REVIEW ARTICLE

WILEY

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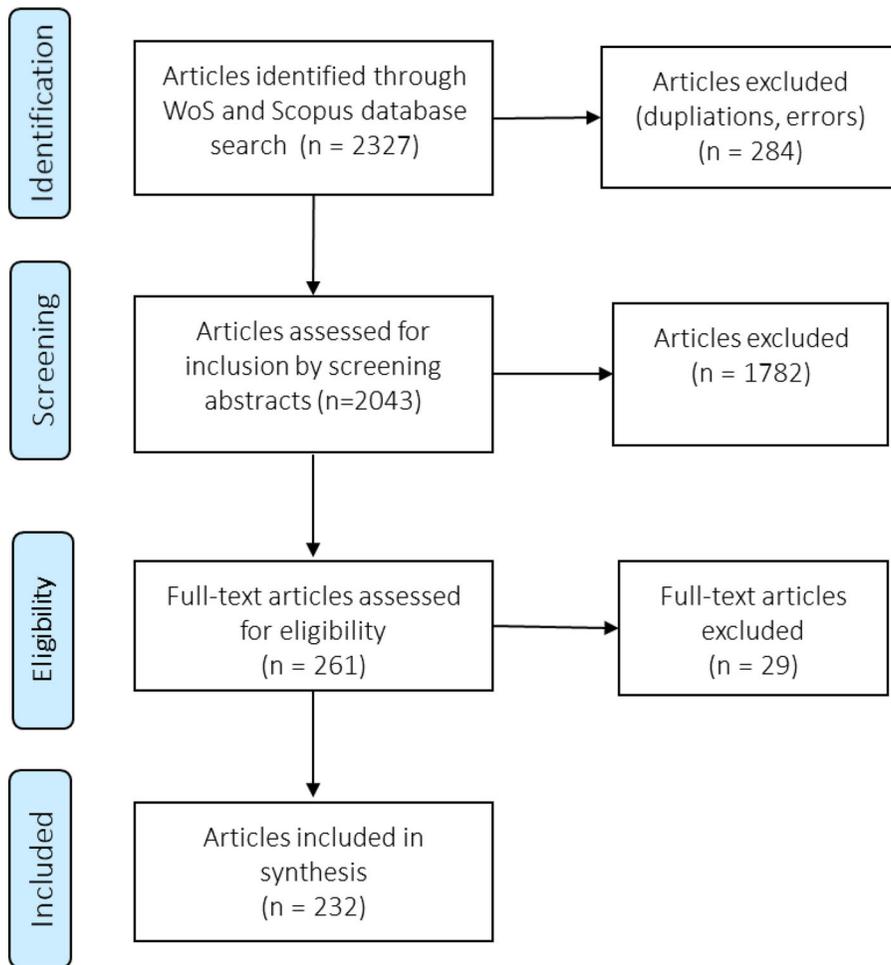
FIGURE 1 PRISMA flow diagram for literature review process, adapted from http://www.prisma-statement.org/ [Colour figure can be viewed at wileyonlinelibrary.com]

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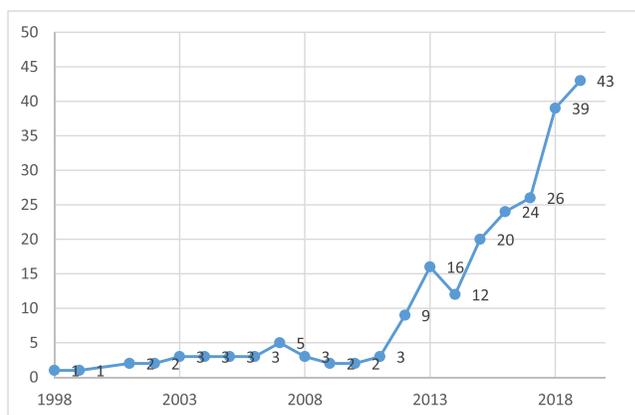
3 | PUBLIC SECTOR DIGITALIZATION, ACCOUNTING AND ACCOUNTABILITY: AN OVERVIEW OF THE LITERATURE

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 Bòlivar 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
Total	**232**	**100**

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
Total	**100**	**232**
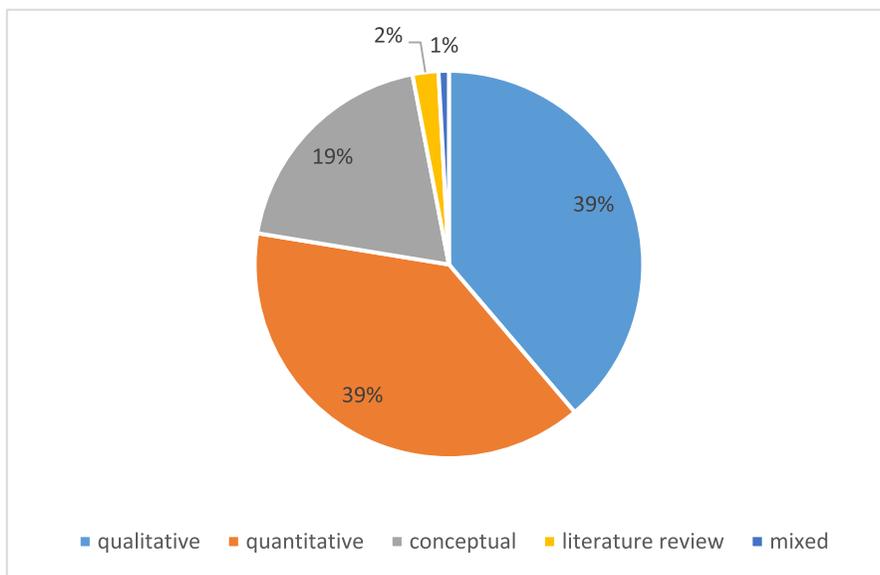
FIGURE 3 Proportion of the methodology used [Colour figure can be viewed at wileyonlinelibrary.com]

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., Ruijer 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
Total	**232**	**100**

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
• Who: multiple data producers (self-made approach) • What: heterogeneous data sets • When: real-time data production • Where: government, citizens and third parties' sources • How (translation): technical view on best algorithms and analytics techniques	• Asaro, 2019 • Basilio et al. 2019 • Currie, 2020 • Choi, 2017 • Dai & Li, 2016 • Driss et al., 2019 • Georgiadou et al., 2020 • Lourenço, 2013 • Ma et al., 2016 • Quinn et al., 2019 • Rodriguez Bolivar et al., 2006 • Tunney & Thomas, 2015	• Horizontal heterarchical and coproduced accountability • Accountability in the process of translation of data: role of accountants and accounting standards

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 heterogenous, 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
• Different users: citizens, intermediaries, governments • Different use: from information provision and decision-making to engagement and empowerment but also surveillance • Drivers, barriers, and obstacles of use	• Anshari & Lim, 2017 • Birchall, 2015 • Boudreau, 2020 • Currie, 2020 • Hand and Ching, 2020 • Harris et al., 2011 • Kum et. al., 2015 • Levine et al., 2017 • Machova et al., 2018 • Ruijer et al., 2020 • Worthy, 2015	• Dialogic forms of accountability • Blurring of accountabilities

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).

*Citizen*s 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; Ruijer 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; Kozlowski 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
• Expected vs. actual effects • Types of effects: improvement of policies and services, implications for social equity, increased transparency, accountability, legitimation, and trust in government	• Agrawal and Nair, 2018 • Manes Rossi et al., 2018 • Marjanovic and Cecez-Kecmanovic, 2017 • Mendieta & Alonso, 2017 • Power, 2016 • Sa & Grieco, 2016 • Zao et al., 2016 • Zuiderwijk and Janssen, 2014	• Accountability for social equity and inclusion • Diffused and pluralistic forms of accountability

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; Hossain 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

[1] Book chapters were excluded, as they are not always peer-reviewed and are not always indexed in databases.

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