organizativo y la falta de transparencia y comunicación con los usuarios. De hecho, en el análisis de la participación de los usuarios en el tercer capítulo, la transparencia y la comunicación se muestran como requisitos esenciales para el éxito de la colaboración. En cuanto a las iniciativas de colaboración analizadas en el cuarto capítulo (con otras entidades públicas o con entidades privadas), su adopción y rendimiento se vieron influenciados por factores contextuales, el tamaño de la población y el marco legal.

La respuesta de los ciudadanos y usuarios a estas iniciativas difiere según la estrategia de las instituciones. La mayoría de las instituciones de auditoría analizadas en el primer capítulo se limitaron a difundir información sobre su actividad y obtuvieron bajos niveles de seguimiento e interacción. El análisis del tercer capítulo muestra que los usuarios quieren tener un papel más activo en los proyectos de innovación colaborativa. Piensan que deberían participar de igual a igual o, al menos, como asesores con capacidad de influir en la definición de los objetivos y en los procesos de toma de decisiones. La plataforma analizada en el segundo capítulo ofrece a los ciudadanos y otros grupos de interés diferentes formas de participación y éstos han respondido con altos niveles de participación en aquellas actividades destinadas a dar más poder de decisión a los ciudadanos (presupuestos participativos). Los menores niveles de participación en otras opciones participativas revelan la necesidad de responder a las opiniones de los ciudadanos para mantener su motivación y confianza.

En general, el impacto de las iniciativas de co-producción y colaboración estudiadas muestra que no parecen haber alcanzado todo su potencial. En cuanto a las iniciativas basadas en el uso de las TIC, el análisis del primer capítulo muestra que el impacto de las redes sociales se ha centrado en la mejora de la transparencia. Un cambio en la estrategia de las instituciones de auditoría hacia la comunicación bidireccional podría mejorar la participación de los usuarios. La plataforma de e-participación analizada en el segundo capítulo ha aumentado el conocimiento de los ciudadanos sobre los procesos políticos, y la participación ciudadana a través de la misma tuvo una influencia significativa en la actividad del Ayuntamiento. No obstante, de los dos primeros capítulos se deriva que el efecto de la introducción de las TIC en la transformación de la cultura organizativa, hacia una cultura más abierta y participativa, es lento. En cuanto a la participación de los

usuarios en los proyectos de innovación colaborativa en salud digital, algunos de ellos piensan que su colaboración es la única forma de obtener una innovación importante y todos ellos piensan que su aportación es necesaria por las diferentes perspectivas que aportan al proyecto. Por último, la colaboración entre organizaciones públicas y público-privadas en la prestación de servicios públicos mejora la eficiencia en escala en municipios pequeños y grandes.

Las iniciativas tratadas en esta Tesis muestran diferentes formas en que las instituciones del sector público están realizando iniciativas de colaboración y co-producción y sus resultados. Investigaciones futuras deberían abarcar otros tipos de iniciativas de colaboración y co-producción y extenderse a otras instituciones y regiones, ya que los factores más importantes para la adopción y los resultados de estas iniciativas fueron contextuales y organizacionales.

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