

# Digitalization, accounting and accountability: A literature review and reflections on future research in public services

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## Abstract

This study discusses the current state of the art and future directions of research on digitalization, accountability, and accounting in public services. Through a systematic literature review, we investigate 232 articles published between 1998 and the first quarter of 2020. These studies are analyzed looking at the implications of the increasing digitalization of the public realm for the (i) production of data, (ii) consumption of data, and (iii) their subsequent effects. Based upon this analysis, we identify the following emerging critical digital accountability issues and related future research avenues: the potential for dialogic and horizontal, multicentric accountability; the blurring of accountability roles and boundaries; the increasing relevance of translation processes and translators' roles—and the need to ensure accountability in such translations; the need to pay stronger attention to social equity and inclusivity implications of digitalization.

## KEYWORDS

accountability, digital technology, digitalization, e-government, public sector accounting

The authors are listed alphabetically.

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## 1 | INTRODUCTION

Digital technologies, from websites and social media to clouds, sensors, artificial intelligence and connected devices, have resulted in “datafication” (Redden, 2018) of our society, which has attracted increasing scholarly attention. Governments have not been immune to the digital wave and, at different levels and with different intensities, are resorting to the use of digital technologies, social media, algorithms, and artificial intelligence to innovate public services and explore new forms of interactions with citizens (Alathur et al., 2012; Charalabidis & Loukis, 2012; Munteanu & Newcomer, 2020). Digitalization in the public sector has been heralded as a way not only to improve services but also to allow wider availability, richness of, and access to, data, and better interactions with other actors. All these features are expected to strengthen decision-making, transparency, accountability and relationships with citizens (Ramirez & Tejada, 2019; Royo et al., 2019; Vydra & Klievink, 2019).

Over the last few decades, knowledge has been accumulated on how digitalization has evolved in the public sector, pointing, among other things, to relevant implications for the production and dissemination of new types of data and information, their use and their possible consequences (e.g., Myeong & Choi, 2010; Rogge, 2017; Ruijter et al., 2020). These evolutions have important potential reverberations on accountability (e.g., Bertot et al., 2012; Cerrillo I Martínez, 2019; Pina et al., 2007; Petrakaki, 2018; Wong & Welch, 2004). Despite the fact that issues related to digital data production, use and related accountability for public services bear a clear relevance for accounting scholarship, a scoping review suggests that many of the contributions in this area of knowledge have developed outside accounting scholarship: only 11 papers have been published in accounting journals on the issues of digitalization, accounting, and accountability in the public sector.

This is in stark contrast with the stronger attention devoted to the relationship between digital technologies and accounting in the private sector (our scoping review found 94 papers on digitalization published in accounting journals). These range from studies on the use of big data, social media, and digital platforms to predict financial or market performance, risks, financial failures, and frauds (e.g., Lee et al., 2019; Yi & Stuart, 2018), explorations on the use of new technologies to support auditing and accounting (e.g., Leoni & Parker, 2019; Schmitz & Leoni, 2019) and investigations of how new technologies and media can provide new forms of dialogic accountability with stakeholders (She & Michelon, 2019) and shape accounting expertise (Moll & Yigitbasioglu, 2019; Viale et al., 2017). Extant reviews and literature on digitalization and accounting in the private sector highlight that digitalization is redefining accountability relationships and, with the increasing use of non-transactional data, blurring the boundaries of accounting. More specifically, it is affecting the roles and power of accountants and shifting them toward more hybrid professional identities (Knudsen, 2020; Arnaboldi et al., 2017). As a consequence, concerns have arisen about human judgement, as applied to traditional accounting data, being replaced by machine-driven and automated decisions (Quattrone, 2016) based on less controllable, externally generated data (Knudsen, 2020).

In the public sector, performance and accountability are, by definition, multifaceted (Bovens et al., 2014; Sinclair, 1995). This requires the consideration and balancing of plural interests that reflect the coexistence of multiple rationalities (Schedler, 2003). Given that accounting has been traditionally conceived of as a means of upholding the principles of democracy, representation, and equity—and not only efficiency, effectiveness, and economy—the implications of digitalization for accountability and accounting may be even more wide-ranging and significant. These implications could bear consequences not only for public managers, politicians, policymakers and accountants but also for citizens and the democratic functioning of our societies.

The above considerations point to a dearth of accounting scholarship investigating public service digitalization's relevance to, and potential implications for, public sector accountability, accounting, and accountants. In light of this, and of our desire to encourage new research endeavors in this area, this paper reviews previous studies on public service digitalization with a focus on the implications for accounting and accountability, in order to reflect on the current state of affairs and identify possible future directions for research. Different from previous reviews, which tend to focus on specific journals and disciplines, we embrace a multidisciplinary perspective. This is warranted in

light of the complexity of the issues at stake; that is, the increasing blurring of the boundaries of accounting and the sites involved in the production and use of data. This review enables us to capture the depth and breadth of relevant contributions.

To achieve these objectives, a systematic review of the current research on digital technologies, accounting and accountability has been performed by collecting peer-reviewed papers from the Scopus and WoS databases, with the final analysis focusing on 232 papers. The study first captures the main features of the extant literature, in terms of publications per year and publication outlets, geographical area, and the methods and theoretical frameworks of the studies, as well as the main technologies covered. It then identifies the main emerging themes and possible future avenues for research in three main areas, which are central in most papers: the production of data and information, the use and consumption of these data, and their effects. Finally, it summarizes the critical issues in accountability concerning digitalization in the public sector. These critical issues relate to (i) the challenges connected to *horizontal*, decentralized, pluralistic, user-generated, multimodal, and *dialogic* forms of accountability; (ii) the need to pay more attention to the *quality and reliability of data*, and especially to the *accountability of the “translators” of data and information and of the relevant “translation”* processes through which data are selected, analyzed, and communicated via both human actors and technological actants; and (iii) the emergence of the *blurring of accountabilities*, in terms of who is accountable for what and the connected implications for social equity.

The reminder of this paper is structured as follows. In the second section, an overview of the methodological approach for the literature review is provided. In the third section, a descriptive analysis of the collected papers is presented. In the fourth section, the findings from the literature review, the main issues arising from digitalization for accounting and accountability, and the emerging avenues for research are critically discussed. Finally, concluding reflections are advanced.

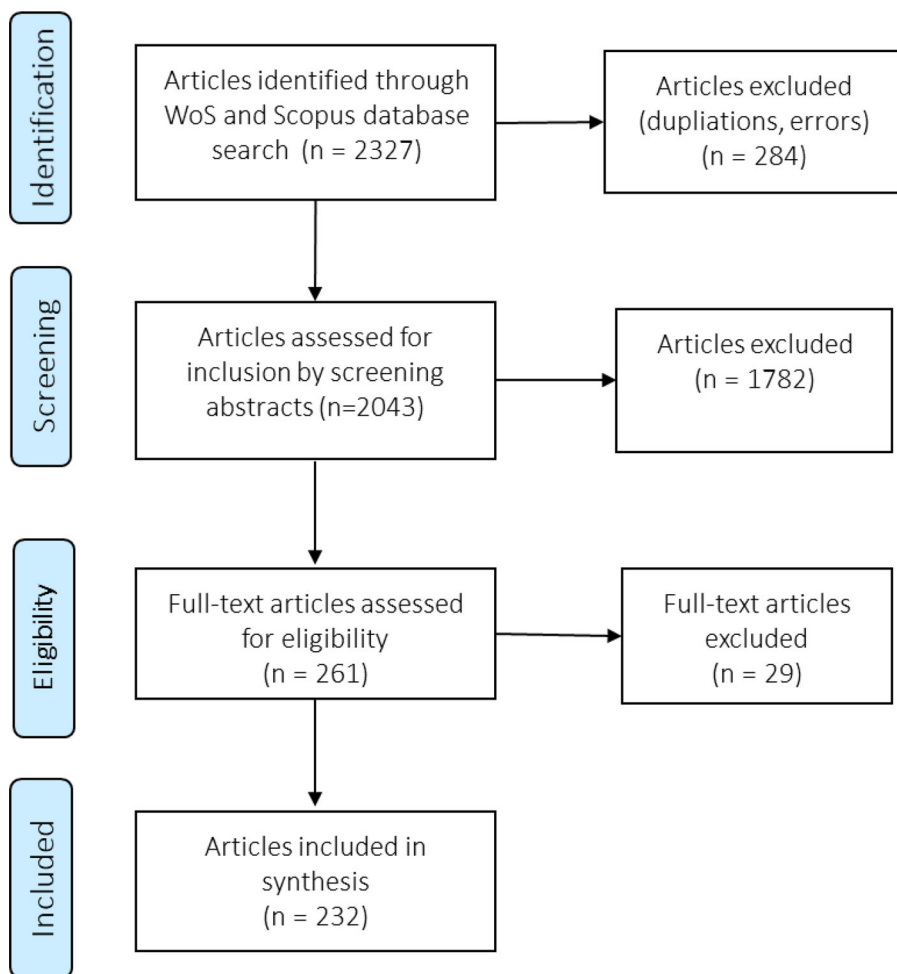
## 2 | METHODS

To identify the current body of knowledge on the implications of digitalization for accounting and accountability in the public service context, we performed a systematic literature review. To ensure coverage of a broad range of journals, both WoS and Scopus were used in our search. Only peer-reviewed articles published in journals were considered; conference proceedings, books, and book chapters were excluded<sup>1</sup> so as to consider only validated knowledge for our review (Podsakoff et al., 2005).

Keywords were identified that cover the three main dimensions of analysis of this review concurrently (public sector, digitalization, and accounting and accountability). Along these lines, the following keywords were specifically combined using the Boolean operator “AND.” The digitalization dimension was covered by the following keywords: “social media” OR “big data” OR “digital” OR “e-government” OR “blockchain” OR “machine learning” OR “artificial intelligence” OR “open data” OR “IoT” OR “open government.” The following keywords addressed the accounting dimension: “accounting” OR “accountability” OR “reporting” OR “measurement” OR “performance” OR “decision” OR “audit.” The public sector dimension was searched using “public sector” OR “public services” OR “public administration” OR “public organizations” OR “government.” These keywords were searched in “abstract-title and keywords.” We did not set a time period for selecting contributions, thus allowing for articles published at any time to be searched.

The study’s selection process is presented in the PRISMA flow chart diagram (2009) in Figure 1.

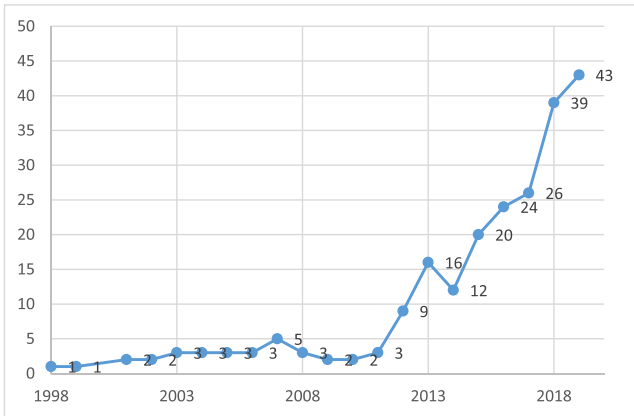
This initial query resulted in 2,327 articles. This initial list of articles was cleaned of errors, such as double-entry articles (284). After an initial process of alignment, whereby the first 37 papers were screened by all three authors, each paper’s abstract was subsequently screened by at least two of the three authors and possible divergences and doubts were discussed by the three authors to increase the robustness of the selection. The 2,043 papers were thus classified into five categories: (i) papers at the intersection between the three dimensions (inclusion criteria) of the literature review; (ii) papers that only covered one of the three dimensions; (iii) papers that intersected with the digital



**FIGURE 1** PRISMA flow diagram for literature review process, adapted from <http://www.prisma-statement.org/> [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

and accounting topics but not the public sector issues; (iv) papers at the intersection of the other two dimensions (i.e., the digital and public sector but not accounting); and (v) papers at the intersection between the public sector and accounting but not digitalization. After the completion of this process, the 261 articles at the intersection between the three dimensions were the subject of detailed review.

The next step consisted of reading the papers and summarizing and classifying them using the following criteria: author(s), year of publication, journal title, publication title, the type of journal, country, methodological approach (i.e., qualitative vs. quantitative, conceptual, or literature review), keywords, emerging themes, type of literature or theoretical framework utilized, type of digital technology investigated, type of (digital) data and type of users (when specified). During this detailed analysis of papers, 29 further articles were excluded, as a full reading of these papers revealed that they did not meet the initial requirements; that is, they did not cover all the three relevant dimensions of our analysis (digitalization, public sector and accounting/accountability). Finally, 232 articles were left to be used in the analysis and for identifying emerging themes, transversal to the papers, their implications for accountability and reflecting on possible future research avenues.



**FIGURE 2** Number of papers published per year [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

### 3 | PUBLIC SECTOR DIGITALIZATION, ACCOUNTING AND ACCOUNTABILITY: AN OVERVIEW OF THE LITERATURE

This section provides an overview of the papers selected for the systematic review, in terms of developments in the research area, publication outlet, geographical area, methodological approach, theoretical framework, and the type of digital data and technologies under analysis.

The articles included in the literature review were published across 22 years (Figure 2), with Chandler's (1998) paper on government websites being the first. Out of the 232 studies, 14% were published before 2011, after which the number of publications rapidly increased. The majority of studies (65%) have been published during the last five years.

With the exception of *Government Information Quarterly*, which attracts 16% of the papers, the 232 papers reviewed are distributed in numerous *publication outlets*, most of which are in the public administration area (113 different journals, see Table 1). Interestingly, only 11 are published in accounting journals, with five published in *Journal of Emerging Technologies in Accounting*.

The *country* context is not relevant in 34 out of the 232 papers (Table 2). Most of the others are set in the United States (26%). Fifteen percent of the papers adopt a European or international comparison (e.g., Chen, 2012; Gulati et al., 2014; Harrison & Sayogo, 2014; Kubler et al., 2018; Michener & Ritter, 2017; Zuiderwijk et al., 2019). Emerging countries, initially less investigated, have recently increasingly become a setting in which to explore open government initiatives (e.g., Arsalan & Widyatama, 2020; Hermanto et al., 2018) and citizens' perceptions of the transparency, accountability, and empowerment offered by government websites (Hossain et al., 2018).

The studies analyzed adopted both *quantitative and qualitative methodologies*, with each methodological approach attracting approximately 39% of papers (Figure 3). Qualitative papers were mostly based on single or multiple case studies, while quantitative papers mostly relied on surveys (25) or website content analysis (13). In more recent years, text mining approaches have been deployed, with some papers (5) looking at machine learning and predictive techniques.

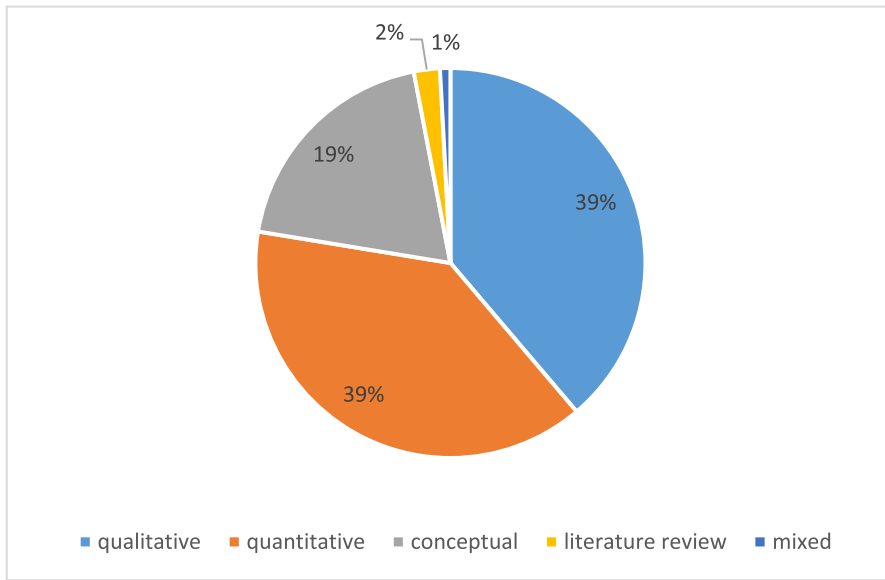
Only a very limited number of the papers under analysis relied on a well-established *theoretical framework*, with agency theory (Carbaca Garcia & Garcia Garcia, 2008; Errichetti & Roohani, 2018), institutional theory (Pina et al., 2010; Torres et al., 2020), the resource-based view (Kim & Eom, 2019), and stakeholder theory (Rien Agustin & Susilowati, 2019) being utilized by very few papers. The remaining papers in our review provided an elaboration and synthesis of the current state of the art with regard to the main themes in the digitalization literature (Table 3). These include the transparency (e.g., Araújo et al., 2016; Bertot et al., 2012), e-government (e.g., Kubler et al., 2018; Lee et al., 2019; Rodriguez Bólivar et al., 2007), social media (Bridges et al., 2012; Jia et al., 2019; Stamati et al., 2015), and big data literature (e.g., Anshari & Lim, 2017; Kowalski et al., 2019; Mergel, 2016).

**TABLE 1** Number of papers by journal

Journal name	N papers	%
Government Information Quarterly	36	16
Transforming Government: People, Process and Policy	9	4
American Review of Public Administration	8	3
Information Polity	8	3
International Journal of Public Administration	8	3
Public Performance and Management Review	8	3
Public Administration	7	3
International Review of Administrative Sciences	6	3
Canadian Public Administration	5	2
Journal of Emerging Technologies in Accounting	5	2
Public Administration Review	5	2
Public Policy and Administration	5	2
Big Data and Society	3	1
International Journal of Electronic Government Research	3	1
Policy and Internet	3	1
Politics and Governance	3	1
Transylvanian Review of Administrative Sciences	3	1
Journal outlets with 1 or 2 publication on the topic	107	46
<b>Total</b>	<b>232</b>	<b>100</b>

**TABLE 2** Number of papers by geographical area

Geographical area	%	No. papers
US	26	61
Asian countries	14	32
Southern Europe	15	35
International	10	23
Central Europe	7	17
Latin America	6	15
Europe	5	12
UK	5	11
Canada	4	9
Emerging countries	3	6
Africa	2	4
Northern Europe	2	4
Australia	1	3
<b>Total</b>	<b>100</b>	<b>232</b>



**FIGURE 3** Proportion of the methodology used [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

The *digital data and technologies* discussed in the papers have evolved over the years. The earliest papers focused on the information provided on governments' websites (e.g., Chandler, 1998). Their levels of transparency have attracted steady and enduring attention from scholars in terms of their features and drivers (e.g., Akgül, 2019; Henman & Graham, 2018; Porumbescu, 2016; Wong & Welch, 2004; Yavuz & Welch, 2014), and their implications for public participation and engagement (Bridges et al., 2012; Harris et al., 2011; Porumbescu et al., 2020). A specific category of papers focused on online reports (27), with studies investigating the drivers of the adoption and diffusion of these reports (e.g., Caba Perez et al., 2014; Pina et al., 2010; Rodriguez Bolívar et al., 2007, 2015; Serrano-Cinca et al., 2009) and their impacts on government–citizen relationships (Harris et al., 2011) or citizens' preferences (Cohen et al., 2017).

A considerable number of studies focused on open government data (50), with these papers assessing the “maturity level” of open government data (portals) (Alzamil & Vasarhelyi, 2019; Park & Oh, 2017; Wen & Hwang, 2019). More recent papers have taken a more critical stance and empirically investigated data disclosure strategies (e.g., Ruijter et al., 2020), as well as the challenges associated with the (re)use of open government data in various public service contexts (e.g., Marjanovic & Cecez-Kecmanovic, 2017; Quinn et al., 2019). These have discussed their impacts on value creation, transparency, accountability, and citizen engagement (e.g., Birchall, 2015; Boudreau, 2020; Garcia, 2019; Zuiderwijk et al., 2019).

Starting in 2012, the number of papers examining social media and digital platforms has steadily increased (40). These explore the level of social media adoption and its use by governments and citizens (Agostino & Arnaboldi, 2017; Guillamón et al., 2016; Torres et al., 2020) and the impact of social media use on transparency, corruption, trust, and accountability (Jia et al., 2019; Porumbescu, 2017; Song & Lee, 2016; Stamati et al., 2015).

In recent years, big data have started to dominate the academic debate, with 29 papers discussing the design, use, and opportunities and benefits connected with big data adoption. These papers generally do not address a specific digital technology but consider more broadly the possibility of mining and analyzing the data generated by both users and governments (e.g., Ingrams, 2019; Ju et al., 2018; Lecy & Thornton, 2016; Trish, 2018).

Finally, although Barth and Arnold (1999) and Saunders-Newton and Scott (2001) were the first to conceptually discuss the implications of artificial intelligence for public administration in terms of responsiveness, judgement, and accountability, the topics of artificial intelligence and algorithms have come to dominate the recent debate, with

**TABLE 3** Number of papers by literature and framework

Reference literature and framework	No.	%
Transparency	33	14.2
e-government	29	12.5
Accountability	25	10.8
Big data and social media	24	10.3
Open government and open data	38	16.4
Information and knowledge management	15	6.5
Public engagement and participation	14	6.0
Policy cycle and analysis	5	2.2
Predictive analytics	4	1.7
Institutional theory	3	1.3
Agency theory	2	0.9
Habermas	1	0.4
Performativity of data (sociology of numbers)	1	0.4
Resource-based theory	1	0.4
Stakeholder theory	1	0.4
Other	36	15.5
<b>Total</b>	<b>232</b>	<b>100</b>

studies on predictive analytics, predictive policies, and automated decision-making on the rise (e.g., Asaro, 2019; Benbouzid, 2019; Trish, 2018).

#### 4 | PUBLIC SECTOR DIGITALIZATION AND ITS IMPLICATIONS FOR ACCOUNTING AND ACCOUNTABILITY: EMERGING ISSUES AND NEW RESEARCH AVENUES

Our review of the literature suggests that digitalization has important implications for accounting and accountability in three main areas: the production of data and information, the consumption of these data, and their effects. These areas are analyzed in the following subsections. In each subsection, a table provides detailed information on the emerging, distinctive features of data production, consumption and effects, their implications for accounting and accountability, and the most relevant papers exemplifying such issues. It is worth noticing that this distinction is made for analytical purposes; however, as pointed out throughout this paper, digitalization has resulted in an increasing overlap between the production and consumption of data and, as we will point out, there is an increasing need to account for what happens during “translation” processes.

##### 4.1 | Production of data and information

Several of the papers included in our review have suggested that digitalization has brought about important changes in terms of the availability of new information and the way data and information are produced. It is possible to classify the distinctive features of the “production” of digital data and information along the following dimensions: who is



**TABLE 4** Key issues about data production and implications for accounting and accountability

Distinctive features of data production	Sample papers	Implications for accounting and accountability
<ul style="list-style-type: none"> <li>Who: multiple data producers (self-made approach)</li> <li>What: heterogeneous data sets</li> <li>When: real-time data production</li> <li>Where: government, citizens and third parties' sources</li> <li>How (translation): technical view on best algorithms and analytics techniques</li> </ul>	<ul style="list-style-type: none"> <li>Asaro, 2019</li> <li>Basilio et al., 2019</li> <li>Currie, 2020</li> <li>Choi, 2017</li> <li>Dai &amp; Li, 2016</li> <li>Driss et al., 2019</li> <li>Georgiadou et al., 2020</li> <li>Lourenço, 2013</li> <li>Ma et al., 2016</li> <li>Quinn et al., 2019</li> <li>Rodriguez Bolivar et al., 2006</li> <li>Tunney &amp; Thomas, 2015</li> </ul>	<ul style="list-style-type: none"> <li>Horizontal heterarchical and coproduced accountability</li> <li>Accountability in the process of translation of data: role of accountants and accounting standards</li> </ul>

generating data, *the type of data produced (what)*, *when and where* data are generated, and, finally, *how* data are analyzed and translated for users (Table 4).

The possibility for users to provide their own comments and perspectives on digital platforms has caused a shift in *who* produces information, with the move from centralized, hierarchical, and internal data production by governments to a more decentralized and horizontal model, relying, for example, on shared platforms where users and citizens become active generators of data. In addition, *where* data are produced has undergone important changes, with data production happening virtually everywhere as data sources move beyond internal and certified government databases toward also including digital and connected devices, such as online fora, social media, open government portals, and city sensors.

In the digital environment, the *type of data (what)* produced has moved gradually from traditional, financial, and non-financial transactional data generated by professionals to textual and visual data that is at times generated (and coproduced) by the same users (Driss et al., 2019).

Another distinctive element of the production of digital data concerns *when* data are produced (or to which time they refer to), as public sector organizations have moved from the collection of past data to real-time data generation (such as in the case of social media interactions between the providers and users of public services, which has become particularly evident in the case of emergencies and disasters).

In terms of the *analysis and translation* of data by producers for users (*how*), several papers adopt a technical focus to discuss the more appropriate techniques for framing, filtering (e.g., text mining or opinion mining) and reporting big data; these are first developed and then tested in different empirical settings (e.g., Kum et al., 2015; Xu et al., 2017). These analytical techniques are typically aimed at identifying either new discussion topics (text mining) or the sentiment of the discussion (opinion mining) (e.g., Basilio et al., 2019; Hand & Ching, 2020). Along similar lines, a more recent area of study is predictive analytics (Asaro, 2019; Benbouzid, 2019; Trish, 2018), which aims at forecasting future events or citizens' behaviors, thus providing a basis to guide policymaking and managerial decision-making (Maciejewski, 2016). Interestingly, these evolutions parallel similar developments in the financial market literature (e.g., Lee et al., 2019; Yi & Stuart, 2018), in which the subject of forecasting has become markets and investors. The position of authority borne by governments when using algorithms and predictions (such in the case of policing, immigration policies, or in schools), and the need to balance and prioritize potentially conflicting public values (such as efficiency, safety, privacy, social equity, and fairness), make this issue particularly salient in the public realm.

These distinctive features of data production in the digital era have important implications for accounting and accountability. First, the described evolutions have translated into the emergence (or the need for) new forms of *horizontal, heterarchical, and coproduced accountability*, in which traditional, monodirectional, or hierarchical forms of

accountability are replaced by peer relationships where multiple parties hold each other accountable thanks to the possibility of real-time and self-made, and even collaborative, approaches to data production, collection, analysis, and interpretation (e.g., Bertot et al., 2012; Hilbert et al., 2009; Pina et al., 2007). Interestingly, in the private sector literature, a few studies have looked at the role of calculative practices in facilitating heterarchical controls and, more generally, the proper functioning of digital platforms (Begkos & Antonopoulou, 2020; Jeacle & Carter, 2011; Kornberger et al., 2017; Scott & Orlikowski, 2012) by identifying to how they can contribute to disclosing and shaping new worlds and identities. In the public sector, these new forms of accountability have also come with promises of empowering marginalized voices and users, and providing them with easier access to services and information and easier ways (e.g., social media platforms) of holding governments accountable. However, this raises further salient questions in terms of representativeness and inclusiveness, and whether digitalization may actually create new forms of exclusion and thus un-accountability toward certain categories of users and citizens.

Second, all the above developments also have important implications for *data quality assurance*. The multicentric, real-time production of data poses important challenges in terms of the veracity, reliability, and quality of data, and with regard to who should be responsible for ensuring that these challenges are addressed (Birchall, 2015; Halachmi & Greiling, 2013). Digital accountability requires public managers and policy makers to recognize the increasing relevance of new sources of data and their pluralism but also the inherent risks of losing control over their quality (besides their use) when they are heterarchically generated. As such, “data quality assurance” accountability takes on new nuances in the digitalized world, and it may need to similarly take on different, shared and diffused coproduced forms, such as in the case of *sousveillance* and armchair auditors. Data quality, which in the private sector literature is seen as being central for the proper functioning of markets, acquires new nuances in the public realm, as it provides the basis for citizens’ trust in governments and the elements for decisions, prioritizations, and negotiations around policies, as well as the elements for assessing government performance. Whenever official data are replaced by heterogeneous, self-made data, reassuring users about their reliability may require an exercise in accountability in and of itself.

The third implication is linked to the accounting and accountability implications related to *accountability in the processes of translation of data*, i.e., the processes through which data are selected, analyzed, and elaborated, thereby making them available to the final users. This has been considered mainly in terms of the technical tools and algorithms used to mine and analyze data. However, there are many more issues that must be addressed. Translation also refers to the very process of the selection, elaboration, and subsequent presentation of data. In addition, there is the question of who should be responsible for it (for example, should accountants be central in this process, or could anyone now be in the position to do this?) and of which ethical, deontological, or reporting standards should be followed (Kellog et al., 2020; Kolman, 2020). Typically, this was the role of accountants, who, in addition to having the “technical” (accounting) knowledge, are also bound by the deontological and ethical standards that come from their belonging to a profession. The advent of digital technologies has, however, brought about a power shift from accountants to experts in IT, social media, algorithms and artificial intelligence, among others, who often have backgrounds in maths or information systems. This reflects the shift from more traditional data, with predefined rules and standards for bookkeeping, toward unstructured, textual, and (often) user-generated data that are not associated with the rules and standards for data collection, recording and translation (see Lourenço, 2013). As IT experts are increasingly the ones who set in place new digital technologies, they increasingly have the potential to shape how the resulting data and information are elaborated, framed, interpreted, and presented to users.

The above issues all point to several open questions that can be addressed by scholars interested in the accountability issues raised by digitalization. What are the implications of horizontal, multicentric forms of accountability for citizens and accountants, and what are their implications for inclusion and representation in the public sector? What are the implications of the new sources and types of data and information for the building of trust in governments and in decisions, especially when prioritizing among different needs and public values? What is the role of accountants and their expertise in the process of data production? What are the roles of accountants in the communication of data to the general public and in ensuring the transparency and reliability of the information provided? What is the relationship between accountants, data scientists, and IT experts in the process of data extraction, data cleaning, and data

**TABLE 5** Key issues about consumption and use of information and implications for accounting and accountability

Distinctive features of data consumption	Sample papers	Implications for accounting and accountability
<ul style="list-style-type: none"> <li>• Different users: citizens, intermediaries, governments</li> <li>• Different use: from information provision and decision-making to engagement and empowerment but also surveillance</li> <li>• Drivers, barriers, and obstacles of use</li> </ul>	<ul style="list-style-type: none"> <li>• Anshari &amp; Lim, 2017</li> <li>• Birchall, 2015</li> <li>• Boudreau, 2020</li> <li>• Currie, 2020</li> <li>• Hand and Ching, 2020</li> <li>• Harris et al., 2011</li> <li>• Kum et al., 2015</li> <li>• Levine et al., 2017</li> <li>• Machova et al., 2018</li> <li>• Ruijter et al., 2020</li> <li>• Worthy, 2015</li> </ul>	<ul style="list-style-type: none"> <li>• Dialogic forms of accountability</li> <li>• Blurring of accountabilities</li> </ul>

visualization? How can accountants facilitate the combination and coexistence of external heterogeneous data with the more traditional data produced internally by governments? What are the possible roles of accounting or other standards in supporting the translation of digital data from production to use?

## 4.2 | Consumption and use of information

Several papers in our review offer interesting perspectives on the potentially different uses of digital data and technologies (Table 5) either from the perspective of internal users, i.e., governments, public managers, and politicians (e.g., Anshari & Lim, 2017; Kum et al., 2015; Levine et al., 2017), or external users, i.e., citizens or society at large (e.g., Boudreau, 2020).

Citizens are mainly referred to as the (potential) users of online reports, open government data, interactive data dashboards and maps, social media platforms, or evaluative infrastructures (Vanhommerig & Karré, 2014). This allows them not only to monitor, evaluate, or (publicly) scrutinize and criticize the conduct of public authorities but also to collaborate in service delivery and engage in decision-making. Thanks to technological developments, the role of citizens has increasingly shifted from them being passive consumers of static online reports to taking on more active roles, i.e., by (co-)producing or engaging with data and taking part in the planning, delivery, and oversight of services and policies (see Boudreau, 2020).

Running counter to these enthusiastic views on the potential of digitalization, several studies have pointed to the potential difficulties that citizens face in relation to locating and understanding the available information (e.g., Harris et al., 2011; Machova et al., 2018; Sie & Jeng, 2019) and as a result of the poor quality of data, missing relevance of data, and strategic release of data (see Tunney & Thomas, 2015). This may be further exacerbated by open government initiatives and the increasing availability of big data, which require specific skills and statistical knowledge to analyze and transform them into intelligible information (Worthy, 2015). Interestingly, governments have been shown to resist some digital transparency initiatives, not only as a result of issues related to their limitations, utility, complexity, and the legal restrictions associated with them but also as a result of perceptions of political threat or sensitivity (Bagozzi et al., 2019; Ruijter et al., 2020).

As ordinary citizens “are not likely to have the tools or expertise required to produce sophisticated analytics on their own” (Kozlowski et al., 2018, p. 155), some papers have highlighted the potential associated with easy-to-use portals or applications and integrated data visualization tools (Dai & Li, 2016; Kozlowski et al., 2018; Machova & Lnenicka, 2019; Quinn et al., 2019) with regard to empowering citizens to engage with data (Piotrowski et al., 2018) and/or hold

governments accountable (e.g., Boudreau, 2020; Kozłowski et al., 2018; O'Leary, 2015). Others have pointed out that *intermediaries* (e.g., NGOs, hacktivists, journalists, civic entrepreneurs, researchers) (Birchall, 2015; Boudreau, 2020) play an important role in "bridging the gap between data producers, governments and their end users, the citizens" (Boudreau, 2020, p. 3). While this is in line with reflections on the increasing importance of translation processes (as discussed in the previous section), the focus on users' perspectives points to an inherent risk associated with reliance on intermediaries: it appears to have encouraged the ad hoc or targeted use of open government data by diverse groups of users with differing interests, depending on the instrumental aims they wish to pursue, instead of continuous use by an engaged community of armchair auditors (see also Worthy, 2015).

In addition to this risk of instrumental roles being played by intermediaries, the further drawbacks of current digitalization initiatives include "the potential misinterpretation and misuse of data (either deliberately or inadvertently), the inadvertent release of confidential data (not properly anonymized), which might incentivize public servants and politicians to act defensively, the potential citizens' information overload (governments might "misuse ICTs to 'drown' people in information," and societal risks that might result from putting data 'in the wrong hands'" (Lourenço, 2013, p. 245).

Moving the focus to *governments*, as the users of information, shifts the attention to the question of how the advent of digital data and technologies interacts with political and bureaucratic decision-making. Some studies have reflected on the pros and cons of relying on such data (see Mergel, 2016; Levine et al., 2017). Others have investigated how users perceive big data (Durrant et al., 2018; Levine et al., 2017; van der Voort et al., 2019). The results remain controversial: big data are seen in some cases as being useful in fostering quality, trustworthiness, and legitimacy (Fredriksson, 2018), while skepticism about big data use appears to prevail in others (Guenduez et al., 2020).

Two main implications for accountability emerge from the existing papers with regard to the use of new data and technologies. The first implication concerns the enhanced potential for *dialogic forms of accountability* (Brown et al., 2015). Digitalization overcomes citizen versus government polarization by moving toward dialogic, diffused, and pluralistic forms of accountability that allow for more interaction, and thus a bi- or multidirectional exchange, between different categories of citizens, users, organizations, and governments (e.g., Bryer, 2013; Dimitrijevska-Markoski, 2018; Farina et al., 2013; Fink, 2017). New technologies (and especially the use of apps and social media) are expected to translate into stronger citizens' voices and the potential for citizens to publicly scrutinize the conduct of governments or to participate actively in shaping service and policy design, delivery, and assessment, thus even facilitating coproduction exercises.

However, at this stage, only a limited number of papers in this area explore actual users' behaviors on social media platforms (Manetti et al., 2016; Ojala et al., 2019; Prabowo et al., 2018) or the use of social media data by governments or public service providers (e.g., Agostino & Arnaboldi, 2016; Bekkers et al., 2013). This brings us to the second implication, which concerns the increasing *blurring of accountabilities*, as the issue of who is accountable for what becomes increasingly vague. Both governments and citizens have access to data and use them for different purposes, from decision-making to dialogue and coproduction, and from surveillance and sousveillance. In some cases, citizens use information to discuss, debate, or complain about public services or policies (Ojala et al., 2019), therefore using social media platforms for raising their voices (Treré, 2016). In some other cases (e.g., Charalabidis & Loukis, 2012; Hand & Ching, 2020; Lee et al., 2019), governments increasingly become agents that are monitored by a number of various actors on the basis of the data they release (Prabowo et al., 2018), while in other cases, more dialogic forms of accountability—taking the form of collaborative conversations—occur (Manetti et al., 2016). More critical papers also revealed that social media data provide a basis for the centralized monitoring and surveillance of citizens; that is, citizens become subjects who are monitored while being asked to monitor (Birchall, 2015; Treré, 2016).

The above discussion shows that the extant literature has provided important advancements in our understanding of how citizens and governments benefit from the new information made available through digital technologies. In addition, it also shows that more needs to be known about: (i) the actual uses of such information, as opposed to the potential ones, and the roles of intermediaries in the use of open government and big data; (ii) how decision makers' (i.e., politicians, public managers, frontline officials) identities, roles, and work are changing in parallel with

**TABLE 6** Key issues about effects of digital data and implications for accounting and accountability

Distinctive features about effects of digital data and technologies	Sample papers	Implications for accounting and accountability
<ul style="list-style-type: none"> <li>Expected vs. actual effects</li> <li>Types of effects: improvement of policies and services, implications for social equity, increased transparency, accountability, legitimation, and trust in government</li> </ul>	<ul style="list-style-type: none"> <li>Agrawal and Nair, 2018</li> <li>Manes Rossi et al., 2018</li> <li>Marjanovic and Cecez-Kecmanovic, 2017</li> <li>Mendieta &amp; Alonso, 2017</li> <li>Power, 2016</li> <li>Sa &amp; Grieco, 2016</li> <li>Zao et al., 2016</li> <li>Zuiderwijk and Janssen, 2014</li> </ul>	<ul style="list-style-type: none"> <li>Accountability for social equity and inclusion</li> <li>Diffused and pluralistic forms of accountability</li> </ul>

technological evolutions and how they make sense of those changes (e.g., in pluralistic, user-generated, multimodal, and dialogic forms of accounts); and (iii) how the interactions between citizens and states are evolving as a consequence of the use of new media and technologies, and how this affects services, policies, and citizens' lives. The Covid-19 outbreak has especially highlighted how the equilibrium in this relationship is far from being stable and requires continuous adjustment. This points to the important role played by social media in keeping communities engaged and involved in the delivery of (difficult) public policies and also to the need to better explore the balance between the collection of data to support policies and service delivery, including for public health or safety purposes, and forms of invasion of privacy and surveillance (Ahn & Wickramasinghe, 2021).

### 4.3 | Effects of digital data and technologies

The availability and use of new types of data, through new formats, media, and sources, are expected to bear important consequences for governments, managers, citizens, and other stakeholders. The papers reviewed discuss the effects of the new forms of digital data and accountability from different perspectives (Table 6). The reviewed papers are distinguished depending on whether they looked at expected or actual effects and further differentiated based on the types of effects they focused their attention on.

Interestingly, in most cases, the effects of digital transformation are discussed as being "expected" or are even taken for granted; however, empirical evidence is not necessarily shown to support these claims (e.g., Ingrams, 2018; Liu et al., 2019; Pencheva et al., 2018). Only a small number of papers identify empirically some of the possible consequences of digital transformations by pointing to both positive and desirable effects, and to less desirable, unexpected ones, such as difficult access (Cho & Choi, 2004) and the lack of clarity with regard to the usefulness of government measures (Boudreau, 2020).

The effects of digitalization, from the perspective of implications for accountability, can be split into two main categories: (i) increased improvements to policies and services, thanks to the use of new data or new digital forms of accountability (e.g., Sa & Grieco, 2016; Zhao et al., 2016) and (ii) increased transparency, accountability, legitimacy, and trust in governments (e.g., Mendieta & Alonso, 2017).

As such, a first stream of studies suggests that digitalization will bring about an improvement in services and policies thanks to the better identification of needs or the use of more powerful analytical tools for planning, designing, and delivering interventions but also thanks to citizens interacting more with government via digital technologies. Studies in this area in some cases illustrate how policies or services are changing and how citizens' satisfaction is increasing (or may increase) thanks to the availability of new data or ways to elaborate them. This includes, for example, studies on predictive policing (Asaro, 2019; Benbouzid, 2019; Levine et al., 2017), which emphasize the benefits of regulating police work in line with predictions of when and where crime is likely to occur.

However, possible negative consequences are also highlighted in a number of papers (Marjanovic & Cecez-Kecmanovic, 2017; Power, 2016; Treré, 2016; Zuiderwijk & Janssen, 2014). The areas that appear to attract most interest are predictive policing and the use of algorithms and artificial intelligence (Young, 2020). While their benefits in terms of simplifications or cost containment may be clear, fairness and social equity remain a central concern in these studies. More generally, technologies are often seen as having the potential not only to provide new forms of empowerment but also to reproduce the power structures present in the context where they are used and implemented. Even seemingly “neutral” tools and media, such as online reports or databases, government websites, and social channels, will reflect and respond better to the needs of certain categories of users and citizens than others (Whites rather than Blacks, men rather than women, the young rather than the elderly, citizens rather than non-citizens and immigrants, etc.), while discriminating across these categories, or “targeting,” certain interventions based on race, gender, or other stereotypes. Systems that “learn” from humans especially may end up reproducing the same biases and penchants for stereotyping, thereby making them even more systematic and institutionalized. The emergence of the Black Lives Matter movement and the different impacts of Covid-19 have further shown that social equality should remain a central preoccupation for public managers, policymakers, and scholars alike. However, more needs to be known (and done) about the social equity implications of digital transformations and how the latter can be leveraged to empower vulnerable citizens and, more significantly, those who are not citizens but are users of public services. Digitalization thus results in new preoccupations with *accountability with regard to social equity and inclusion*.

A second stream of papers discussed effects of digitalization in terms of the accountability, transparency, trust, and legitimacy of governments, which refers generally to the relationship between citizens and governments. While digital technologies are generically claimed to increase accountability, what this entails in practice is the subject of a variety of interpretations, as the accountability implications of digital transformations may take on different nuances and meanings (Koppell, 2005). The availability of more data, or data from more sources, such as in the case of open government initiatives or simply because they are available via digital media, is sometimes described as evidence of increased accountability toward citizens. Some of the studies that take this stance will refer to the word “transparency” and will especially conceive of accountability as being a unilateral exercise of the provision of data by focusing on the richness or accessibility of information on websites, the exhaustivity of reports according to some checklists or guidelines, or the creation of comprehensive online databases (Bertot et al., 2012; Garde Sanchez et al., 2014; Manes Rossi et al., 2018; Murillo, 2014). However, this view of accountability has been criticized as being naïve and narrow, as the mere availability of data does not necessarily translate, per se, into stronger democratic accountability. For example, Birchall (2015), while describing the “Data.gov-in-a-box” experience, points to the risks associated with offering data in lieu of providing actual responses to needs and shifting responsibility for public accountability from governments to citizens, who become the ones responsible for elaborating data and using them to hold governments accountable.

Other studies suggest that digitalization, via the aforementioned dialogic, diffused, and pluralistic forms of accountability, will translate into stronger citizens’ voices, better participation in decisions and the delivery of services, and improved trust in government (Meijer, 2003; Song & Lee, 2016; Porumbescu, 2017). It may also result in increased legitimacy for the latter; for example, by translating into a greater propensity of users to engage with governments (Agrawal & Nair, 2018; Bridges et al., 2016). However, at this stage, only a limited number of papers go beyond discussing expectations in this area to providing evidence that this is actually the case (e.g., Manetti et al., 2016).

Limited evidence exists so far about whether and how digital engagement is actually changing our forms and conceptions of accountability. Birchall (2015, p. 195) suggests three important questions to be addressed when adopting models promising increased transparency and accountability; that is: “1. Does this model of transparency constitute or facilitate a response rather than a contribution to the flow? 2. Is this model of transparency the one that will best serve the interests of politics understood as an arena of dissent and antagonism? 3. Will it enable the formation of subjectivities that have meaningful political agency?”. There may thus be a need to undertake more studies that look more explicitly at if and how digitalization can strengthen pluralistic dialogue by giving a voice to less represented, vulnerable citizens and by fostering an environment where multiple perspectives and needs are taken into consideration, thus providing inputs to service provisions and political and managerial decisions. Indeed, the extant studies seem to



suggest that digital accountability has been approached more as a technology-driven exercise rather than with regard to its lasting effects on helping citizens to feel empowered, represented, and included and, ultimately, how it might enable them to concretely hold governments accountable and contribute to changes and improvements to policies and services.

More generally, the extant literature has suggested some possible positive effects of digital evolutions in the public sector. However, evidence is still lacking for most of these, and it remains limited to descriptions of implementation processes, narrow views of unilateral accountability, and to initial evidence for, or simulations of, the potential of new technologies to support decisions. All these areas warrant further investigation, as more research is needed to address, among others, the following questions. What are the consequences of these developments for services, citizens, and users? Given the outputs of digitalization (e.g., data, databases, and reports), what are its actual outcomes (e.g., changes in society, the economy, the wellbeing of people, trust in government, the inclusiveness of public policies and our societies, and the better representation of interests)? What difference do they make to citizens' satisfaction and improvements in services, in terms of quality, quantity, equity, fairness, citizens' voices, and the responsiveness of governments to those voices?

## 5 | CONCLUDING THOUGHTS AND WAYS FORWARD

Digitalization processes are causing unprecedented changes to public services, the ways in which governments and citizens interact, and how knowledge and information are produced, shared, interpreted, and used; they are also being used to support decision-making and accountability processes, while also posing new challenges for accountants, policymakers, managers, and citizens (Arnaboldi et al., 2017; Porumbescu et al., 2020; Torres et al., 2020; Zuiderwijk & Janssen, 2015). Since the 1990s, an increasing number of scholars have devoted their attention to documenting these processes and their consequences (e.g., Mergel, 2013; Sivarajah et al., 2015; Spiliotopoulou et al., 2014; Valpy, 2019; Wang, 2012). Taking stock of this body of scholarly work, this paper has systematically reviewed the 232 papers that look at accounting and accountability issues in the context of the digitalization of public services to provide a detailed overview of the current state of affairs in this field, identify the main critical issues arising for accountability and accounting, and suggest possible new avenues of investigation.

Starting with Chandler's study, published in 1998, the issues of accounting and accountability in public sector digitalization have been the subject of a growing body of literature; although U.S. studies have been dominant in the past, emerging countries have attracted increasing scholarly attention recently (e.g., Araújo et al., 2016; Garcia, 2019; Hosain et al., 2018; Park & Oh, 2017; Rajão & Jarke, 2018). These studies reflect the state of play regarding technological developments, starting with a focus on websites and open government initiatives before moving on to the implications of the social media revolution and, more recently, to artificial intelligence, predictive analytics, and algorithms (e.g., Asaro, 2019; Basilio et al., 2019; Benbouzid, 2019). Interestingly, most of the papers analyzed are published in public administration journals and, rather than being informed by theories from sociology, public administration, management, or accounting, they appear to be the product of a close-knit community and are informed by other empirical studies in the same area. Accounting journals appear to have mostly ignored the digitalized public sector and have instead focused on the private sector (see Knudsen, 2020). This lack of attention must be redressed; our review shows that digitalization bears particularly salient accounting and accountability implications for the public sector.

In particular, our review shows that the move toward digital forms of the production of data has brought about a shift from vertical, monodirectional, and government-focused forms of accountability to more *horizontal*, decentralized, pluralistic, user-generated, multimodal and *dialogic* forms of accountability. This change has also resulted in citizens becoming actively involved in the production and generation of their own content. This potentially promises them greater levels of empowerment, including of marginalized voices and users, by providing them with easier access to services and information.

Digital transformation, along with trust in technology-driven change, has created an illusory notion about the infinite possibilities offered by the enhanced availability of data, analytical power, and interactivity (Quattrone, 2016); however, the related risks should not be downplayed. The papers reviewed have pointed to the importance of paying more attention to the *quality and reliability of data*, and especially to the *accountability of the “translators” of data and information and of relevant “translation” processes* through which data are selected, analyzed, and communicated via both human actors and technological actants. This is vitally important in contexts where the production and use of data are diffused, less centralized, and left to non-experts.

Moreover, the studies examined point to an increasing *blurring of accountabilities* regarding who is accountable for what in relation to day-by-day contingencies, negotiations, and emergencies. Although this may provide opportunities for certain groups to experiment with new ways of holding governments accountable, it may also result in new, digitally generated inequalities. Thus, there is the need to more strongly reconsider the implications of digitalization for social equity and the possible roles of *empowering (digital) forms of accountability*.

We hope our review will encourage scholars to explore new, less explored options and directions. On the one hand, more knowledge accumulation on emerging countries may be further needed. On the other, the scientific community (and the public as a whole) may benefit from digitalization issues being examined from wider disciplinary and interdisciplinary perspectives. It is vital that we see more attention devoted not only to public sector digitalization in accounting studies and the accountability and accounting issues related to digitalization in public administration journals but also in other general journals. This is because these issues affect the very relationship between states and their citizens, as well as the latter's lives and experiences. In the post-truth era, in which there is declining trust in governments and increasing confidence in digital technologies, it may be especially important for research not only to ascertain the positive potential associated with developments in digital technology but also to identify the pitfalls and risks related to digital forms of accountability, as pointed out in our review.

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## NOTE

<sup>1</sup> Book chapters were excluded, as they are not always peer-reviewed and are not always indexed in databases.

## REFERENCES

- Agostino, D., & Arnaboldi, M. (2016). A measurement framework for assessing the contribution of social media to public engagement: An empirical analysis on Facebook. *Public Management Review*, 18(9), 1289–1307.
- Agostino, D., & Arnaboldi, M. (2017). Social media data used in the measurement of public services effectiveness: Empirical evidence from Twitter in higher education institutions. *Public Policy and Administration*, 32(4), 296–322.
- Agrawal, V., & Nair, H. (2018). From Jan Sunwai to Rajasthan Right to Hearing Act 2012: Fostering transparency and accountability through citizen engagement. *Studies in Indian Politics*, 6(2), 282–296.
- Ahn, P., & Wickramasinghe, D. (2021). Pushing the limits of accountability: Big data analytics containing and controlling COVID-19 in South Korea. *Accounting Auditing and Accountability Journal*. <https://doi.org/10.1108/AAAJ-08-2020-4829>
- Akgül, Y. (2019). The accessibility, usability, quality and readability of Turkish state and local government websites: An exploratory study. *International Journal of Electronic Government Research*, 15(1), 62–81.
- Alathur, S., Ilavarasan, P. V., & Gupta, M. P. (2012). Citizen participation and effectiveness of e-petition: Sutharyakeralam – India. *Transforming Government: People, Process and Policy*, 6(4), 392–403.



- Alzamil, Z. S., & Vasarhelyi, M. A. (2019). A new model for effective and efficient open government data. *International Journal of Disclosure and Governance*, 16, 174–187.
- Anshari, M., & Lim, S. A. (2017). E-Government with big data enabled through smartphone for public services: Possibilities and challenges. *International Journal of Public Administration*, 40(13), 1143–1158.
- Araújo, A. C., Reis, L., & Sampaio, R. (2016). Do transparency and open data walk together? An analysis of initiatives in five Brazilian capitals. *Medijske Studije*, 7(14), 65–82.
- Arnaboldi, M., Busco, C., & Cuganesan, S. (2017). Accounting, accountability, social media and big data: Revolution or hype? *Accounting, Auditing and Accountability Journal*, 30(4), 762–776.
- Arsalan, S., & Widyatama, U. (2020). Public satisfaction on transparency of e-government information in Bandung City to prevent corruption. *International Journal of Innovation, Creativity and Change*, 6(8), 1–10.
- Asaro, P. M. (2019). AI ethics in predictive policing: From models of threat to an ethics of care. *IEEE Technology and Society Magazine*, 38(2), 40–53.
- Bagozzi, B. E., Berliner, D., & Almquist, Z. W. (2019). When does open government shut? Predicting government responses to citizen information requests. *Regulation & Governance*, 1–18.
- Barth, T. J., & Arnold, E. (1999). Artificial Intelligence and administrative discretion: Implications for public administration. *The American Review of Public Administration*, 29(4), 332–351.
- Basilio, M. P., Pereira, V., & Brum, G. (2019). Identification of operational demand in law enforcement agencies: An application based on a probabilistic model of topics. *Data Technologies and Applications*, 53(3), 333–372.
- Begkos, C., & Antonopoulou, K. (2020). Measuring the unknown: Evaluative practices and performance indicators for digital platforms. *Accounting Auditing and Accountability Journal*, 33(3), 588–619.
- Bekkers, V., Edwards, A., & Kool, D. De. (2013). Social media monitoring: Responsive governance in the shadow of surveillance? *Government Information Quarterly*, 30(4), 335–342.
- Benbouzid, B. (2019). To predict and to manage. Predictive policing in the United States. *Big Data & Society*, January–June, 1–13.
- Bertot, J. C., Jaeger, P. T., & Grimes, J. M. (2012). Promoting transparency and accountability through ICTs, social media, and collaborative e-government. *Transforming Government: People, Process and Policy*, 6(1), 78–91.
- Birchall, C. (2015). 'Data.gov-in-a-box': Delimiting transparency. *European Journal of Social Theory*, 18(2), 185–202.
- Boudreau, C. (2020). Reuse of open data in Quebec: From economic development to government transparency. *International Review of Administrative Sciences*, 1–15.
- Bovens, M., Schillemans, T., & Goodin, R. E. (2014). Public accountability. *The Oxford handbook of public accountability*, 1–22. Oxford University Press.
- Bridges, F., Grossklags, J., & Appel, L. (2012). Young adults' online participation behaviors: An exploratory study of web 2.0 use for political engagement. *Information Polity*, 17(2), 163–176.
- Brown, J., Dillard, J., & Hopper, T. (2015). Accounting, accountants and accountability regimes in pluralistic societies: Taking multiple perspectives seriously. *Accounting Auditing and Accountability Journal*, 28(5), 626–650.
- Bryer, T. A. (2013). Public participation in regulatory decision-making. *Public Performance & Management Review*, 37(2), 263–279. <https://doi.org/10.2753/PMR1530-9576370204>
- Caba Perez, M. C., Rodríguez Bòlivar, M. P., & Lopez Hernández, A. M. (2014). The determinants of government financial reports online. *Transylvanian Review of Administrative Sciences*, 42, 5–31.
- Carbaca García, A., & García García, J. (2008). Determinants of internet financial disclosure by local governments. *Revista Española de Financiación y Contabilidad*, 37(137), 63–84.
- Cerrillo I Martínez, A. (2019). How can we open the black box of public administration? Transparency and accountability in the use of algorithms. *Revista Catalana de Dret Ppublic*, 58, 13–28.
- Chandler, H. E. (1998). Towards open government: Official information on the web. *New Library World*, 99(6), 230–237.
- Charalabidis, Y., & Loukis, E. (2012). Participative public policy making through multiple social media platforms utilization. *International Journal of Electronic Government Research*, 8(3), 78–97.
- Chen, Y. (2012). A comparative study of e-government XBRL implementations: The potential of improving information transparency and efficiency. *Government Information Quarterly*, 29(4), pp. 553–563.
- Cho, Y. H., & Choi, B. (2004). E-government to combat corruption: The case of Seoul metropolitan government. *International Journal of Public Administration*, 27(10), 37–41.
- Choi, J. M. (2017). Factors influencing public officials' responses to requests for information disclosure. *Government Information Quarterly*, 35(1), 30–42.
- Chomchaiya, S. (2015). Consolidated performance measurement framework for government e-procurement focusing on internal stakeholders. *Information Technology and People*, 29(2), 354–380.
- Cohen, S. Mamakou, X. J., & Karatzimas, S. (2017). IT-enhanced popular reports: Analyzing citizen preferences. *Government Information Quarterly*, 34(2), 283–295.

- Currie, M. (2020). Data as performance – Showcasing cities through open data maps. *Big Data & Society* January–June: 1–14, <https://doi.org/10.1177/2053951720907953>
- Dai, J., & Li, Q. (2016). Designing audit apps for armchair auditors to analyze government procurement contracts. *Journal of Emerging Technologies in Accounting*, 12(2), 71–88.
- Dimitrijevska-Markoski, T. (2018). Exploring municipal utilization of social media in performance measurement and management. *Public Administration Issues*, 106(11), 98–106.
- Driss, O. B., Mellouli, S., & Trabelsi, Z. (2019). From citizens to government policy-makers: Social media data analysis. *Government Information Quarterly*, 36(3), 560–570.
- Durrant, H., Barnett, J., & Rempel, E. S. (2018). Realising the benefits of integrated data for local policymaking: Rhetoric versus reality. *Politics and Governance*, 6(4), 18–28.
- Errichetti, J., & Roohani, S. J. (2018). The merit of the DATA Act to enhance the governmental reporting process: A corporate governance perspective. *Journal of Emerging Technologies in Accounting*, 15(1), 107–120.
- Farina, C. R., Epstein, D., Heidt, J. B., & Newhart, M. J. (2013). Regulation room: Getting “more, better” civic participation in complex government policymaking. *Transforming Government People Process and Policy*, 7(4), 501–516.
- Fink, K. (2017). Opening the government’s black boxes: Freedom of information and algorithmic accountability. *Information Communication and Society*, 21, 1453–1471.
- Fredriksson, C. (2018). Big data creating new knowledge as support in decision-making: Practical examples of big data use and consequences of using big data as decision support. *Journal of Decision Systems*, 27(1), 1–18.
- García, D. R. (2019). Politics, technology, and accountability: The transparency façade of open government data reforms in Paraguay. *eJournal of eDemocracy and Open Government*, 11(2), 60–93.
- Garde Sanchez, R., Rodriguez Bolivar, M. P., & Alcaide Munoz, L. (2014). Are Spanish SAs accomplishing Intosai’s best practices code of transparency and accountability? *Transylvanian Review of Administrative Sciences*, 43 E), 122–145.
- Georgiadou, E., Angelopoulos, S., & Drake, H. (2020). Big data analytics and international negotiations: Sentiment analysis of Brexit negotiating outcomes. *International Journal of Information Management*, 51, 1–9.
- Guenduez, A. A., Mettler, T., & Schedler, K. (2020). Technological frames in public administration: What do public managers think of big data? *Government Information Quarterly*, 37(1), 1–12.
- Guillamón, M. D., Ríos, A. M., Gesuele, B., & Metallo, C. (2016). Factors influencing social media use in local governments: The case of Italy and Spain. *Government Information Quarterly*, 33(3), 460–471.
- Gulati, G. J. J., Williams, C. B., & Yates, D. J. (2014). Predictors of on-line services and e-participation: A cross-national comparison. *Government Information Quarterly*, 31(4), 526–533.
- Halachmi, A., & Greiling, D. (2013). Transparency, e-government, and accountability: Some issues and considerations. *Public Performance & Management Review*, 36(4), 562–584.
- Hand, L. C., & Ching, B. D. (2020). Maintaining neutrality: A sentiment analysis of police agency Facebook pages before and after a fatal officer-involved shooting of a citizen. *Government Information Quarterly*, 37(1), 1–11.
- Harris, J. A., Mckenzie, K. S., & Rentfro, R. W. (2011). Performance reporting: Assessing citizen access to performance measures on state government websites. *Journal of Public Budgeting, Accounting & Financial Management*, 23(1), 117–138.
- Harrison, T. M., & Sayogo, D. S. (2014). Transparency, participation, and accountability practices in open government: A comparative study. *Government Information Quarterly*, 31(4), 513–525.
- Henman, P., & Graham, T. (2018). Webportal vs google for finding government information on the web: From a website-centric approach to a web ecology perspective. *Information Polity*, 23(5), 1–18.
- Hermanto, A., Solimun, S., Achmad, A., Fernandes, R., & Wahyono, W. (2018). The importance of open government data for the private sector and NGOs in Indonesia. *Digital Policy, Regulation and Governance*, 20(4), 293–309.
- Hilbert, M., Miles, I., & Othmer, J. (2009). Foresight tools for participative policy-making in inter-governmental processes in developing countries: Lessons learned from the eLAC Policy Priorities Delphi. *Technological Forecasting & Social Change*, 76(7), 880–896.
- Hossain, M. N., Talukder, M. S., Hoque, M. R., & Bao, Y. (2018). The use of open government data to citizen empowerment: An empirical validation of a proposed model. *Foresight*, 20(6), 665–680.
- Ingrams, A. (2017). Managing governance complexity and knowledge networks in transparency initiatives: The case of police open data. *Local Government Studies*, 43(3), 364–387.
- Ingrams, A. (2018). Transparency for results: Testing a model of performance management in open government initiatives. *International Journal of Public Administration*, 41(13), 1033–1046.
- Ingrams, A. (2019). Public values in the age of big data: A public information perspective. *Policy & Internet*, 11(2), 128–148.
- Jeacle, I., & Carter, C. (2011). In TripAdvisor we trust: Rankings, calculative regimes and abstract systems. *Accounting Organizations and Society*, 36(4–5), 293–309.
- Jia, Z., Liu, M., & Shao, G. (2019). Linking government social media usage to public perceptions of government performance: An empirical study from China. *Chinese Journal of Communication*, 12(1), 84–101.

- Ju, J., Liu, L., & Feng, Y. (2018). Citizen-centered big data analysis-driven governance intelligence framework for smart cities. *Telecommunications Policy*, 42(19), 1–16.
- Kellog, K. C., Valentine, M. A., & Christin, A. (2020). Algorithms at work: The new contested terrain of control. *Academy of Management Annals*, 14(1), 366–410.
- Kim, J. H., & Eom, S. (2019). The managerial dimension of open data success: Focusing on the open data initiatives in Korean local governments. *Sustainability*, 11, 6758. <https://doi.org/10.3390/su11236758>
- Knudsen, D. R. (2020). Elusive boundaries, power relations, and knowledge production: A systematic review of the literature on digitalization in accounting. *International Journal of Accounting Information Systems*, 36, 1–22.
- Kolman, D. (2020). The usefulness of algorithmic models in policy making. *Government Information Quarterly*, 37(3), 1–14.
- Koppell, J. G. S. (2005). Pathologies of accountability: ICANN and the challenge of “multiple accountabilities disorder”. *Public Administration Review*, 65(1), 94–108.
- Kornberger, M., Pflueger, D., & Mouritsen, J. (2017). Evaluative infrastructures: Accounting for platform organization. *Accounting Organizations and Society*, 60, 79–95.
- Kowalski, R., Esteve, M., & Mikhaylov, S. J. (2019). Improving public services by mining citizen feedback: An application of natural language processing. *Public Administration*, 98(4), 1011–1026.
- Kozłowski, S., Issa, H., & Appelbaum, D. (2018). Making government data valuable for constituents: The case for the advanced data analytics capabilities of the ENHANCE framework. *Journal of Emerging Technologies in Accounting*, 15(1), 155–167.
- Kubler, S., Robert, J., Neumaier, S., Umbrich, J., & Le Traon, Y. (2018). Comparison of metadata quality in open data portals using the analytic hierarchy process. *Government Information Quarterly*, 35(1), 1–17.
- Kum, H., Stewart, C. J., Rose, R. A., & Duncan, D. F. (2015). Using big data for evidence based governance in child welfare. *Children and Youth Services Review*, 58, 127–136.
- Lecy, J., & Thornton, J. (2016). What big data can tell us about government awards to the nonprofit sector: Using the FAADS. *Nonprofit & Voluntary Sector Quarterly*, 45(5), 1052–1069.
- Lee, T. D., Park, H., & Lee, J. (2019). Collaborative accountability for sustainable public health: A Korean perspective on the effective use of ICT-based health risk communication. *Government Information Quarterly*, 36(2), 226–236.
- Leoni, G., & Parker, L. D. (2019). Governance and control of sharing economy platforms: Hosting on Airbnb. *The British Accounting Review*, 51(6), 1–22.
- Levine, E. S., Tisch, J., Tasso, A., & Joy, M. (2017). The New York City Police Department’s Domain Awareness System. *INFORMS Journal of Applied Analytics*, 47(1), 70–84.
- Liu, H. W., Lin, C-F., & Chen, Y. J. (2019). Beyond State v. Loomis: Artificial intelligence, government algorithmization, and accountability. *International Journal of Law and Information Technology*, 27(2), 122–141.
- Lourenço, R. P. (2013). Data disclosure and transparency for accountability: A strategy and case analysis. *Information Polity*, 18(3), 243–260. <https://doi.org/10.3233/IP-130310>
- Ma, B., Zhang, N., Liu, G., Li, L., & Yuan, H. (2016). Semantic search for public opinions on urban affairs: A probabilistic topic modeling-based approach. *Information Processing & Management*, 52(3), 430–445.
- Máchová, R., Hub, M., & Lněnička, M. (2018). Usability evaluation of open data portals: Evaluating data discoverability, accessibility, and reusability from a stakeholders’ perspective. *Aslib Journal of Information Management*, 70(3), 252–268.
- Máchová, R., & Lněnička, M. (2019). A multi-criteria decision making model for the selection of open data management systems. *Electronic Government, an International Journal*, 15(4), 372–391.
- Maciejewski, M. (2016). To do more, better, faster and more cheaply: Using big data in public administration. *International Review of Administrative Science*, 83(Supplement 1), 120–135.
- Manes Rossi, F., Brusca, I., & Aversano, N. (2018). Financial sustainability as a driver for transparency and e-democracy: A comparative study in Italian and Spanish local governments. *International Journal of Public Administration*, 41(1), 22–33.
- Manetti, G., Bellucci, M., & Bagnoli, L. (2016). Stakeholder engagement and public information through social media: A study of Canadian and American public transportation agencies. *The American Review of Public Administration*, 47(8), 991–1009.
- Marjanovic, O., & Cecez-Kecmanovic, D. (2017). Exploring the tension between transparency and datafication effects of open government IS through the lens of complex adaptive systems. *Journal of Strategic Information Systems*, 26(3), 210–232.
- Meijer, A. J. (2003). Trust this document! ICTs, authentic records and accountability. *Archival Science*, 3, 275–290.
- Mendieta, M. V., & Alonso, A. I. (2017). Developments in transparency in the Spanish municipalities: An analytical revision of the last research. *Lex Localis - Journal of Local Self-Government*, 15(3), 411–432.
- Mergel, I. (2013). A framework for interpreting social media interactions in the public sector. *Government Information Quarterly*, 30(4), 327–334.
- Mergel, I. (2016). Big data in public affairs education. *Journal of Public Affairs Education*, 22(2), 231–248.
- Michener, G., & Ritter, O. (2017). Comparing resistance to open data performance measurement: Public education in Brazil and the UK. *Public Administration*, 95(1), 4–21.
- Moll, J., & Yigitbasioğlu, O. (2019). The role of internet-related technologies in shaping the work of accountants: New directions for accounting research. *The British Accounting Review*, 51(6), 1–20.

- Munteanu, I., & Newcomer, K., (2020). Leading and learning through dynamic performance management in government. *Public Administration Review*, 80(2), 316–325.
- Murillo, M. J. (2014). Evaluating the role of online data availability: The case of economic and institutional transparency in sixteen Latin American nations. *International Political Science Review*, 36(1), 42–59.
- Myeong, S., & Choi, Y. (2010). Effects of information technology on policy processes: Some evidences beyond rhetoric. *Administration & Society*, 42, 441–459.
- Ojala, M., Pantti, M., & Laaksonen, S.-M. (2019). Networked publics as agents of accountability: Online interactions between citizens, the media and immigration officials during the European refugee crisis. *New Media & Society*, 21(2), 279–297.
- O'Leary, D. E. (2015). Armchair auditors: Crowdsourcing analysis of government expenditures. *Journal of Emerging Technologies in Accounting*, 12(1), 71–91.
- Park, E. G., & Oh, W. (2017). Developing a government openness index: The case of developing countries. *Information Development*, 35(1), 121–134. <https://doi.org/10.1177/0266666917731946>
- Pencheva, I., Esteve, M., & Mikhaylov, S. J. (2018). Big data and AI – A transformational shift for government: So, what next for research? *Public Policy and Administration*, 35(1), 24–44.
- Petrakaki, D. (2018). Re-locating accountability through technology: From bureaucratic to electronic ways of governing public sector work. *International Journal of Public Sector Management*, 31(1), 31–45.
- Pina, V., Torres, L., & Royo, S. (2007). Are ICTs improving transparency and accountability in the EU regional and local governments? An empirical study. *Public Administration*, 85(2), 449–472.
- Pina, V., Torres, L., & Royo, S. (2010). Is e-government promoting convergence towards more accountable local governments? *International Public Management Journal*, 13(4), 37–41.
- Piotrowski, S., Rosenbloom, D. H., Kang, S., & Ingrams, A. (2018). Levels of value integration in federal agencies' mission and value statements: Is open government a performance target of U.S. federal agencies? *Public Administration Review*, 78(5), 705–716.
- Podsakoff, P., MacKenzie, S., Bachrach, D., & Podsakoff, N. (2005). The influence of management journals in the 1980s and 1990s. *Strategic Management Journal*, 26, 473–488.
- Porumbescu, G. (2016). Linking public sector social media and e-government website use to trust in government. *Government Information Quarterly*, 33(2), 291–304.
- Porumbescu, G. (2017). Linking transparency to trust in government and voice. *The American Review of Public Administration*, 47(5), 520–537.
- Porumbescu, G. A., Cucciniello, M., & Gil-garcia, J. R. (2020). Accounting for citizens when explaining open government effectiveness. *Government Information Quarterly*, 37(2), 1–10.
- Power, D. J. (2016). "Big brother" can watch us. *Journal of Decision Systems*, 25, 578–588.
- Prabowo, H., Hamdami, R., Sanusi, Z. (2018). The new face of people power: An exploratory study on the potential of social media for combating corruption in Indonesia. *Australasian Accounting, Business and Finance Journal*, 12(3), 19–20.
- Quattrone, P. (2016). Management accounting goes digital: Will the move make it wiser? *Management Accounting Research*, 31, 118–122.
- Quinn, A., Cooke, L., & Monaghan, M. (2019). An exploration of the progress of open crime data: How do ongoing limitations with the police.uk website restrict a comprehensive understanding of recorded crime? *Policing and Society: An International Journal of Research and Policy*, 29(4), 455–470.
- Rajão, R., & Jarke, J. (2018). The materiality of data transparency and the (re) configuration of environmental activism in the Brazilian Amazon. *Social Movement Studies*, 17(3), 318–332.
- Ramírez, Y., & Tejada, Á. (2019). Digital transparency and public accountability in Spanish universities in online media. *Journal of Intellectual Capital*, 20(5), 701–732.
- Redden, J. (2018). Democratic governance in an age of datafication: Lessons from mapping government discourses and practices. *Big Data and Society*, July–December 2018: 1–13.
- Rien Agustin, F., & Susilowati, D. (2019). Preventing corruption with blockchain technology (case study of Indonesian public procurement). *International Journal of Scientific and Technology Research*, 8(9), 2377–2383.
- Rodríguez Bolívar, M. P., Caba Pérez, C., & Lopez Hernandez, A. M. (2006). Cultural contexts and governmental digital reporting. *International Review of Administrative Sciences*, 72(2), 269–290.
- Rodríguez Bolívar, M. P., Caba Pérez, C., & López Hernández, A. M. (2007). E-government and public financial reporting: The case of Spanish regional governments. *The American Review of Public Administration*, 37(2), 142–177.
- Rodríguez Bolívar, M. P., del Carmen Caba Pérez, M., & López-Hernández, A. M. (2015). Online budget transparency in OECD member countries and administrative culture. *Administration & Society*, 47(8), 943–982.
- Rogge, N. (2017). Big data and the measurement of public organizations' performance and efficiency: The state-of-the-art. *Public Policy & Administration*, 32(4), 263–281.
- Royo, S., Yetano, A., & García-Lacalle, J. (2019). Accountability styles in state-owned enterprises: The good, the bad, the ugly ... And the pretty. *Revista de Contabilidad*, 22(2), 156–170.



- Ruijter, E., Détienné, F., Baker, M., Groff, J., & Meijer, A. J. (2020). The politics of open government data: Understanding organizational responses to pressure for more transparency. *The American Review of Public Administration*, 50(3), 260–274.
- Sa, C., & Grieco, J. (2016). Open data for science, policy, and the public good. *Review of Policy Research*, 33(5), 526–543.
- Saunders-Newton, D., & Scott, H. (2001). But the computer said! Credible uses of computational modeling in public sector decision making. *Social Science Computer Review*, 19(1), 47–65.
- Schedler, R. (2003). "... and politics?" Public management developments in the light of two rationalities. *Public Management Review*, 5(4), 533–550.
- Schmitz, J., and Leoni, G. (2019). Accounting and auditing at the time of blockchain technology: A research agenda. *Australian Accounting Review*, 29(2), 331–342.
- Scott, S. V., & Orlikowski, W. J. (2012). Reconfiguring relations of accountability: Materialization of social media in the travel sector. *Accounting Organizations and Society*, 37(1), 26–40.
- Serrano Cinca, C., Rueda-Tomas, M., & Portillo-Tarragona, P. (2009). Factors influencing e-disclosure in local public administrations. *Environment and Planning C: Government and Policy*, 27(2), 355–378.
- She, C., and Michelon, G. (2019). Managing stakeholder perceptions: Organized hypocrisy in CSR disclosures on Facebook. *Critical Perspectives on Accounting*, 51, 54–76.
- Sie, L., & Jeng, W. (2019). Between informative and esthetic: A user study of content and visualization on government data dashboards. *Proceedings of the Association for Information Science and Technology*, 56(1), 755–756.
- Sinclair, A. (1995). The chameleon of accountability: Forms and discourses. *Accounting Organizations and Society*, 20(2–3), 219–237.
- Sivaramaj, U., Irani, Z., & Weerakkody, V. (2015). Evaluating the use and impact of Web 2.0 technologies in local government. *Government Information Quarterly*, 32(4), 473–487.
- Song, C., & Lee, J. (2016). Citizens' use of social media in government, perceived transparency, and trust in government. *Public Performance and Management Review*, 39(2), 430–453.
- Spiliotopoulou, L., Charalabidis, Y., Loukis, E. N., & Diamantopoulou, V. (2014). A framework for advanced social media exploitation in government for crowdsourcing. *Transforming Government: People, Process and Policy*, 8(4), 545–568.
- Stamati, T., Papadopoulos, T., & Anagnostopoulos, D. (2015). Social media for openness and accountability in the public sector: Cases in the Greek context. *Government Information Quarterly*, 32(1), 12–29.
- Torres, L., Royo, S., & Garcia-Rayado, J. (2020). Social media adoption by Audit Institutions. A comparative analysis of Europe and the United States. *Government Information Quarterly*, 37(1), 1–14.
- Trerè, E. (2016). The dark side of digital politics: Understanding the algorithmic manufacturing of consent and the hindering of online dissidence. *IDS Bulletin*, 47(1), 127–138.
- Trish, B. (2018). Big data under Obama and Trump: The data-fueled U.S. presidency. *Politics and Governance*, 6(4), 29–38.
- Tunney, S., & Thomas, J. (2015). Public access to NHS financial information: From a freedom of information regime to full open-book governance? *Social Theory & Health*, 13, 116–140.
- Valpi, D. R. (2019). For the purpose of accountability: The need for a comprehensive recordkeeping act. *Archivaria*, 88 (November), 198–229.
- van der Voort, H., Klievink, B., Arnaboldi, M., & Meijer, A. J. (2019). Rationality and politics of algorithms. Will the promise of big data survive the dynamics of public decision making? *Government Information Quarterly*, 36(1), 27–38.
- Vanhommerig, I., & Karré, P. M. (2014). Public accountability in the internet age: Changing roles for governments and citizens. *International Review of Public Administration*, 19(2), 37–41.
- Viale, T., Gendron, Y., & Roy, S. (2017). From "mad men" to "math men: The rise of expertise in digital measurement and the shaping of online consumer freedom. *Accounting Auditing & Accountability Journal*, 30(2), 270–305.
- Vydra, S., & Klievink, B. (2019). Techno-optimism and policy-pessimism in the public sector big data debate. *Government Information Quarterly*, 36(4), 1–10.
- Wang, T. (2012). An Analysis of the Effects of Online Fiscal Disclosure on Municipal Bond Issuances. *International Review of Public Administration*, 17(2), 1–18. <https://doi.org/10.1080/12294659.2012.10805225>
- Wen, Y. F., & Hwang, Y.T. (2019). The associativity evaluation between open data and country characteristics. *The Electronic Library*, 37(2), 337–364.
- Wong, W., & Welch, E. (2004). Does e-government promote accountability? A comparative analysis of website openness and government accountability. *Governance: An International Journal of Policy Administration and Institutions*, 17(2), 275–297.
- Worthy, B. E. N. (2015). The impact of open data in the UK: Complex, unpredictable and political. *Public Administration*, 93(3), 788–805.
- Xu, W., Liu, L., & Shang, W. (2017). Leveraging cross-media analytics to detect events and mine opinions for emergency management. *Online Information Review*, 41(4), 487–506.
- Yan, H., & Ting, Y. (2018). The effectiveness of online citizen evaluation of government performance: A study of the perceptions of local bureaucrats in China. *Public Personnel Management*, 47(4), 419–444.

- Yavuz, N., & Welch, E. W. (2014). Factors affecting openness of local government websites: Examining the differences across planning, finance and police departments. *Government Information Quarterly*, 31(4), 574–583.
- Yi, J., & Stuart, J. (2018). Corporate distress prediction in China: A machine learning approach. *Accounting and Finance*, 58(4), 1063–1109.
- Young, M. (2020). Implementation of digital-era governance: The case of open data in U.S. cities. *Public Administration Review*, 80(2), 305–315.
- Zhao, M., Xu, G., & Li, Y. (2016). Evaluating urban public facilities of Shenzhen by application of open source data. *Geo-Spatial Information Science*, 19(2), 129–139.
- Zuiderwijk, A., & Janssen, M. (2015). Towards decision support for disclosing data: Closed or open data? *Information Polity*, 20(2/3), 103–117.
- Zuiderwijk, A., & Janssen, M. (2014). Design principles for improving the process of publishing open data. *Transforming Government: People, Process and Policy*, 8(2), 185–204.
- Zuiderwijk, A., Shinde, R., & Janssen, M. (2019). Investigating the attainment of open government data objectives: Is there a mismatch between objectives and results? *International Review of Administrative Science*, 85(4), 645–672.

## ADDITIONAL REFERENCES

- Agbozo, E., & Spassov, K. (2018). Evaluating metropolitan assembly web sites in Ghana: Accessibility, compatibility and usability. *Webology*, 15(1), 46–60.
- Alcaide Munoz, L., Rodriguez Bolivar, M. P., & Lopez Hernandez, A. M. (2013). Financial determinants for improving public sector accountability: A meta-analytic study. *Transylvanian Review of Administrative Sciences*, 66–87.
- Alcaraz-Quiles, F. J., Navarro-Galera, A., & Ortiz-Rodríguez, D. (2015). Factors determining online sustainability reporting by local governments. *International Review of Administrative Sciences*, 81(1), 79–109.
- Alizadeh, T., Sarkar, S., & Burgoyne, S. (2019). Capturing citizen voice online: Enabling smart participatory local government. *Cities*, 95(June), 1–10.
- Al-Shbail, T., & Aman, A. (2018). E-government and accountability: How to mitigate the disorders and dysfunctions. *Transforming Government: People, Process and Policy*, 12(2), 155–190.
- Antipova, T. (2019). Digital public sector auditing: A look into the future. *Quality - Access to Success*, 20, 441–446.
- Aung, M., Bahramirad, S., Burga, R., Hayhoe, M., & Leblanc, J. (2017). Sense-making accountability: Netnographic study of an online public perspective. *Social and Environmental Accountability Journal*, 37(1), 18–32.
- Bannister, F. (2007). The curse of the benchmark: An assessment of the validity and value of e-government comparisons. *International Review of Administrative Sciences*, 73(2), 171–188.
- Barbosa, A. F., Pozzebon, M., & Diniz, H. (2013). Rethinking e-government performance assessment from a citizen perspective. *Public Administration*, 91(3), 744–762.
- Bergström, Y. (2002). New approaches to data exchange with businesses. *Statistical Journal of the United Nations Economic Commission for Europe*, 19, 161–173.
- Bezboruah, K., & Dryburgh, M. (2012). Personal social media usage and its impact on administrative accountability: An exploration of theory and practice. *International Journal of Organization Theory and Behavior*, 15(4), 469–495.
- Bowman, J. S., & Stevens, K. A. (2013). Public pay disclosure in state government: An ethical analysis. *The American Review of Public Administration*, 43(4), 476–492. <https://doi.org/10.1177/0275074012445597>
- Brown, D. C. G. (2013). Accountability in a collectivized environment: From Glassco to digital public administration. *Canadian Public Administration*, 56(1), 47–69.
- Brown, D. C. G., & Toze, S. (2017). Information governance in digitized public administration. *Canadian Public Administration*, 60(4), 581–604.
- Canales, K. L., Pope, J. V., & Maestas, C. D. (2019). Tweeting blame in a federalist system: Attributions for disaster response in social media following Hurricane Sandy. *Social Science Quarterly*, 100(7), 2594–2606.
- Carrasco, C., & Sobrepere, X. (2015). Open government data: An assessment of the Spanish municipal situation. *Social Science Computer Review*, 33(5), 631–644.
- Castro, P., & Bettencourt, L. (2017). Exploring the predictors and the role of trust and concern in the context of data disclosure to governmental institutions. *Behaviour & Information Technology*, 36(3), 321–331.
- Chatfield, A. T., Reddick, C. G., & Brajawidagda, U. (2015). Government surveillance disclosures, bilateral trust and Indonesia–Australia cross-border security cooperation: Social network analysis of Twitter data. *Government Information Quarterly*, 32(2), 118–128.
- Chomchaiya, S., & Esichaikul, V. (2016). Consolidated performance measurement framework for government e-procurement focusing on internal stakeholders. *Information Technology & People*, 29(2), 354–380.
- Chen, G., Kang, H., & Luna-Reyes, L. F. (2018). Key determinants of online fiscal transparency: A technology-organization-environment framework. *Public Performance & Management Review*, 42(3), 606–631. <https://doi.org/10.1080/15309576.2018.1486213>

- Chen, Y. (2015). Improving transparency in the financial sector: E-government XBRL implementation in the United States. *Public Performance & Management Review*, 37(2), 241–262. <https://doi.org/10.2753/PMR1530-9576370203>
- Crespo, C., Ripoll, V., Tamarit, C., & Valverde, R. (2018). Institutional characteristics and managers' perceptions of accounting information: Impact on e-government use and organisational performance. *Revista Española de Financiación y Contabilidad*, 47(3), 352–365.
- De Blasio, E., & Selva, D. (2016). Why choose open government? Motivations for the adoption of open government policies in four European countries. *Policy & Internet*, 8(3), 225–247.
- De Chiara, F. (2018). Public data and value creation in Italy. The findings from the Open Data 200 study. *Sociologia Del Lavoro*, 65–83.
- De Filippi, F., Coscia, C., & Cocina, G. (2017). Collaborative platforms for social innovation projects. The Miramap case in Turin. *TECHNE - Journal of Technology for Architecture and Environment*, 14, 218–225.
- De Filippi, F., Coscia, C., & Guido, R. (2017). How technologies can enhance open policy making and citizen-responsive urban planning: MiraMap – A governing tool for the Mirafiori sud district in Turin (Italy). *International Journal of E-Planning Research*, 6(1), 23–43.
- Deng, S., Peng, J., & Wang, C. (2013). Fiscal transparency at the Chinese provincial level. *Public Administration*, 91(4), 947–963.
- Eom, S. J., Hwang, H., & Kim, J. H. (2018). Can social media increase government responsiveness? A case study of Seoul, Korea. *Government Information Quarterly*, 35(1), 109–122.
- Field, M. (2019). How European Union policy actors use and assess the effectiveness of e-transparency. *Public Policy and Administration*, 34(1), 42–61.
- Fucini, M., Cesarini, M., & Mezzananza, M. (2007). Analysis-sensitive conversion of administrative data into statistical information systems. *Journal of Cases on Information Technology*, 9(4), 293–296.
- Gandía, J. L., Marrahi, L., & Huguet, D. (2016). Digital transparency and Web 2.0 in Spanish city councils. *Government Information Quarterly*, 33(1), 28–39.
- Giacomini, D. (2019). Debate: Should there be rules governing social media use for accountability in the public sector? *Public Money & Management*, 40(6), 471–472.
- lemma, R. (2016). Towards personal data services: A view on some enabling factors. *International Journal of Electronic Governance*, 8(1), 58–73.
- Ingrams, A. (2017). The legal-normative conditions of police transparency: A configurational approach to open data adoption using qualitative comparative analysis. *Public Administration*, 95(2), 1–19.
- Janssen, M., Kars, M., & Van Veenstra, A. F. (2007). Integrating information architecture and process management: Experiences from the development of a digital safe by the Dutch inland revenue service. *International Journal of Technology, Policy and Management*, 7(4), 378–395.
- Jiang, H., Shao, Q., Liou, J. J. H., Shao, T., & Shi, X. (2019). Improving the sustainability of open government data. *Sustainability*, 11(8), 1–27.
- Johnston, R., Manley, D., Jones, K., Hoare, A., & Harris, R. (2017). British educational trajectories from school to university: Evaluating quantitative evidence in policy formulation and justification. *Policy & Politics*, 45(2), 137–155.
- Justice, J. B., Melitski, J., & Smith, D. L. (2006). E-government as an instrument of fiscal accountability and responsiveness: Do the best practitioners employ the best practices? *The American Review of Public Administration*, 36(3), 301–322.
- Kalema, B. M., & Mokgadi, M. (2017). Developing countries organizations' readiness for big data analytics. *Problems and Perspectives in Management*, 15(1), 260–270.
- Katz, J., & Halpern, D. (2013). Political and developmental correlates of social media participation in government: A global survey of national leadership websites. *International Journal of Public Administration*, 36(1), 1–15.
- Koga, T. (2005). Government information and roles of libraries and archives: Recent policy issues in Japan. *Progress in Informatics*, 1, 47–58.
- Kosajan, V., Chang, M., Xiong, X., Feng, Y., & Wang, S. (2018). The design and application of a government environmental information disclosure index in China. *Journal of Cleaner Production*, 20, 1192–1201.
- Krishnamurthy, R., & Desouza, K. C. (2016). Big data analytics: The case of the social security administration. *Information Polity*, 19(3/4), 165–178.
- Ku, C., & Leroy, G. (2014). A decision support system: Automated crime report analysis and classification for e-government. *Government Information Quarterly*, 31(4), 534–544.
- Kuoppangas, P., Kinder, T., Stenvall, J., Laitinen, I., Ruuskanen, O. P., & Rannisto, P. H. (2019). Examining the core dilemmas hindering big data-related transformations in public-sector organisations. *NISPAcee Journal of Public Administration and Policy*, 12(2), 131–156.
- Lavertu, S. (2016). We all need help: "Big data" and the mismeasure of public administration. *Public Administration Review*, 76(6), 864–872.
- Letch, N., & Teo, J. (2015). Accounting for the contexts of government service transformation: The case of building approvals in Singapore. *Transforming Government: People, Process and Policy*, 9(3), 352–369.

- Linde, J., & Karlsson, M. (2013). The dictator's new clothes: The relationship between e-participation and quality of government in non-democratic regimes. *International Journal of Public Administration*, 36(4), 269–281.
- Lindquist, E. A., & Huse, I. (2017). Accountability and monitoring government in the digital era: Promise, realism and research for digital-era governance. *Canadian Public Administration*, 60(4), 627–656.
- Lněnička, M., & Komárková, J. (2015). The performance efficiency of the virtual hadoop using open big data. *Scientific Papers of the University of Pardubice, Series D: Faculty of Economics and Administration*, 23 (1), 88–100.
- Longo, J., & Dobell, R. (2018). The limits of policy analytics: Early examples and the emerging boundary. *Politics and Governance*, 6(4), 5–17.
- Loukis, E. (2001). Information systems security in the Greek public sector. *Information Management & Computer Security*, 9(1), 21–31.
- Lourenço, R. P. (2015). An analysis of open government portals: A perspective of transparency for accountability. *Government Quarterly*, 32(3), 323–332.
- Lourenço, R. P., Piotrowski, S., & Ingrams, A. (2017). Open data driven public accountability. *Transforming Government: People, Process and Policy*, 11(1), 42–57.
- Lowry, P. B., Albrecht, C. C., Jr, J. F. N., & Lee, J. D. (2002). Evolutionary development and research on internet-based collaborative writing tools and processes to enhance eWriting in an eGovernment setting. *Decision Support Systems*, 34(3), 229–252.
- Luna-Reyes, L. F., & Najafabadi, M. M. (2019). The US open data initiative: The road ahead. *Information Polity*, 24(2), 163–182.
- Lytras, M. D. (2006). The semantic electronic government: Knowledge management for citizen relationship and new assessment scenarios. *Electronic Government, an International Journal*, 3(1), 5–17.
- Mahzan, N. (2014). IT auditing activities of public sector auditors in Malaysia. *African Journal of Business Management*, 5(5), 1551–1563.
- Matheus, R., & Janssen, M. (2019). A systematic literature study to unravel transparency enabled by open government data: The window theory. *Public Performance and Management Review*, 43(3), 503–534.
- Mergel, I. (2017). Building holistic evidence for social media impact. *Public Administration Review*, 77(4), 489–495.
- Michael, B., & Bates, M. (2003). Assessing international fiscal and monetary transparency: The role of standards, knowledge management and project design. *International Public Management Journal*, 6(2), 95–116.
- Misuraca, G., Codagnone, C., & Rossel, P. (2013). From practice to theory and back to practice: Reflexivity in measurement and evaluation for evidence-based policy making in the information society. *Government Information Quarterly*, 30(Supplement 1), 68–82.
- Mosweu, O. (2019). Skills and competencies for authenticating digital records to support audit process in Botswana public sector. *African Journal of Library Archives and Information Science*, 29(1), 17–28.
- Mullen, P. R. (2005). US performance-based laws: Information technology and e-government reporting requirements. *International Journal of Public Administration*, 28(7/8), 37–41.
- Narro, A. J., Mayo, C., & Miller, A. F. (2008). Legislators and constituents: Examining demographics and online communication tools. *Information Polity*, 13(3/4), 153–165.
- Navarro-Galera, A., Alcaraz-Quiles, F. J., & Ortiz-Rodríguez, D. (2015). Online dissemination of information on sustainability in regional governments. Effects of technological factors. *Government Information Quarterly*, 33(1), 53–66.
- Nelson, J. K., Quinn, S., Swedberg, B., Chu, W., & Maceachren, A. M. (2015). Geovisual analytics approach to exploring public political discourse on Twitter. *ISPRS International Journal of Geo-Information*, 4(1), 337–366.
- Nikoloyuk, G. M., Marche, S., & Mcniven, J. (2005). E-commerce impact on Canadian public sector audit practice. *International Journal of Public Sector Management*, 18(1), 83–95.
- Osman, I. H., Latef, A., Irani, Z., Al-Ayoubi, B., Lee, H., Medeni, T. D., & Weerakkody, V. (2014). COBRA framework to evaluate e-government services: A citizen-centric perspective. *Government Information Quarterly*, 31(2), 243–256.
- Oswald, M., Grace, J., Urwin, S., & Barnes, G. C. (2018). Algorithmic risk assessment policing models: Lessons from the Durham HART model and “experimental” proportionality. *Information & Communications Technology Law*, 27(2), 223–250.
- Payne, W. M. (2016). New development: Putting a 25-year experiment to the test. *Public Money & Management*, 36(3), 197–200.
- Peeters, R., & Schuilenburg, M. (2018). Machine justice: Governing security through the bureaucracy of algorithms. *Information Polity*, 23(3), 267–280.
- Pérez, C. C., Rodríguez Bolívar, M.P., & Lopez Hernández, A. M. (2008). E-government process and incentives for online public financial information. *Online Information Review*, 32(3), 379–400.
- Pors, A. S. (2018). Digital displacements in patient-professional relations: Four modes of organizational patient. *Journal of Health Organization and Management*, 32(4), 603–617. <https://doi.org/10.1108/JHOM-10-2016-0193>
- Prier, E. (2018). Analysing the European Union's tenders electronic daily: Possibilities and pitfalls. *International Journal of Procurement Management*, 11(6), 722–747.
- The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. <https://doi.org/10.1371/journal.pmed1000097>



- Puron-Cid, G., Pedro, M., & Bolívar, R. (2017). The effects of contextual factors into different features of financial transparency at the municipal level. *Government Information Quarterly*, 35(1), 135–150.
- Rao, A. R., & Clarke, D. (2017). Hiding in plain sight: Insights about health-care trends gained through open health data. *Journal of Technology in Human Services*, 36(1), 2–5.
- Ray, S. (2012). Reinforcing accountability in public services: An ICT enabled framework. *Transforming Government: People, Process and Policy*, 6(2), 135–148.
- Roberts, A. (2002). Administrative discretion and the access to information act: An “internal law” on open government? *Canadian Public Administration*, 45(2), 175–194.
- Roy, J. (2017). Digital government and service delivery: An examination of performance and prospects. *Canadian Public Administration*, 60(4), 538–561.
- Rumbul, R. (2016). ICTs, openness and citizen perceptions of government: How civic technologies can facilitate external citizen efficacy. *Medijske Studije*, 7(14), 32–46.
- Schillemans, T., Van Twist, M., & Vanhommerig, I. (2013). Innovations in accountability. Learning through interactive, dynamic, and citizen-initiated forms of accountability. *Public Performance & Management Review*, 36(3), 37–41. <https://doi.org/10.2753/PMR1530-9576360302>
- Schmid, A. (2017). Big data – Public controlling fundamental changes in public management. *Public Policy and Administration*, 16(2), 325–334.
- Schnell, S., & Jo, S. (2019). Which countries have more open governments? Assessing structural determinants of openness. *The American Review of Public Administration*, 49(8), 944–956.
- Seifert, J. W., & Relyea, H. C. (2004). Do you know where your information is in the homeland security era? *Government Information Quarterly*, 21(4), 399–405.
- Severo, M., Feredj, A., & Romele, A. (2016). Soft data and public policy: Can social media offer alternatives to official statistics in urban policymaking? *Policy & Internet*, 8(3), 354–372.
- Sharma, P. N., Morgeson III, F. V., Mithas, S., & Aljazzaf, S. (2018). An empirical and comparative analysis of e-government performance measurement models: Model selection via explanation, prediction, and parsimony. *Government Information Quarterly*, 35(4), 515–535.
- Silva, P. N., & Pinheiro, M. M. K. (2018). DGABr: Metric for evaluating Brazilian open government data. *Informacao e Sociedade*, 28(3), 225–243.
- Sohl, S. N., Waymire, T. R., & Webb, T. Z. (2018). Determinants of bifurcated local government reporting lag: The potential for XBRL to improve timeliness. *Journal of Emerging Technologies in Accounting*, 15(1), 121–140.
- Stier, S. (2015). Political determinants of e-government performance revisited: Comparing democracies and autocracies. *Government Information Quarterly*, 32(3), 270–278.
- Vetrò, A., Canova, L., Torchiano, M., Orzoco Minotas, C., Iemma, R., & Morando, F. (2016). Open data quality measurement framework: Definition and application to open government data. *Government Information Quarterly*, 33(2), 325–337.
- Wandhöfer, T., Taylor, S., Alani, H., Joshi, S., Sizov, S., Walland, P., Thamm, M., Bleier, A., & Mutschke, P. (2012). Engaging politicians with citizens on social networking sites: The WeGov toolbox. *International Journal of Electronic Government Research*, 8(3), 22–43.
- Wang, C., Medaglia, R., & Zheng, L. (2017). Towards a typology of adaptive governance in the digital government context: The role of decision-making and accountability. *Government Information Quarterly*, 35(2), 306–322.
- Wang, T. (2014). An analysis of the effects of online fiscal disclosure on municipal bond issuances. *International Review of Public Administration*, 17(2), 1–18.
- Wasike, B. (2016). FoIA in the age of “Open .Gov”: An analysis of the performance of the Freedom of Information Act under the Obama and Bush administrations. *Government Information Quarterly*, 33(3), 417–426.
- Yang, Y.-N., Zhang, Y., Jiang, Y.-Y., & Shen, Y. (2014). Leveraging new media applications in response to public opinions: The Chinese county governments’ performance. *International Journal of Information Systems and Change Management*, 7(2), 115–134.
- Young, M., Katell, M. A., & Krafft, P. M. (2017). Municipal surveillance regulation and algorithmic accountability. *Big Data & Society*, July–December 2019, 1–14.
- Yu, W. (2011). Open government information: Challenges faced by public human resource management in China. *International Journal of Public Administration*, 34(13), 879–888.

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