

Exploring the discourse on digital transformation in nonprofit organizations

Michele Cipriano^{1,*} , Stefano Za

University "G. D'Annunzio" of Chieti-Pescara, Department of Management and Business Administration, Pescara, Italy

ARTICLE INFO

Keywords:

Digital transformation
Nonprofit organizations
Bibliometric analysis
Thematic map
Research agenda

ABSTRACT

This study explores digital transformation (DT) phenomena in nonprofit organizations (NPOs) through a bibliometric analysis of related literature, contributing to the examination of such organizations' unequal development and digital presence. Unlike research predominantly focused on for-profit-based assumptions, this study inspects nonprofit-based elements linked to DT. The analysis identifies people-centered factors, nonprofit-related themes, and key dynamics of DT within NPOs, highlighting the need for conceptual models that reflect their specificities. By bridging insights from information systems and nonprofit studies disciplines, this research highlights distinct aspects linked to DT outcomes in the NPO context, designing targeted guidance for future research.

1. Introduction

The digital transformation (DT) phenomenon still represents a challenging topic for academics and practitioners [1], who question its novelty [2] while examining multiple and interconnected variables affecting its comprehension [3]. In the last decade, scholars have conceptualized different understandings of DT [4,5], adopting a technology-centric approach [6], a business-centric perspective [7], or a holistic one [8]. Accordingly, definitions of DT adopt different forms [9, 10], ranging from an IT-driven phenomenon [11,12] involving multiple entities to the conceptualization of Vial [13], presenting DT as a process that could improve, transform, or change an entity's property [13]. Building on these assumptions, a large body of academic research examines the DT process with regard to different sectors and fields of study [14–18]. However, some top journal editorials [4], special issues [19, 20], and calls for papers² [21], especially from the information systems (IS) community, invite researchers to expand their insight into the DT process and theoretical diversity [22–24]. Practitioners and academics increasingly acknowledge the nexus of multi-scale and multi-level stimuli and the effects influencing or generating contemporary DT processes [1,25]. In addition, there is growing recognition of organizations' unequal development and digital presence [26], where room for further investigations concerns how to manage and sustain DT processes [27], the distinct characteristics of certain contexts for exploring

intradisciplinary implications [24,28], and how value and human-centric themes (among other) influence such a conversation [23, 29].

Moreover, some scholars claim that there are difficulties in conceptualizing DT-enabled change management and implementation [14,15], and they also argue that the DT process seems not to have been well theorized yet [4]. For example, Trischler and Li-Ying [30] claim that the absence of context-specific considerations regarding DT outcomes hinders the possibility to clearly define and understand DT within that particular context. Remane et al. [31], challenge the idea that DT processes can be evaluated and measured through the same DT path for all firms, stating that the impact of DT processes relies on a firm's digital maturity level and readiness to master the related changes. Furthermore, there is growing interest in how organizations can access resource management for their DT in dynamic and transient arrangements [32], since one difficulty concerns the resource fluidity for DT processes [33]. Other challenges involve some IS contexts [28] that may not be well understood [34,35], perhaps because they do not have a well-defined organizational ecosystem [34,36,37].

From this perspective, some researchers have discussed the roles of information and communication technologies (ICTs) for a wide range of major societal challenges, providing recommendations for designing DT processes [38]. Scholars have analyzed DT processes and societal challenges extensively with regard to public and for-profit organizations [1,

* Corresponding author at: University "G. D'Annunzio" of Chieti-Pescara, Department of Management and Business Administration, Viale Pindaro 42, 65127 Pescara, Italy.

E-mail addresses: michele.cipriano@unich.it, michele.cipriano@unicatt.it (M. Cipriano), stefano.za@unich.it (S. Za).

¹ The present address is Catholic University of the Sacred Heart, Department of Economic and Social Sciences, Via Emilia Parmense 84, 29,122 Piacenza, Italy.

² https://onlinelibrary.wiley.com/pb-assets/assets/13652575/Final%20Special%20Issue%20call_ISJ_DT-1634657282920.pdf

39]. However, the literature reveals that nonprofit organizations (NPOs) represent a unique context [40,41] that deserves further investigation concerning DT and related organizational changes [36,42]. Some scholars argue that little attention is paid to the DT process with respect to the commitment of NPOs, their organizational operability, and the way they create value [37]. NPOs rely predominantly on voluntary participation, work, and membership [43]. NPOs' operability depends primarily on donations and fundraising, and their activities disregard any consideration or distribution of profit [40]. NPOs are organizations that, by nature, are uniquely committed to building civil society and strengthening common well-being, social capital, and economic development [43]. Although NPOs may operate like any other industry, they usually have unique objectives, organizational features, and operability assets [36,43]. As a consequence, since NPOs are characterized by a "non-distributional constraint" [44], they differ significantly from other organizational forms, both in the ways they achieve their objectives and in their unique *raison d'être* [45,46]. For these reasons, NPOs may represent an IS context that is still poorly understood and an opportunity to enrich and improve further conceptualization of DT by accounting for interdisciplinary components [24].

This research questions whether the existing literature is relevant to analyzing and advancing the DT debate concerning NPOs. Specifically, it attempts to extend the understanding of DT with regard to specific lines of inquiries exploring a nexus of changes considering the DT diversity [25,47,48] in the footsteps of Vial's [13] definition of DT. Moreover, it aims to shift the analytical framework from a predominantly for-profit orientation [49] to one tailored to the nonprofit context [50], acknowledging that prior research findings are often rooted in specific markets and cases analyzed [12,27,51]. In addition, this work attempts to challenge and broaden the problematization of the debate on DT related to civic and societal challenges [38,52]. For example, it seeks to provide an extensive overview of the discussion (strictly discussing DT in NPOs), not limiting it to empirical evidence based on large-scale companies [52]. It is not restricted, for example, to the level of investigation considering the involvement of several actors and millions of members and supporters [52]. Furthermore, it does not adopt governmental perspectives [53] or focus on specific initiatives/phenomena such as (i) social media's influence on political activism, (ii) Internet access in various countries, (iii) refugee families that make use of personal computers and online access, (iv) delivering government benefits to citizens in a remote area, (v) comparison of biometric identity verification programs, or (vi) focus on specific geographical areas (such as Western business contexts) [38].

Hence, we propose a literature review based on bibliometric data analysis to advance the understanding of themes [54–56] concerning the evolution of DT research in NPOs [57,58]. By adopting this approach, we aim to provide a more comprehensive overview of the discussion than in previous research [36,41,42], which focused predominantly on for-profit-based assumptions [59]. Given the characteristics and peculiarities of the nonprofit context [60–62], attention is placed on investigating organizational culture and human engagement, with an emphasis on outlining the people-centered factors, such as collaboration and adaptability themes [23], that could characterize the conversation about DT and related initiatives associated with nonprofit outcomes [22, 24]. Thus, following in the footsteps of Gregor's [63] nature of theories in IS research, and drawing on Rivard's [64] assumptions on performing literature review and theory building (as a bottom-up approach), this study seeks to answer the following research question: *What is the trend, and what are the main themes characterizing the DT research regarding NPOs?* As a way of explanation, such a question also allows us to benchmark the purpose of the "Analysis" theory type, which is helpful in guiding research in exploring "What is" a phenomenon [63], at the same time, seeking to inspect the distinctive aspects that reflect on characterizations of the conversation focused on NPOs (and related potential theoretical diversity about the DT phenomenon [22]). To this end, we first developed a performance analysis [65–67] to describe the scientific

contributions discussing DT in NPOs, considering different sources and quality of publications, with a particular focus on the IS field [57]. To perform the analysis, we mainly used the Bibliometrix package [68] in the R environment, also employing additional software such as "WOS viewer" [69] and "Gephi" [70]. Afterward, we conducted a science mapping network analysis, focusing on authors' keyword co-occurrences, to investigate the conceptual structure, evolution, and relations between themes [65–67]. Thus, we summarize the theoretical development of previous studies to support comprehension of the research design, data analysis, and result interpretation in the next section. The methodology section and the literature search protocol follow this. Then, the performance and science mapping analysis are provided in the results section, followed by discussions proposing future research directions. Conclusions, contributions, and limitations close the paper.

2. Theoretical background

In recent years, challenges triggered by uncertainty and unexpected events [53,71], such as coronavirus disease 19 (COVID-19), have significantly influenced the production of scientific research [56,57]. Among other aspects, several scholars in the literature focus on the need to understand [71], conceptualize [62], and manage [21] the changes affecting organizational ecosystems [59]. By exploring organizational antifragility [72] and envisioning "a new normal" of resilience, well-being, and Sustainable Development Goals (SDGs) [60,71,73,74], DT initiatives seem to be a global priority today [33,75]. The importance of DT initiatives can be observed in facilitating innovation, in providing organizational flexibility [19], and in their potential to generate social and economic value [61,75]. For example, some organizations develop DT initiatives to enable organizational changes [14,15], while others seek to improve their business opportunities [9,10]. Similarly, some NPOs are thought to foster DT initiatives to leverage digital-based communication to facilitate interactions with their stakeholders and be involved mainly in providing public services to society [36,43]. Hence, since DT phenomena also trigger broad-scale societal changes [19], it might be significant to explore the implications of a digitized society for the organizations involved in societal challenges carefully.

Evidence from recent studies highlights several potential benefits of designing and developing DT initiatives in organizations such as NPOs. For instance, DT initiatives could enhance value co-creation between NPOs and their collaborators, fostering partnerships that support shared goals [76]. DT initiatives can improve alliance performance, helping NPOs and their sponsors achieve financial and non-financial objectives, such as environmental sustainability, workforce diversity, human rights, philanthropy, and ethical practices [77]. In addition, DT can serve NPOs as a strategic enabler for organizational development, aligning operations with mission-driven values and objectives [78], so that the adoption of user-driven technologies can enable NPOs to implement cost-effective solutions despite constrained budgets and cost pressures [79].

However, DT processes in NPOs remain under-researched in the extant literature [41,42], especially the investigation concerning the main DT processes adopted by NPOs and their motivations, and how those processes are implemented [80], given the inherent differences and dynamics of the nonprofit construct (i.e., concerning the distinct preconditions and value-creation structures that characterize these organizations) [42,59]. NPOs are becoming increasingly important in a globalized world, considering their involvement in supporting society [60] in overcoming unprecedented socioeconomic and geopolitical challenges [47]. NPOs belong to the broader nonprofit sector (NPS), ranging from tertiary and non-governmental organizations to foundations, philanthropic, and volunteer entities [61]. NPOs are flagships of a unique organizational nature based on non-distributional constraints, the primacy of nonfinancial outcomes, and the deployment of their values structured around a social mission. Moreover, only a few

organizations running nonprofit activities are thought to succeed in DT processes and to be able to navigate such transformations strategically [41,81]. This limited progress may be hindered further by operational and theoretical challenges surrounding the DT discourse in the NPO domain [43]. One constraint lies in the complexity of the NPO ecosystem, which is shaped by unique characteristics, legal frameworks, and divergent conceptualizations across different regions around the globe [62,71], complicating examination of their DT processes [21,34].

Some scholars have recently contributed to developing the assumption that organizational vision and strategic and financial constraints represent inherent differences of NPOs, contraposing the construct of DT, which originated in the for-profit sector [59]. From this perspective, an initial discourse on exploring differences and dynamics concerning the DT process developed by NPOs is emerging in the literature [60,77]. Some scholars examine DT by considering the classic references to the nonprofit construct, such as the limited availability of resources [43]. Others argue that a lack of knowledge concerning the specific pre-conditions of NPOs limits understanding of which particular aspects link to DT outcomes in this context [42]. Further researchers claim that the strategic development of DT in NPOs, understood as how NPOs operationalize a DT process [41,75,82], as well as the impact of DT on the NPOs' work and performance [75], has yet to be acknowledged. From this perspective, a lack of in-depth understanding of DT processes within NPOs could result in nonprofit stakeholders failing to meet expectations or deliver anticipated value [61].

Based on these previous findings, we consider the DT phenomenon as a process, focusing on its potential implications for organizational change [13]. Yet, considering that the DT phenomenon differs from past IT-related organizational change [15], it is challenging to analyze DT-enabled change management and implementation, as DT is triggered and shaped by the widespread deployment of digital technologies [14]. Research examining objectives within the NPS highlights that the structural and operational distinctiveness of NPOs significantly influences their approach to DT. One of the most notable challenges arises from limited resources, which often hinder the implementation of technology initiatives [83]. These constraints are manifested in various ways, including a lack of adequate funding, insufficient technical expertise, a prevailing problem-focused mindset, and underdeveloped governance structures [79]. Regarding the identification of the organizational context, this research adopts Salomon and Sokolowski's [50] conceptualization of NPOs. Specifically, this definition allows an NPO to be identified when the following five characteristics simultaneously occur: (i) *institutions* (or organizations that may or may not be formally or legally constituted), (ii) *private* (institutionally separated and not controlled by the government), (iii) *self-governing* (able to control their activities without operational control by any other entity, whether private or governmental), (iv) *nonprofit-distributing* (a legal prohibition is placed on the organization's constituents or other stakeholders receiving any quota of the surplus generated by the organization's activities), and (v) *without compulsion* (participation in the organization must be voluntary and the result of a free choice) [50].

3. Materials and methods

To provide a comprehensive overview of the research examining the DT phenomenon and the NPO domains using bibliometric methods, we summarize the previous literature reviews in the first sub-section. Afterward, we develop an exhaustive narrative describing the research design integrating mixed-method bibliometric investigation [66,67,84, 85].

3.1. Previous literature review

For methodological assessment, the adoption of bibliometric techniques by researchers to examine scientific publications systematically within specific fields is extensively acknowledged in the literature

[86–89]. These methods are particularly used for examining theoretical paradigm shifts, developments, and current trends of research topics over extended periods [90–92]. Bibliometric analyzes typically consist of processing bibliographic data gathered from online databases [91, 93], ranging from basic descriptive analyzes (performance analysis) [90, 94] to more advanced approaches useful to map knowledge structures and examine the evolution of specific research areas (science mapping) [95,96].

Regarding the conversation on DT literature, bibliometric studies have also emerged in recent years, particularly concerning multidisciplinary examinations [97]. Kraus et al. [98] investigate the thematic evolution of DT in business and management studies, highlighting its limited exploration to the date of analysis and assessing the quality of published research. Similarly, Chawla and Goyal [99] analyze 234 journal articles revealing emerging trends in DT by exploring the intellectual structure of the conversation through citation, co-citation, and keyword analysis. De Bem Machado et al. [100] conduct a structured review of 761 articles discussing DT, knowledge management, and Industry 4.0, aiming to understand the interconnections between these fields. Their study employs a hybrid methodology, using the Bibliometrix R package to enhance analytical rigor and reduce bias [100].

Other studies adopt diverse tools and approaches to investigate the DT discourse. Kraus et al. [101] use the VOSviewer software to analyze keyword co-occurrences, identifying three clusters (technological, business, and societal impacts) that shape the DT discussion. Their research offers insights for policymakers and private enterprises for guiding changes given fostered DT initiatives [101]. In contrast, Adekunle et al., [102] examine the conversation on DT focusing on the construction sector, classifying the related literature through keyword co-occurrence analysis (based on both authors and journal indexed keywords). Their findings highlight an increasing interest in DT within the industry, particularly over the past decade, while emphasizing barriers impeding progress in certain regions. To address these challenges, the authors propose a conceptual model and outline areas for further investigation [102].

An additional contribution is from Pizzi et al., [103], who examine the impacts of DT on managerial auditing through a combined bibliometric and literature review approach. Their analysis involves techniques based on citation, keyword clustering, and density mapping, resulting in a research agenda focused on four key areas for this discipline: continuous auditing, fraud detection, data analytics, and technology [103]. Similarly, Chinotaikul and Vinayavekhin [97] investigate DT, framing it as a research field in business and management, performing co-word network analysis to identify influential works and intellectual trends. They observe a significant increase in DT-related studies between 2016 and 2020, especially concerning topics such as the Internet of Things (IoT) and digital twins [97]. However, only a few studies explore the debate on DT by focusing strictly on NPOs [36, 40–43], most of which adopt a qualitative approach.

3.2. Research protocol

This study employs a bibliometric approach to investigate the key research areas and foundational aspects of the DT discourse in NPOs [58, 66,104]. By analyzing the structure and characteristics of topics in scientific publications [105,106], we use the bibliometric methods (i.e., performance analysis and science mapping) [57,91], with two primary objectives: (i) to trace the conceptual evolution of the conversation on DT in NPOs, and (ii) to reveal connections between concepts through the co-occurrence of terms [107]. To this aim, we examine the distribution of publications across journals, book chapters and conference proceedings [108,109]. Particular attention is given to the proliferation of research in major IS sources [58,93], considering that this discipline represents a field often viewed as closely linked to and relevant for the present research domains [23,110,111]. We focus exclusively on author-defined keywords, excluding platform-generated terms (e.g.,

“indexed keywords”), as these are considered the most accurate representation of a contribution, in accordance with the authors’ standpoint [55]. In particular, we develop a thematic map using co-word network analysis and keyword clustering [98,112,113]. We adopt this science mapping approach (investigating the conceptual structure of the conversation [65]) to identify strongly interconnected keyword networks (as keywords strongly linked to each other) [114,115] and present the resulting themes through a thematic network. The clusters derived from this analysis represent prominent research streams or areas of significant scholarly interest [87,88,97], given their computed centrality and density measures [91,114], providing a quantitative basis for interpreting the importance and cohesion of each theme. According to Aria et al., [55], this approach builds on specific assumptions: (i) authors of scientific publications deliberately choose terms to represent the key aspects of their research; (ii) the presence of multiple terms within the same publication suggests potential connections between concepts or themes; and (iii) when numerous authors recognize and use similar relationships between terms, these connections gain significance within the research field. The methodological foundation relies on co-word analysis, apt to examine the co-occurrence of terms across publications (e.g., performing a bibliographic coupling to connect publications) [55,66]. Thus, the more frequently two terms appear together, the stronger their conceptual relationship. By analyzing these term pairs, the relational data can be visualized using tree diagrams or graph networks [55]. Statistical measures are employed to quantify and assess the significance of these relationships [114], where co-word analysis offers a robust means to map the evolution of research topics and uncover links between concepts [55].

We adopted the research protocol in Fig. 1, which is based on three main steps: (I) dataset setting, (II) dataset refining, and (III) data analysis. We adapted this crafted protocol [64] from Za and Braccini [84] (as a more synthetic guide), at the same time, making sure to address collection and processing criteria properly [65] and design tailored performance and science mapping techniques (in line with the objectives of the present study) according to broader frameworks that account for all methods of knowledge structure examination (as suggested by Di Vaio et al. [65]) or extensive bibliometric analysis toolbox (as proposed by Donthu et al., [66]). The first step consists of data collection. We identified a congruous source for the literature search, developed a comprehensive search query, and manually refined the keywords in the query search [65,84]. We used the Scopus database for the dataset collection, an indexing platform highly deployed by social studies academics and practitioners [116]. We decided to use Scopus as a database for this comprehensive and rigorously selected collection of scientific literature. This choice was motivated by Scopus’s ability to provide access to a wide variety of metadata, making it useful and suitable for bibliometric analyzes [117], especially serving as a significant source for the fields of social sciences, humanities, engineering, and technology

[118]. Moreover, we opted for this database (among others such as Web of Science (WoS), EBSCO, or ProQuest), considering that each database could provide different levels of reference metadata quality (in terms of raw data to be downloaded, including the bibliographic information of the papers) [117,119]. In other words, we noticed that Scopus was mostly apt to conduct conceptual structure investigations [65] (providing more accurate indexing information about authors’ keywords) in contrast to WoS (for example), which instead provides more accurate indexing information about citations and bibliographic references (and thus is most suited for conducting intellectual structure investigations [66,67], as proposed by Tigre et al., [120]). Hence, we iterated the search query several times, using different keywords, to include all the publications that do not focus on DT in any sector but are strongly related to NPOs. We did not include keywords such as “ICT” or “IT,” as this research considers DT to be an exclusive phenomenon [14, 15]. This choice did not affect the analysis, considering that some contributions in the final dataset also discuss related themes and thus could include these keywords anyway (despite their not being used for the retrieval). It is also worth nothing saying that several authors recognize significant differences between specific labels [2] or keywords when it comes to investigating, for example, the DT continuum [18] (intended as a progressive organizational endeavor through the steps of digitization, digitalization, and digital transformation). In comparison, although we acknowledge the significance of this assumption for the IS discipline, we relax this and focus on broader reasoning for this study. In light of this, we attempt to take into examination all the related discussions (such as how digital technologies could affect an NPO’s organizational design research [36,41,42]), seeking to advance an interdisciplinary understanding to problematize DT-related themes in NPOs that might surround the conversation in such a context. In particular, this choice is driven by the results discussed in previous studies (as reviewed in Section 2, given the characteristics and theoretical limitations related to the NPS discipline, we thought it useful to apply more relaxed assumptions for advancing such a bibliometric examination focused strictly on the NPOs context). Ultimately, we searched for the terms digitalization and nonprofit organization in the authors’ keywords, title, and abstract fields, using wildcards to include plurals as well as grammatical and spelling variations (e.g., digit*). Also, a language restriction was set to retrieve papers written only in English. By running the final query, we collected an initial dataset of 698 papers covering a period automatically established by the search (last updated on 30 May 2022).

Afterward, in the second step, we performed two main refinements of the dataset [84]. First, we defined the criteria for including or not including a paper [65,84]. For example, we included journal articles, conference papers, books, book chapters, editorials, and reviews. Conversely, we excluded conference reviews, notes, short surveys, data papers, errata, and undefined papers (after analyzing them). Moreover, we excluded papers missing the authors’ names after a manual check on

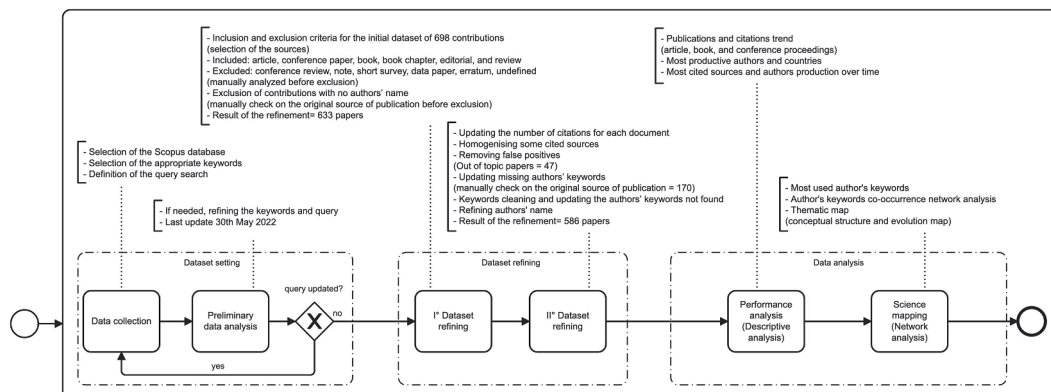


Fig. 1. Research protocol adapted from Za and Braccini [84].

the source page of the publications. As a result, we obtained a refined dataset of 633 papers.

In the second refinement round, we updated the number of citations for each paper and homogenized some cited sources (e.g., *VOLUNTAS—Voluntas—voluntas*). We excluded 47 false positive papers (e.g., papers that included the two keywords but did not discuss the two topics together). Furthermore, we cleaned and updated some of the authors' keywords, as we noticed that several keywords representing the same topic overlapped among the papers (i.e., synonyms and periphrases). In particular, in line with the assumptions presented in the previous paragraph, to keep the perspective closer to the authors, we attempted to homogenize objectively and theoretically similar keywords, such as acronyms, singular or plural spelling variations, abbreviations, and etymologically equivalent words [84]. In this way, we refined an initial set of authors' keywords of 1882 (different occurrences) into a homogeneous set of 1808 (see some examples in Table 1). Also, as we noticed that 170 papers lacked the authors' keywords but were suitable for analysis, we selected and added a set of representative keywords for each of them. Specifically, we added only homogenized keywords after reading the papers. In addition, we focused on the authors' names in order to develop accurate analyses concerning the authors' production and the most representative publications. In other words, this step aimed to identify the correct number of publications attributed to each author and the authors receiving the highest number of citations concerning the most representative papers (in accordance with the local dataset). Then we used the Scopus API to ascertain each author's name, ensuring that the correspondence was with the *Scopus Author Identifier* number (assigned by the same database). As a result, we homogenized and reduced the number of authors. Hence, the final dataset used in the following step consisted of 586 papers (further information concerning the dataset is available upon request to the authors).

Finally, in the third step, we employed the software VOS viewer [121,122] and Gephi [70,123] in addition to R-studio with the Bibliometrix package [67,68] to perform the bibliometric analysis. We investigated publication and citation trends [65,120] (as a complementary focus useful to the aim of our study), emphasizing the analysis of sources belonging to the IS field of study (considering it especially relevant to the research domain under study [23,110,111]). Afterward, we developed a co-word analysis focusing on the authors' most frequently used keywords, their co-occurrences, and their relations [65]. We then elaborated on a thematic map [56,91,98] to analyze the behavior of such a scientific community and the links emerging between the objects of analysis [86,92,124]. According to Cobo et al., [91], based on the keyword co-occurrence graph, the thematic map allows us to identify clusters (research themes) of keywords, considering the strength of their interconnections [91,105,114,115]. These clusters are generated using the "Louvain algorithm" [66,125] for computing two key measures: density (internal cluster connections) and centrality (external connections between clusters). Density indicates topic development, while centrality reflects their relevance. Considering the combination of high and low values for the two parameters, we defined a

strategic diagram (the thematic map) consisting of four categories of themes (*motor themes, niche themes, emerging or declining themes, basic and transversal themes*) [114].

Regarding the choice of software to run analyses, we mainly opt for Bibliometrix, considering that such a tool allows researchers to perform various and complementary analyses based on both descriptive (focus on domains) and science mapping investigations (knowledge-structure) [67,68]. However, we employed VOS viewer to generate the authors' keywords co-occurrences network [121,122], by taking as input the analysis of the occurrences of authors' keywords performed in Bibliometrix. In addition, we then employed Gephi, which is a helpful tool for developing social network analysis [70,123], to improve graphical representation (considering that the VOS viewer software does not allow modeling the computed co-occurrences network).

4. Results

This section consists of two parts encompassing the two objectives of the study. The first provides the performance analysis, describing publication and citation trends, focusing on the most relevant sources, countries, authors, and cited papers [65–67]. The second carries on the science mapping analysis, investigating the most influential topics in our dataset based on the most recurrent keywords that authors use (drawing on one of the bibliographic coupling techniques) [55,65,67,68,126]. Specifically, it focuses on the trend of authors' 41 most frequently used keywords, authors' keyword co-occurrences, and the thematic map based on co-word analysis [56,65,67,127].

4.1. Performance analysis

This analysis was conducted in June 2022, focusing on the final dataset of 586 papers distributed across 462 sources. Fig. 2 depicts the annual trend of publications since 1983, distinguishing three major sources from those included and reported in the methodology section [108,109]. These are articles, book chapters, and conference proceedings. There is a fourth category (others) encompassing the remaining less relevant sources in terms of the number of publications.

The histogram shows growing interest in the DT discussion focused on NPOs over the last two decades, with slight decreases in 2015 and 2019 (with respect to the general trend). Regarding NPOs compared with the studies reported in the theoretical framework [97,99], the DT debate shows an exponential increase (over time) and a growing proliferation in the number of publications (in recent years). Almost 50 % of the papers in the present collection were published in the last four years (2018–2021). Also, although 25 publications were assigned to 2022 at the end of May, the number of contributions for this year may grow, considering this trend. Moreover, considering the sources of publications, the dataset is composed of 347 articles, 55 book chapters, 154 conference contributions, and 30 other sources. In this regard, the number of journal articles is consistently higher than all other sources for each year, except for five years where the number of publications in conference proceedings is more significant (1996, 2005, 2006, 2008, 2009).

When the most relevant source is analyzed, it appears that the dataset is distributed over various specializations, developing a multi-disciplinary discussion. We noted that among 462 different sources, only 67 published more than one paper. Specifically, 41 out of 67 sources published two papers, 12 published three, and 5 published four. In comparison, Table 2 shows the remaining top 9 sources that published at least five papers each.

Interestingly, the *Nonprofit and Voluntary Sector Quarterly*, one of the highest-rated journals in the Sector field, is assigned a low percentage of publications in the local dataset (focused on NPOs). Also, the annual Hawaii International Conference on System Sciences (HICSS) is one of the most prolific conference proceedings affiliated with the IS field.

Afterward, we investigated the sources belonging to the IS field of

Table 1
Sample of the refined set of authors' keywords.

Original author's keywords	The adopted keyword
Non-profit	Nonprofit
Non-profits	
Nonprofit	
Nonprofits	
Non-for-profit	
Digital transformation	Digital transformation
Digitalisation	
Digitalization	
Digitisation	
Digitization	

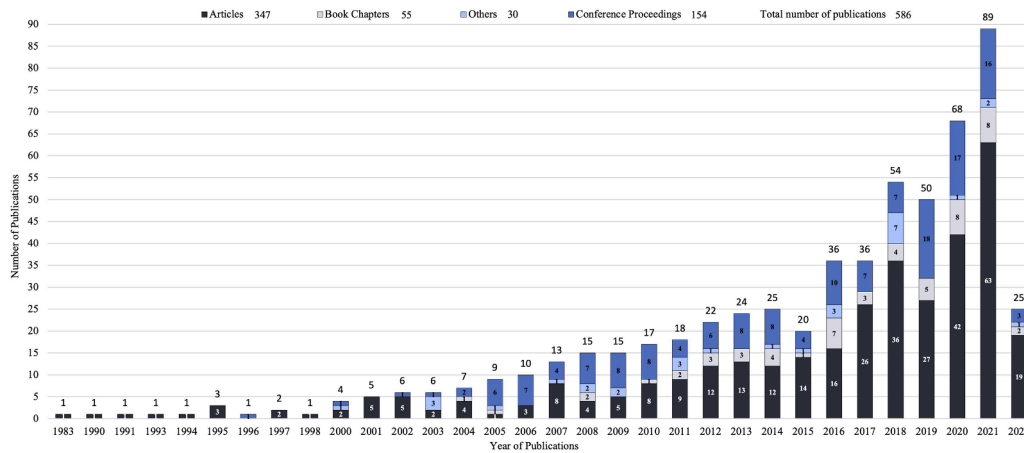


Fig. 2. Annual scientific production of the digital transformation debate in nonprofit organizations since 1983.

Table 2
Top nine most relevant sources.

Source	Articles
ACM International Conference Proceeding Series	8
Voluntas: International Journal of Voluntary and Nonprofit Organizations	7
Digital Journalism	6
Journalism	6
Telematics and Informatics	6
Proceedings of the Annual Hawaii International Conference on System Sciences (HICSS)	6
CEur Workshop Proceedings	5
Journalism Practice	5
Nonprofit and Voluntary Sector Quarterly	5

study further. To cover the literature in the IS field comprehensively, we first used the Association for Information Systems (AIS) eLibrary (the central repository for research papers and journal articles of the IS academic community).³ Then we considered the AIS journals, the AIS Affiliated Journals,⁴ and the “list of premier journals” as the top journals in the IS field.⁵ The latter list was adopted by the College of Senior Scholars of the IS community to provide greater consistency and significance to tenure and promotion cases.

Following Lowry et al., [128], we further identified the sources assigned to the 21 top- and second-tier IS journals. In addition to these journals, the College of Senior Scholars of the IS community also recognizes 15 Special Interest Groups (SIGs) of the AIS,⁶ which they encouraged to recommend up to five journals that they felt were particularly relevant to their constituencies and worthy of broader AIS recognition (extending beyond the “list of premier journals”). We identified the sources suggested by such AIS special interest groups.

Subsequently, we focused on book chapter sources. We identified the AIS chapters⁷ (the most active chapters within AIS, representing different networks and collaborations between “local” members of the international community to create excellence in academic research). Considering other sources recommended by the AIS community, we further sought to identify the AIS conference proceedings⁸ and the AIS affiliated conferences⁹ (proceedings and research from prominent IS-related conferences that are directly affiliated with AIS). Finally, we

utilized the Academic Journal Guide (AJG2021) released by the Chartered Association of Business Schools (CABS), which assesses the quality of journals and determines the excellence of business research and the relative status of different business specializations [129]. Among a set of twenty-two different fields of study, this guide ranks journals into five categories (4*, 4, 3, 2, 1), where 4* is the top level [116]. We then examined journal sources in the dataset to identify those classified into the Information Management (Info. Man.) field and assess their quality (developing complementary investigation that could contribute to extending the research front in this specific discipline).

Excluding the “others” and focusing on the sources related to articles, book chapters, and conference proceedings (as in Fig. 2), Table 3 shows that 19 contributions represent conference proceedings publication, and one contribution is a book chapter (related to the IS community) distributed over the last two decades.

Afterward, of the journal articles, Table 4 shows that 15 publications are distributed in 11 different journals ranked in the AJG2021 list. Among these publications, one belongs to the “list of premier journals,” and four are identified as one of the 21 top- and second-tier IS journals. Furthermore, nine publications are recommended by seven AIS Special Interest Groups (SIGs). In particular, the *Information Systems Research* journal is assigned one publication. This journal is classified as a 4* journal in the AJG2021, the only one belonging to the “list of premier journals” and included in the list of the 21 top- and second-tier IS journals.

Furthermore, three other journals are included in the 21 top- and second-tier IS Journals with one publication each. These journals are *Electronic Commerce Research and Applications*, *Information Systems Management*, and the *Journal of Computer Information Systems*, all of which are ranked 2 in the AJG2021. Among the remaining seven journals, the most prolific is *Computers in Human Behavior*, ranked 2 in the AJG2021, with three publications. This journal is also recommended by two of the fifteen AIS (SIGs): *Cognitive Research* (SIG IS-CORE) and *Human-Computer Interaction* (SIG HCI). *Government Information Quarterly*, ranked 3 in the AJG2021, has one publication and is recommended by the Electronic Government SIG (SIG e-Gov).

Additionally, focusing on the journals recognized as relevant by one AIS (SIGs), we identified four additional sources recommended by five different SIGs. These journals are *Information Technology for Development* (ranked 2 in the AJG2021), *Telecommunications Policy* (1), *Information Technology and People* (3), and *First Monday* (not ranked). Notably, *Telecommunications Policy* is the only journal recommended by a (SIG) of AIS, which is assigned the Sector field of study in the AJG2021. It is also interesting to note that the *Journal of the Association for Information Science and Technology* (JASIST) and the *Journal of Information Technology Teaching Cases*, with one article each, are classified with ranks of 3 and 1 in the AJG2021, respectively, and are not directly connected to a

³ <https://aisel.aisnet.org/?AISELibrary>

⁴ <https://aisel.aisnet.org/journals/>

⁵ <https://aisnet.org/page/SeniorScholarListofPremierJournals>

⁶ <https://aisel.aisnet.org/groups/>

⁷ <https://aisel.aisnet.org/chapters/>

⁸ <https://aisnet.org/page/Conferences>

⁹ <https://aisel.aisnet.org/affiliated/>

Table 3
Conference proceedings and book chapters strictly related to the Information Systems academic community (AIS).

Type of contribution	Type of AIS source	Source name	AJG2021 Rank	No. of pubs.
Conference Proceedings	AIS Affiliated Conference	35th HICSS 2002	(none)	1
Conference Proceedings	AIS Conference	11th PACIS 2007	(none)	1
Conference Proceedings	AIS Conference	13th AMCIS 2007	(none)	1
Conference Proceedings	AIS Affiliated Conference	42nd HICSS 2009	(none)	1
Conference Proceedings	AIS Affiliated Conference	43rd HICSS 2010	(none)	1
Conference Proceedings	AIS Conference	18th AMCIS 2012	(none)	1
Conference Proceedings	AIS Conference	19th AMCIS 2013	(none)	1
Conference Proceedings	AIS Affiliated Conference	46th HICSS 2013	(none)	1
Conference Proceedings	AIS Conference	34th ICIS 2013	(none)	1
Conference Proceedings	AIS Affiliated Conference	47th HICSS 2014	(none)	1
Conference Proceedings	AIS Conference	36th ICIS 2015	(none)	1
Conference Proceedings	AIS Conference	37th ICIS 2016	(none)	1
Conference Proceedings	AIS Conference	22nd AMCIS 2016	(none)	1
Conference Proceedings	AIS Conference	25th AMCIS 2019	(none)	1
Conference Proceedings	AIS Conference	26th AMCIS 2020	(none)	1
Conference Proceedings	AIS Affiliated Conference	53rd HICSS 2020	(none)	1
Conference Proceedings	AIS Conference	41st ICIS 2020	(none)	1
Conference Proceedings	AIS Affiliated Conference	22nd ICEIS 2020	(none)	1
Conference Proceedings	AIS Affiliated Conference	15th Wirtschaftsinformatik 2020	(none)	1
Conference Proceedings	(none)	Others	(none)	135
Book Chapter	AIS Chapter	LNISO, Italian Chapter of AIS (2020)		1
Book Chapter	(none)	Others (remaining book Ch.)	(none)	54

source of the IS field of study. Finally, we noticed that the journal *First Monday*, with two articles, is not included in the AJG2021 but is recommended by the *Open Research and Practice SIG (SIG OPEN)*. Table 4 summarizes the results of this analysis.

Next, we examined the most productive countries in relation to authors' affiliation [58,93]. Fig. 3 shows the number of contributions for each country based on the affiliation of the authors included in the dataset. In particular, the graph distinguishes contributions whose authors belong to one or more countries. Accordingly, in the second case, the authors' affiliations are considered to cover two or more countries. Thus, the graph shows single-country production (SCP) and multiple-countries production (MCP) levels. This way, it is possible to identify the countries whose authors usually publish by collaborating with colleagues from different countries.

Interestingly, the debate on DT in NPOs has been significantly developed in the United States of America (USA) with 157 contributions, 11 of which are classified as multiple countries' publications. The United Kingdom and Germany follow with significantly fewer publications (approximately 10 % of the USA). However, considering single-country production, Spain is the second most productive country, with 13 articles. Among the other countries, Switzerland, Hungary, and Hong Kong are assigned one single and one multiple-country publication, respectively. In contrast, Colombia, Indonesia, Luxembourg, and Turkey

present no single-country and only one multiple-country publication. This result highlights the most productive area (USA) where the debate is prolific and may further explain the reason behind its limited advancement worldwide. For example, a prevailing mainstream based on the American connotations given to NPOs and related discussions could represent an additional difficulty for researchers from other countries [36,37,40–43]. Specifically, they might not rely on the same assumptions in developing their studies. Similarly, they might not contribute to advancing previously identified gaps or future research directions due to different geographical, political, cultural, or other connotations related to their own country and the country where the investigated NPOs operate.

We then focused on the authors' production over time, considering authors with at least three publications in the local dataset. Fig. 4 shows the 14 most productive authors over time. In particular, the number of published articles is represented by the dot size (N.Articles), while the color intensity defines the total citations (TC) per year. Also, as explained in the *Methodology* section, a thorough refinement of the dataset was conducted to perform this analysis and to determine the number of publications assigned to each author adequately (included in the local dataset).

Considering the number of papers, Patrick R. Ferrucci is the most productive author, with seven articles published in different journals

Table 4
Articles strictly related to the information systems academic community (AIS) and the information management (Info. Man.) field of study (from the AJG2021).

Type of contribution	Type of AIS source	Source name	AJG2021 Rank	N. of Pub.
Article	"list of premier journals" as the top IS J. / 21 top- and second-tier IS J.	<i>Information Systems Research</i>	Info. Man. (4*)	1
Article	Electronic Government (SIG e-Gov)	<i>Government Information Quarterly</i>	Info. Man. (3)	1
Article	Cognitive Research (SIG IS-CORE) / Human-Computer Interaction (SIG HCI)	<i>Computers in Human Behavior</i>	Info. Man. (2)	3
Article	ICT and Global Development (SIG GlobDev)	<i>Information Technology for Development</i>	Info. Man. (2)	2
Article	Geographic Information Systems (SIG GIS)	<i>Telecommunications Policy</i>	Sector (1)	2
Article	(none)	<i>Journal of the Association for Information Science and Technology (JASIST)</i>	Info. Man. (3)	1
Article	Grounded Theory Methodology (SIG GTM) / Leadership in IT (SIG LEAD)	<i>Information Technology and People</i>	Info. Man. (3)	1
Article	21 top- and second-tier IS J.	<i>Electronic Commerce Research and Applications</i>	Info. Man. (2)	1
Article	21 top- and second-tier IS J.	<i>Information Systems Management</i>	Info. Man. (2)	1
Article	21 top- and second-tier IS J.	<i>Journal of Computer Information Systems</i>	Info. Man. (2)	1
Article	(none)	<i>Journal of Information Technology Teaching Cases</i>	Info. Man. (1)	1
Article	Open Research and Practice (SIG OPEN)	<i>First Monday</i>	(none)	2
Article	(none)	Others	(not examined)	330

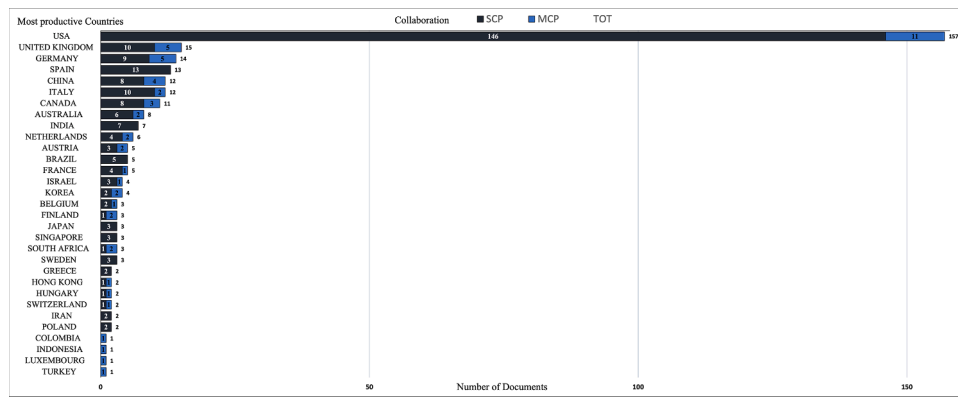


Fig. 3. Most productive countries according to the affiliations of authors included in the local dataset.

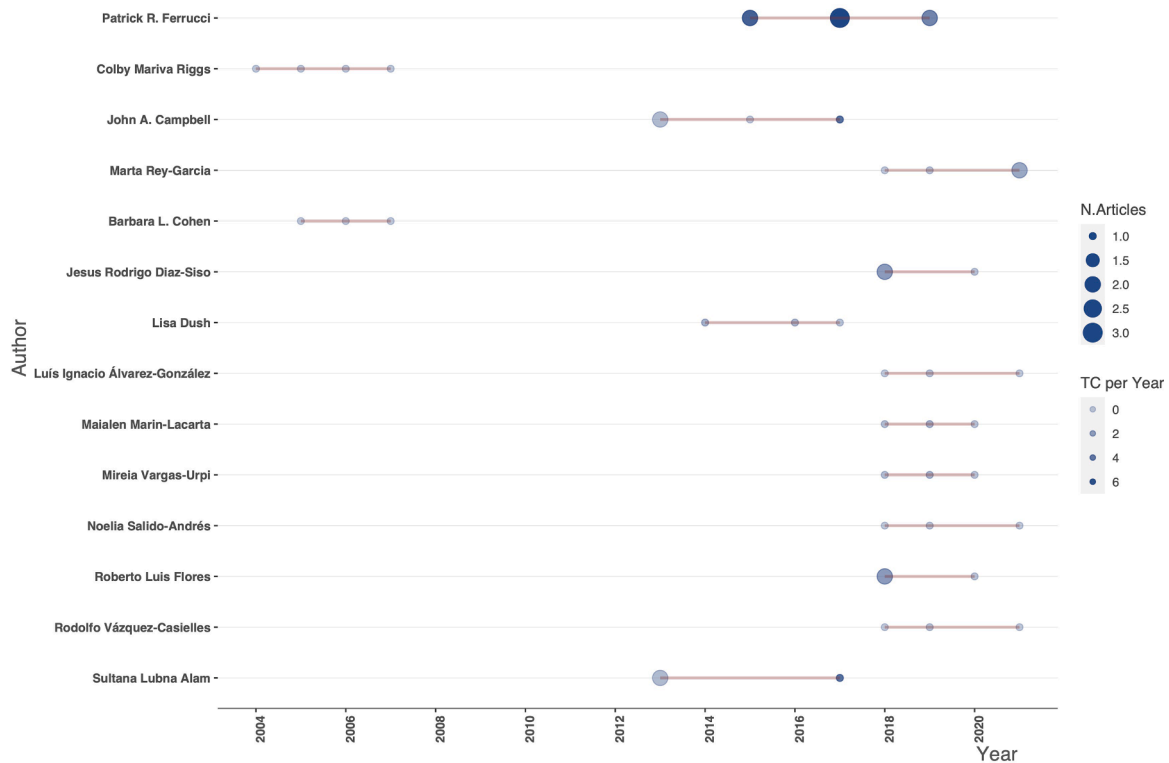


Fig. 4. Top authors' production over time in relation to the 14 most productive authors.

between 2015 and 2019. Colby Mariva Riggs, John A. Campbell, and Marta Rey-Garcia follow with four papers (each) between 2004 and 2007, 2013 and 2017, and 2018 and 2021, respectively. The remaining authors contributed three publications, between 2018 and 2021, except for Barbara L. Cohen, who contributed between 2005 and 2007. It is also noteworthy that two further authors, Sultana Lubna Alam and Lisa Dush, contributed mainly between 2013 and 2017, as did John A. Campbell. Regarding these authors' impact on the literature, Patrick R. Ferrucci received a total of 111 citations, followed by John A. Campbell and Sultana Lubna Alam, with 38 citations received across three of their co-authored articles. In addition, Lisa Dush, Jesus Rodrigo Diaz-Siso, Roberto Luis Flores, Mireia Vargas-Urpi, and Maialen Marin-Lacarta received 20, 15, 15, 9, and 9 citations, respectively, Marta Rey-Garcia received six citations overall. As for the remaining authors, Rodolfo Vázquez-Casielles, Noelia Salido-Andrés, and Luis Ignacio Álvarez-González received one citation each. In contrast, Colby Mariva Riggs and Barbara L. Cohen received no citations (at the period of the present study development). These results provide further insights into the growing

interest in progressing research on DT and NPOs over the last four years (see Fig. 4).

In addition, we provide a preliminary citation analysis [108,109] (including information concerning the field of study from the AJG2021 and rank, if the paper is a journal article publication, and if it is ranked in such a list) to explore further the papers that received greater attention from scholars, especially regarding the IS field [84,130,131]. Table 5 reports the 13 most cited papers that garnered at least 50 citations, highlighting, in this case, that no recurrent patterns of collaborations (considering the same group of authors) appear among the most cited papers. Interestingly, none of the three most prolific authors over time (Patrick R. Ferrucci, John A. Campbell, and Sultana Lubna Alam) appears in the top 25 most cited papers. However, the largest number of citations received by Patrick R. Ferrucci is 32 for his publication in *Journalism* [132], followed by John A. Campbell and Sultana Lubna Alam, with 31 citations for their co-authored publication in the *Information Systems Research* journal [133]. Also, although the other two authors contributed the most with four papers each, they did not receive

Table 5

Top 13 most cited papers with at least 50 citations.

Paper	Total citations (TC)	AJG2021 Rank	Total citations per year (TCperY)
V. Bakir, A. McStay, Fake News and The Economy of Emotions, <i>Digit. J.</i> 6 (2018) 154–175. https://doi.org/10.1080/21670811.2017.1345645	272	(none)	54.40
L. Michelini, L. Principato, G. Iasevoli, Understanding Food Sharing Models to Tackle Sustainability Challenges, <i>Ecol. Econ.</i> 145 (2018) 205–217. https://doi.org/10.1016/j.ecolecon.2017.09.009	93	Econ. (3)	18.60
H. Bendea, P. Boccardo, S. Dequal, F.G. Tonolo, D. Marenchino, M. Piras, Low Cost Uav For Post-Disaster Assessment, in: Proc. The Int. Arc. of the Photo., <i>Remote Sens. and Spatial Inf. Sci.</i> pp. 1373–1380 (2008). https://www.isprs.org/proceedings/XXXVII/congress/8_14_ThS-20/37	83	(none)	5.53
Y.M. Kim, J. Hsu, D. Neiman, C. Kou, L. Bankston, S.Y. Kim, R. Heinrich, R. Baragwanath, G. Raskutti, The Stealth Media? Groups and Targets behind Divisive Issue Campaigns on Facebook, <i>Polit. Commun.</i> 35 (2018) 515–541. https://doi.org/10.1080/10584609.2018.1476425	81	(none)	16.20
P. Bakker, Aggregation, content farms and Huffinization. <i>Journal Pract.</i> 6 (2012) 627–637. https://doi.org/10.1080/17512786.2012.667266	76	(none)	6.90
K. Starbird, L. Palen, Working and sustaining the virtual “disaster desk,” in <i>Proc. 2013 Conf. Comput. Support. Coop. Work</i> , ACM, New York, NY, USA, 2013: pp. 491–502. https://doi.org/10.1145/2441776.2441832	75	(none)	7.50
G. Remane, R.C. Nickerson, A. Hanelt, J.F. Tesch, L.M. Kolbe, A taxonomy of carsharing business models, <i>2016 Int. Conf. Inf. Syst. ICIS 2016</i> . (2016) 1–19. https://aisel.aisnet.org/icis2016/Crowdsourcing/Presentations/18	65	(none)	9.28
A. Voidsa, E. Harmon, B. Al-Ani, Homebrew databases, in: <i>Proc. SIGCHI Conf. Hum. Factors Comput. Syst.</i> , ACM, New York, NY, USA, 2011: pp. 915–924. https://doi.org/10.1145/1978942.1979078	65	(none)	5.41
M.W. Wilson, “Training the eye”: Formation of the geocoding subject, <i>Soc. Cult. Geogr.</i> 12 (2011) 357–376. https://doi.org/10.1080/14649365.2010.521856	64	(none)	5.33
R.C. Nee, Creative Destruction: An Exploratory Study of How Digitally Native News Nonprofits Are Innovating Online Journalism Practices, <i>Int. J. Media Manage.</i> 15 (2013) 3–22. https://doi.org/10.1080/14241277.2012.732153	63	(none)	6.30

Table 5 (continued)

Paper	Total citations (TC)	AJG2021 Rank	Total citations per year (TCperY)
F.G. Alberti, M.A. Varon Garrido, Can profit and sustainability goals co-exist? New business models for hybrid firms, <i>J. Bus. Strategy</i> 38 (2017) 3–13 https://doi.org/10.1108/JBS-12-2015-0124	56	Strat. (1)	9.33
C.A. Le Dantec, W.K. Edwards, The view from the trenches, in <i>Proc. 2008 ACM Conf. Comput. Support. Coop. Work</i> , ACM, New York, NY, USA, 2008: pp. 589–598. https://doi.org/10.1145/1460563.1460656	54	(none)	3.60
R.J. Kauffman, F.J. Riggins, Information and communication technology and the sustainability of microfinance, <i>Electron. Commerce Res. Appl.</i> 11 (2012) 450–468. https://doi.org/10.1016/j.elerap.2012.03.001	50	Info. Man. (2)	4.54

particular attention. Specifically, Marta Rey-Garcia received the largest number of citations (5) for her co-authored publication in *Public Relations Review* [134], while Colby Mariva Riggs did not receive any citations. Table 5, on the other hand, shows that Bakir and McStay [135], who published on *Digital Journalism*, received 272 citations, representing the authors with the largest number of citations. Notice also that Remane et al. [136] received 65 citations, thus becoming the authors with the highest number of citations for a publication connected to the IS field of study (conference proceedings, *ICIS2016*) in our dataset.

4.2. Science mapping analysis

To investigate the most important topics regarding the DT discussion in NPOs, we analyzed the most recurrent keyword used by authors. By developing this analysis, we were able to gain insight into the content and the relations between the topics discussed in our dataset. Specifically, we first analyzed the trend of the top 41 most widely used keywords. Then we explored the authors’ keyword co-occurrences. Then we performed co-word analysis focusing on the thematic map [65,67,87], identifying keyword clusters based on their centrality and density measures, alternatively to complementary approaches [65,120,137–140].

Fig. 5 shows the distribution of the 41 most widely used keywords by authors over the years. *Nonprofit organizations* is the most frequent keyword, represented by 91 occurrences. *Nonprofit* and *digital transformation* follow with 77 and 42 occurrences, respectively. Also, with less frequency, *ICT*, *technology*, *social media*, and *digital divide* are the other keywords with at least 30 occurrences (36, 34, 33, and 30, respectively). Regarding the frequency of the 41 keywords, it appears to be relatively regular in the figure in relation to the last two decades. However, it seems to increase significantly between 2017 and 2021, with a lower occurrence in 2013 and 2014. In particular, this period shows a higher concentration of occurrences concerning multidisciplinary topics related to DT and NPOs. For example, some frequent keywords are *digital platforms*, *digital health*, *nonprofit journalism*, *charity*, and *community*. Focusing on the three most frequent keywords, we can see that *nonprofit organizations* and *nonprofit* were used more frequently after 2002, which is the period when researchers started to analyze the impact of technology on NPOs with greater frequency [141,142]. This seems particularly true considering that some keywords such as *ICT*, *technology*, and *digital divide* were used to some extent during the same period.

network (see Fig. 6) starting from the 41 most recurring keywords. For this purpose, we employed VOS viewer [121,122] and Gephi [70,123] to create a graph displaying the resulting network (as described in Section 3). Specifically, the network is a graphical representation of how each keyword is mentioned together with a different one. Each node (and its label) in the graph identifies one keyword. The greater the thickness of a keyword, the higher the number of connections between that keyword and other keywords in the network (occurrence of a keyword). Thus, if two keywords are mentioned (together) in a publication, a tie exists between them (co-occurrence). Moreover, the thickness of a tie represents the number of contributions including the keyword pair. Additionally, the keywords in the graph comply with a threshold set at five regarding the minimum number of occurrences (every keyword appears in a minimum of five papers).

Overall, observing the connections between the keywords in Fig. 6, it is possible to recognize seven clusters:

1. The light-blue cluster in the upper right-hand corner is mainly focused on digitalized channels, that is, tools, enabling various NPO activities, such as volunteering, fundraising, media literacy, and civic engagement, in addition to communication and interaction aspects. Interestingly, this cluster includes the keyword *covid-19*. As a result, the keywords composing this cluster would mainly represent the discussions concerning DT initiatives in NPOs, including those triggered by the pandemic. The most recurrent keywords for this cluster are *nonprofit organizations*, *digital transformation*, and *social media*, with 91, 42, and 33 occurrences, respectively.
2. The blue cluster in the top left-hand corner is related to e-publishing, certain aspects of copyright, and associated initiatives involving different organizations. The most recurrent keyword is *open access*, with 10 occurrences.
3. The green cluster in the upper left-hand corner is focused on the adoption of digital technologies, considering the commitment of NPOs to limiting issues related to the digital divide. The most recurrent keywords for this cluster are *ICT* and *digital divide*, with 36 and 30 occurrences, respectively.
4. The red cluster in the center left is related to the nonprofit topic to a more general extent. It concerns the digitalization of activities for social common utility and well-being. Among others, this cluster includes keywords such as *partnership*, *knowledge sharing*, *e-learning*, and *open source*. The most recurrent keywords for this cluster are *nonprofit*, *archiving*, and *digital libraries*, with 77, 17, and 16 occurrences, respectively.
5. The brown cluster in the bottom left-hand corner focuses on digital marketing and the adoption of analytical tools, also exploring issues related to data protection. The most recurrent keywords for this cluster are *digital marketing*, *artificial intelligence*, and *analytics*, with 8, 6, and 6 occurrences, respectively.
6. The orange cluster at the center bottom is related to the adoption and implementation of more specific digital technologies for public benefit, often involving other organizations and government institutions. Among others, this cluster includes keywords such as *geographic information systems*, *blockchain*, and *smart city*. The most recurrent keywords for this cluster are *technology* and *case study*, with 34 and 10 occurrences, respectively.
7. The pink cluster in the lower right-hand corner is mainly focused on business models. In particular, it explores the digital impact on the news business and journalism practices. The most recurrent keywords for this cluster are *business models*, *innovation*, and *digital news*, with 13, 11, and 10 occurrences, respectively.

By exploring authors' keyword co-occurrences, this analysis provides a first overview of the most debated topics in the DT discussion focusing on NPOs, also considering the studies related to the impact of the COVID-19 pandemic. In order to investigate the topics discussed in the dataset and their relevance deeply, starting from the co-occurrence

network of all keywords, we developed a thematic map calculating the centrality and density of each cluster [91].

In accordance with Cobo et al., [91], the thematic map consists of an in-depth analysis of the important topics discussed in a dataset [91,105,114,115]. Based on the keyword co-occurrence graph, the thematic map identifies clusters (research themes) of keywords, considering the strength of their interconnections [91]. Specifically, by adopting the "Louvain algorithm" [125], the clusters are shown according to the measures of density and centrality. By way of explanation, the clusters of authors' keywords are arranged on a map based on the *centrality* value (*x*-axis), *density* value (*y*-axis), and *occurrence* (bubble size) of each cluster [125]. The first measure, *centrality*, represents the importance of a cluster in the development of the whole research domain and the degree to which a network interacts with other networks. The second measure, *density*, identifies the internal strength of a network in terms of internal connections between the keywords of a cluster (theme development). The third measure, *occurrence*, is self-explanatory, representing the count of keyword occurrences. Using these measures, one could represent a set of research themes mapped into a (two-dimensional) strategic diagram as a synthetic network representation [114]. According to Cobo et al., [91], to analyze the thematic map, one could assign a strategic meaning to each quadrant of the diagram [91]. In doing so, we seek to classify the themes into four groups: (i) *motor themes* (well-established and theoretically relevant to the research field), (ii) *niche (highly developed and isolated) themes* (theoretically relevant but with marginal importance to the research field), (iii) *emerging or declining themes* (marginal and weakly established due to an emerging or declining theoretical relevance), (iv) *basic (transversal) themes* (relevant to the research field but poorly developed) [91].

Fig. 7 depicts the thematic map, which outlines the research themes concerning each cluster and summarizes the discussion regarding the DT debate in NPOs. Subsequently, each quadrant of the thematic map is described in relation to the clusters assigned to it and the keywords contributing to the definition of the cluster with their frequency in brackets (occurrences of keywords). Specifically, for this analysis, we used the first three keywords (if there are more than two keywords in the specific cluster) assigned to each cluster (in relevance order) while providing the sets of all the keywords with respective frequencies in Appendix A (the frequencies of keywords are not included in Fig. 7 to ensure clear graphical representation, and also considering that most of them already appeared in Fig. 5). To discuss the thematic evolution of this literature [91,143], we also developed Fig. 8, focusing on the distribution of papers by clusters over the years (e.g., we avoid presenting additional thematic map graphs representing different timeframes (periods) [54–56], seeking to provide a synthetic and complete representation while emphasizing extensive and integrated result presentation instead). Specifically, Fig. 8 is based on the result of the thematic map (Fig. 7), where for each quadrant, we arranged the clusters using a histogram. Then, each bar of a histogram represents a different year and depicts a cluster if at least a publication is assigned for such a cluster in that year.

Moreover, based on the result obtained by the mentioned algorithm, we considered only the papers assigned to a unique cluster (i.e., each publication contributes to developing a specific discussion of the debate, and, therefore, seeking to ensure exploring intradisciplinary implications [24,28]). Accordingly, Fig. 8 shows that among 586 contributions in the dataset, 428 papers were assigned to a unique cluster (shown in the graph). At the same time, the remaining 158 papers were ignored (not shown in the graph) because they were assigned to two or more clusters. Furthermore, Fig. 8 shows a greater distribution of papers between motor and basic themes, which is not surprising, considering the degree of advancement of the debate as discussed in Section 3. Then, we describe the clusters belonging to each quadrant (see Fig. 7) using their most frequent keywords, also considering the related publication trend over the years (see Fig. 8).

Additionally, we analyzed the representative papers for each cluster

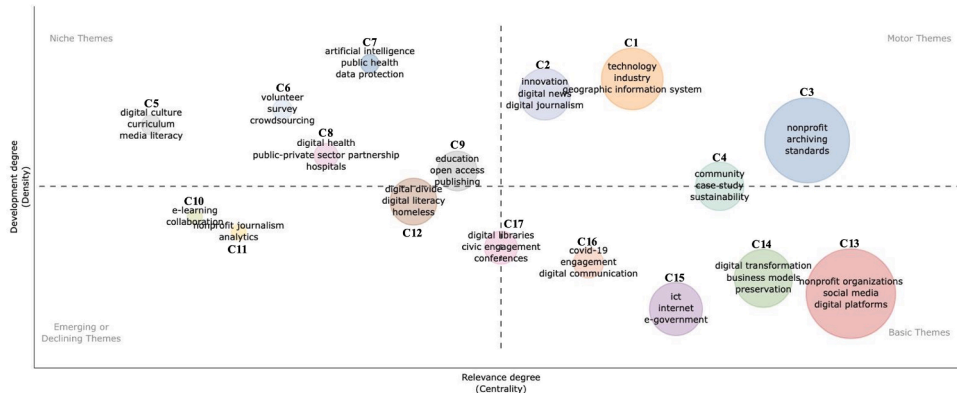


Fig. 7. Thematic map based on the most recurring keywords defined by the authors (of the papers in the local dataset).



Fig. 8. Evolution of the clusters (research themes) summarizing the debate on digital transformation in nonprofit organizations based on the thematic map. Here, for each quadrant of the thematic map, the x-axis = year of publications, and the y-axis = number of publications (assigned to the clusters).

and considered the main keywords for defining the cluster name and providing a short description of the emerging clusters. Then, among the representative papers (selected among those with the most significant number of total citations per year assigned exclusively to the specific cluster), we also include discussion and particular references to some of them. As a way of explanation, this does not necessarily mean that such papers represent the most cited publications in the present collection. As a way of exemplification, we numbered each cluster (C), from one (C1) up to seventeen (C17) by starting from the upper right of Fig. 7 (i.e., the Motor Themes quadrant) to make it more straightforward to identify a specific cluster, describe it subsequently, and assign a representative title for each of them. Regarding the identification of a representative title we assigned to each cluster, we sought to recognize labels that make it evident and unique the specific cluster’s value and human-centric themes influencing the conversation on DT in NPOs [23,29]. Moreover, concerning Fig. 8, while we kept the same number to identify a specific cluster, we used the first keyword of each cluster, like its representative name label, to ensure a clear graphical representation (therefore, avoiding listing all the keywords already shown in Fig. 7, as well as avoiding potential graphical overlapping of long labels we

assigned to name each cluster).

Exploring Fig. 7, it is possible to identify 17 clusters (research themes) distributed over the four quadrants of the thematic map. Starting from the *motor themes* quadrant, one could recognize three well-placed clusters and one other cluster that borders on the basic themes quadrant. The first cluster, C1, called “enabling digital operations,” has a frequency of 82 occurrences overall. It includes the keywords *technology* (34), *industry* (9), and *geographic information system* (7). It is related to 43 publications (see Fig. 8). Among the most established and theoretically relevant themes in the debate, this cluster concerns the discussions focused on the adoption of new technologies for fostering changes in the value proposition or enabling alternative distribution systems of NPOs. For example, Wang et al., [144] is a representative discussion of the sustainable development of some nonprofit museums in America, considering the financial difficulties they have undergone due to COVID-19. It proposes an authorization mechanism that combines blockchain and smart contracts to protect nonprofit museums’ digital rights, aimed at supporting the long-term operations and sustainable development of these museums. In contrast, Wilson [145] investigates new web-based architectures and social and spatial media capacities (e.

g., interfaces, protocols) that NPOs increasingly adopt to capture the attention of potential customers and constituents. A second cluster, C2, called “enabling digital news,” has a frequency of 57 occurrences, includes the keywords *innovation* (11), *digital news* (10), and *digital journalism* (8), and is related to 28 articles. It focuses on discussions concerning the impact of digital technologies on the production of nonprofit news, exploring the challenges related to gathering and distributing digital news. For example, Bekker [146] is representative of this cluster, analyzing the consequences and implications for journalists and journalism and proposing a low-cost model for the online news business. This study reveals that nonprofit digital journalism is mainly based on aggregation, user-generated content, and volunteer contributions, also considering that NPOs often encounter difficulties in developing online revenue models to sustain a news department and expenses related to the media they adopt. Moreover, Creech and Nadler [147] argue that research concerning innovation in news form, related technological changes, and emerging business models neglect the democratic value that nonprofit journalism is supposed to sustain. Also, they suggest that research on nonprofit journalism should focus on how the potential of digital media best fulfils this purpose instead of adopting a market-oriented vision. A third cluster, C3, called “empowering nonprofit aims,” is based on 191 keywords’ occurrences, including the keywords *nonprofit* (77), *archiving* (17), and *standards* (13). This cluster concerns the greatest number of publications for this quadrant (69), representing themes particularly relevant in the debate of DT in NPOs. It focuses on the nonprofit nature of services and products and how digital ecosystems could impact the work of NPOs. Powell et al., [148] are representative of this cluster, investigating the webpages developed by NPOs and how they could provide stakeholders with opportunities to understand organizational behavior. These authors claim that a webpage depicts the organizational identity of an NPO; it could affect stakeholders’ perception (with regard to receiving funds, recruiting volunteers, etc.) and, at the same time, produce additional consequences in the offline environment of NPOs. In comparison, Özdemir et al., [149] propose an action framework for creating micro-granting programs to fund broad and highly diverse small groups of stakeholders. Specifically, they suggest that new models based on collaborative and open innovation by users could further support NPOs in leveraging the analysis of Big Data. The fourth cluster, C4, called “enabling digitalized communities and active participation,” with a frequency of 51 occurrences, includes the keywords *community* (14), *case study* (10), and *sustainability* (9), and it concerns 22 articles. Interestingly, this cluster is positioned in the center bottom of this quadrant and overlaps with the basic themes quadrant (i.e., the themes given to this cluster are well developed as much as they theoretically contribute to developing the overall debate of DT in NPOs). This cluster focuses on the discussions concerning the interactions between NPOs, communities, and the relationships they develop with different stakeholders. Moreover, considering other representative keywords of this cluster, further papers discuss how NPOs promote and develop marketing practices in relation to the adoption of digital technologies. A representative article by Dobush and Kapeller [150] explores how NPOs increasingly adopt digital technologies to rely on contributions by actors external to their organization, also focusing on open strategy-making processes. Then, NPOs seek to reach different stakeholders, which could be isolated and dispersed or self-identify as members of a community, benefitting from their support concerning various purposes, such as innovating or even accomplishing their core tasks. Then, we remind that the topics presented in this quadrant have been significantly developed and are relevant to this research domain.

The *niche themes* quadrant is populated by five clusters (see Fig. 7). Among widely established themes in the literature concerning NPOs, it appears that themes such as culture, education, and health have been discussed, particularly over the period when scholarly attention increased in relation to the DT phenomenon (see Fig. 8). Thus, the clusters populating this quadrant are slightly relevant to understanding the development of the whole research NPO field. The first cluster, C5,

called “enabling digital culture,” with a frequency of 18 occurrences, is formed by the keywords *digital culture* (8), *curriculum* (5), and *media literacy* (5), and it includes 15 publications. This cluster identifies discussions concerning media contexts as online environments where people and NPOs are active for different purposes and varying degrees (e.g., designing specific or digital skills, offering or receiving teaching activities, and focusing on different stakeholders). Petranová et al., [151] is a representative paper discussing projects that have significantly contributed to the media education of citizens or selected population groups by focusing on extracurricular, non-formal education systems implemented by companies and NPOs. Interestingly, they summarize different areas and types of literacy, such as critical analysis of media content, digital and information, film, news and reading, Internet and online safety, digital games, and media communication. A second cluster, C6, called “enabling digital volunteering,” with a frequency of 18 occurrences, includes the keywords *volunteer* (7), *survey* (6), and *crowdsourcing* (5), and it is related to 11 papers. This cluster focuses on discussions examining the impact of digital technologies concerning crowdsourcing work and volunteer participation. Also, further attention is given to the dynamic changes of NPOs, the governance of online crowdsourcing, and cultural or sensitive aspects such as the motivations related to online participation. A representative article by Alam and Campbell [133] investigates online projects without monetary compensation and volunteer work in some NPOs, and it also discusses mechanisms for ongoing participation. This study analyzes the motivations of high-performing volunteers, which usually support NPOs in data and knowledge shaping, in addition to developing norms and social roles for participation in those NPOs. A third cluster, C7, called “leveraging data,” with a frequency of 17 occurrences, is formed by the keywords *artificial intelligence* (6), *public health* (6), and *data protection* (5) and includes 11 papers. This cluster focuses on the discussions concerning the increasing use of artificial intelligence for managing and analyzing personal and more generic data of groups of citizens, communities, or large populations. Hafen [152] is a representative paper analyzing personalized health research by focusing on NPOs working with personal data. The study reveals that those DT initiatives could offer improved precision health and limit the socio-economic asymmetries in a digital society. Specifically, citizens could benefit from the intellectual and economic value of the data they can control since a governance and trust framework for data sharing and donation is developed by those organizations. A fourth cluster, C8, called “enabling digital health,” with a frequency of 21 occurrences, includes the keywords *digital health* (10), *public-private sector partnership* (6), and *hospitals* (5) and 11 articles. In contrast to the previous cluster, which is mainly based on the relevance of data usage, this cluster concerns discussions based on the collaborations of organizations committed to public health services and developing digital health. Specifically, attention is given to the design of online healthcare trials and services, the development of healthcare websites and digital health ecosystems, and complementary aspects such as improving the civil well-being status or providing more efficient and cost-effective services. A representative article is Ratanjee-Vanmali et al., [153], focusing on an NPO providing online hearing healthcare. This study examines the result of some free online digit-in-noise tests, investigating the interactions between patients and audiologists. Interestingly, NPOs and other institutional providers could offer initial services to detect, counsel and support citizens through an initial engagement process by employing Internet-connected devices. Then, the authors suggest that hybrid modes combining online, face-to-face, synchronous, and asynchronous sessions could enhance health service delivery. Finally, a fifth cluster, C9, called “enabling inclusive and digital education,” exhibits a frequency of 37 occurrences and borders on the emerging or declining themes quadrant. This cluster includes the keywords *education* (16), *open access* (10), and *publishing* (6) and it is related to 18 papers. It focuses on the discussion concerning the use of digital technologies for educative purposes, considering the changing needs of the new generations, as well as concerning the

provision of digital products (e.g., software, ecosystems) for NPOs supporting people with disabilities. Furthermore, other discussions examine some issues concerning e-publishing in terms of open access to sources, for-profit, public, and nonprofit perspectives, or library and copyright management. Gasca-Hurtado et al., [154] is a representative paper studying an alternative methodological structure designed to gamify educational environments. Specifically, their research focuses on gamification for developing software products to benefit an NPO supporting deaf and hard-of-hearing people. To summarize, the topics presented in this quadrant are highly developed and isolated.

The *emerging or declining* themes quadrant consists of three clusters (see Fig. 7). By advancing examinations, we recognized two clusters that we considered to be labeled as “emerging.” These clusters represent some emerging discussions (as they align in problematizations and expand evidence from previous investigations [34,36,37]), especially concerning the variety of NPOs, their resource availability, and the diversity of the social services they offer [155,156]. In contrast, a third cluster, which is more stable than the two others, is more centrally positioned with respect to the thematic map. Thus, it could be deemed weakly declining by further assessing the distribution of the publications (as in Fig. 8). The first cluster, C10, called “developing e-learning,” with a frequency of 15 occurrences, is formed by the keywords *e-learning* (10) and *collaboration* (5). This cluster is related to nine articles only, the smallest number of publications displayed in the thematic map (see Fig. 8). Compared with previous clusters, it highlights the commitment of NPOs to developing online classes, such as training courses for college enrolment and learning platforms for agricultural workers, at the same time also developing online social activism. A representative paper by Brusk and Engström [157] discusses a collaborative transmedia project developed by two NPOs that partly shared their resources to develop a digital game. Specifically, this initiative is intended to promote shared cultural experience through radio episodes and foster inclusivity, since those NPOs developed a tailored strategy. A second cluster, C11, called “enhancing nonprofit journalism,” with a frequency of 15 occurrences, is represented by the keywords *nonprofit journalism* (9) and *analytics* (6), and it contains 11 articles. This cluster focuses again on nonprofit journalism, and in contrast to the previous discussion, this is not strongly related to technological aspects. Specifically, attention is given to the impact of journalism in some communities, civic contributions, professional norms, view of the journalistic mission, or measure of evaluations. However, further authors analyze some data analytics techniques for developing strategies based on customers’ behavior or investigate the financial statements of these NPOs [158]. Shin [159] is a representative article studying nonprofit news outlets from various local NPOs. Interestingly, the study suggests expanding the definition of measurable journalism by providing an overview of audience analytics and effect-oriented metrics (i.e., audience awareness, public discourse, and public policy). A third cluster, C12, called “bridging the digital divide,” with a frequency of 48 occurrences, is based on keywords such as *digital divide* (30), *digital literacy* (7), and *homeless* (6), and it refers to 24 papers. Considering that these papers are distributed over two decades (as Fig. 8 shows), this cluster does not represent emerging themes. In particular, it focuses on issues concerning digital culture to a broader extent. For example, some discussions analyze the impact of digital technology adoption on organizational and societal changes [160]. Some others explore the capacity to access infrastructure that can enhance society, creating opportunities rather than establishing barriers and causing a divide among the population [161]. A representative article is Woelfer and Hendry [162], discussing new cultural frontiers into which ubiquitous computing could diffuse. It explores some homeless communities supported by some NPOs. Interestingly, these authors seek to foresee the consequences of pervasive digital media and communications access, also exploring how those NPOs prepare them by considering their vulnerable conditions.

Finally, five clusters are populated by the *basic and transversal themes* quadrant (see Fig. 7). In general, the keywords contributing to the

definitions of these clusters outline some basic themes that confirm the findings of previous research focused on DT in NPOs [37,40–43]. These themes are important for the research domain and could be applied to different research areas. The first cluster, C13, called “enabling digitalized channels,” with a frequency of 227 occurrences, includes the keywords *nonprofit organizations* (91), *social media* (33), and *digital platforms* (15). It represents the largest cluster of the thematic map (see Fig. 7), and it includes 79 articles. This cluster focuses on heterogeneous purposes concerning different nonprofit aims fostered by adopting social media and digital ecosystems. For example, some discussions concern groups and targets of NPOs’ campaigns on Facebook, the psychology of social media engagement, web-based communication, digital public relations for social services provisions, immigrant-focused communities using Twitter, social networks, and political ties. Kim et al., [163] is a representative article analyzing digital media in relation to anonymous political campaigns and foreign interference in some political elections. The authors provide insights concerning some regulatory policy and normative implications by focusing on the aspects contributing to the prevalence of such divisive campaigns by anonymous groups on digital media (including NPOs). A second cluster, C14, called “enabling organizational and social development,” with a frequency of 72 occurrences, is formed by the keywords *digital transformation* (42), *business models* (13), and *preservation* (6), and it includes 28 papers. This cluster focuses primarily on DT initiatives fostered by NPOs for innovative and social development purposes. In particular, attention is given to the impact of such initiatives on the business model of NPOs, economic relations and strategic capabilities, regulation evolution, and the development of collaborations and partnerships. Among the representative papers, Popkova and Sergi [164] explore the imbalance of social entrepreneurship in Russia and Asian countries regarding the social services market (focusing on nonprofit, volunteer, and charity organizations). Then they discuss DT initiatives as a recent tendency to the development of social entrepreneurship in those countries. In comparison, Jorge et al., [165] study the implementation, use, and value creation of social media platforms of a small NPO, considering this as the first step of every DT project of NPOs. Machado et al., [166] discuss the DT in the construction industry in relation to the macro adoption of ICT and regulation of building information modeling promoted by some governments and NPOs. A third cluster, C15, called “exploiting the Internet,” with a frequency of 60 occurrences, is formed by the keywords *ICT* (36), *Internet* (11), and *e-government* (7), and it is related to 22 articles. Some representative discussions in this cluster concern the “shared” digital economy, the implications of the Internet for people with disabilities, and the impact of the use of the Internet on the relationships between NPOs, government, and public benefit organizations. For example, Zekanovic-Korona and Grzunov [167] explore the shared economy and its advantages and disadvantages, focusing on the aspects that increase value, such as sharing information about assets (goods, knowledge, and services). In comparison, Chiner et al., [168] analyze Internet safety and the risks, focusing on an NPO working with people with developmental and intellectual disabilities. They suggest that these NPOs should develop training programs involving caregivers and family members in addition to people with intellectual disabilities. The fourth cluster, C16, called “covid-19,” with a frequency of 26 occurrences, is based on the keywords *covid-19* (13), *engagement* (8), and *digital communication* (5), and it is related to 10 papers. This cluster focuses on DT initiatives in NPOs concerning their engagement to support society in overcoming the challenges triggered by the COVID-19 pandemic. Among others, some representative discussions concern the contribution of NPOs to the adoption of telework and digital tools by organizations and employees, the nature of nonprofit service innovation supporting youth during COVID-19, or telemedicine services in higher education. For example, Raghavan et al., [71] examine the impact of COVID-19 on organizations and employees across public, private, and nonprofit sectors, seeking to recognize the more pervasive long-term changes across sectors. Interestingly, further investigations are suggested concerning the work

processes of NPOs, the adoption rate of telework, and digitalization across sectors, especially considering that NPOs are heterogeneous and operate differently than other organizations. Finally, the fifth cluster, C17, called “developing digital libraries,” with a frequency of 29 occurrences, includes the keywords *digital libraries* (16), *civic engagement* (8), and *conferences* (5), and it is related to 17 articles. This last cluster overlaps with the emerging or declining themes quadrant (see Fig. 7). Considering the keywords representing this cluster, it appears that some discussions are mostly related to a basic theme (represented by *civic engagement*). In contrast, other discussions could be related to declining themes, according to the results of previous studies and Fig. 8 (i.e., represented by the other two keywords). Thus, some representative discussions of this cluster concern the commitment of some NPOs to engage students using the geospatial web to develop digital content, such as mapping the local history and the production of media as a transformative action for supporting youth-based communities. For example, Sieber et al., [169] investigate how public participation enabled by geoweb environments affects how citizens and NPOs could communicate with the state on environmental issues relating to their lives. Interestingly, their findings reveal existing digital inequalities and other issues concerning the participation process.

5. Discussion

In line with the purpose of this research and given the approach used to develop a comprehensive and quantitative overview of the DT conversation focused on NPOs, we benchmark our findings against previous studies [26,37,41,42,60,77] and reasoning on themes, conceptual relationships, and research areas found at the intersection of IS studies and NPS studies [126]. By leveraging the previous statistical calculations, we were able to review the different themes emerging from the entire collection. Consequently, we advance in reasoning on such evidence and representative discussions contributing to advance inter-disciplinary understanding [24].

Compared with other bibliographic approaches [138], our results are based on the principle that the higher the frequency of common keywords between two documents, the closer the relationship between those units is [114]. In our study, the similarity between articles was established through the overlap in their keywords, with the co-word metric functioning as the bibliometric technique. Authors' keywords were used as the unit of analysis, and we employed network analysis (co-words) and thematic mapping (thematic map) as the statistical techniques [56]. This quantitative approach allowed us to identify and visualize clusters of research themes based on keyword co-occurrences, providing a comprehensive overview of the field [67]. From this perspective, we were able to consider different disciplines in the analyses (as an interdisciplinary approach [126,170]) while identifying areas of thematic convergence (offering granularity in the analysis and making it possible to map such a field [138,171,172]).

Accordingly, the result of our bibliometric analysis shows a growing interest in the scientific conversation discussing DT in NPOs, at the same time emphasizing the need for theorization that considers the specificities of the NPS as limited evidence emerges on the factors influencing the success of DT initiatives in NPOs. The present study shows that various organizations are involved in the DT discussion together with some NPOs, potentially representing a driver aspect for the advancement of DT in NPOs [37,40]. In this regard, compared to previous research, we observe other explicit partnerships or collaborations, such as business ventures [173] and social enterprises [174], characterizing some discussions. Thus, drawing on Chang et al.'s [175] assumptions, we claim that this aspect further highlights the need for some NPOs to change their organizational form to preserve their financial sustainability for accomplishing their social missions (thus potentially affecting the frame upon which conversation on DT advances in the NPOs context).

In particular, our analysis identifies several thematic clusters

representing areas of interest in DT research in NPOs. Among these emerged themes concerning the adoption of digital technologies to improve NPOs' communication with stakeholders, relationship management, digitalization of services (for supporting people as well as people-centered), organizational development initiatives, dependence on external funding, and strong presence of volunteers (assuming various roles and focus within the conversation). Moreover, thematic clusters summarize and link activities, dynamics, and processes that NPOs undertake, along with DT initiatives to achieve their goals, providing bases to develop concepts and models that integrate knowledge beyond the boundaries of a single discipline (for studying DT in NPOs).

In addition, our analysis identifies key clusters and their associated keywords, while providing an understanding of the evolution of these themes over time [54–56]. We use this foundation to delve deeper into the areas where the DT discussions are most active and to frame a more holistic and contextualized interdisciplinary perspective for studying DT in NPOs by proposing a revised thematic map (see Fig. 9). We use the thematic map as a tool for synthesizing insights by leveraging the strategic logic and thematic evolution understanding that it offers, drawing on Figs. 7 and 8. Accordingly, we develop Fig. 9 to propose a strategic lens for setting frameworks for future investigations and practical applications; at the same time, we use it to suggest future research directions expanding upon people-centered factors, nonprofit-related problematization themes, and key dynamics of DT within NPOs [22,23,80]. In particular, by focusing on the value dimensions of DT and human-factor themes that characterize such a conversation in the context of NPOs, we argue that the debate is active primarily in three areas of investigation, presumably increased due to the challenges triggered by the COVID-19 pandemic. We labeled these three main areas by adopting an interdisciplinary logic that intersects the IS and NPS fields of study: digital channels, digital education, and digital society (each one highlighting the nuances of certain themes and their implications for NPOs, while reflecting the thematic concentrations and interconnections of the respective clusters) [24].

Specifically, one area concerns discussions about “digital channels”, including the digitalization of communications and interactions at different levels and extents [176,177], and introducing aspects relating to artificial intelligence and analytics tools [152], blockchain technology and smart contracts [144], and the Internet of Things technology [173]. We label this area “digital channels,” recognizing its focus on elements representing in particular some value of DT within NPOs. This direction emphasizes the scientific attention placed to how digital tools and technologies enhance communication, enable transactional pathways, and reorganize operations, reinforcing their role in driving value through efficient and innovative connections. A second area concerns discussions focused on “digital education”, both in terms of skills and competencies in the use of digital tools [151], as well as in enabling digitalized teaching, courses, lessons, training [154], and knowledge-sharing aspects [167,178]. The term “digital education” is assigned to this area to reflect its exploration of certain people-centered factors and the development of skills and competencies through digital platforms. It problematizes how digital education can address NPO-specific challenges by fostering accessible, scalable learning environments and facilitating knowledge dissemination tailored to diverse needs. Finally, a third area concerns discussions related to a “digital society,” including themes such as the digital divide, digital inclusion, digital health, crowdfunding, homeless care, charity, and digital security [71,152–154]. This area is labeled “digital society” to acknowledge its focus on nonprofit-related problematization themes and key dynamics of DT within NPOs. It refers to human-centric themes such as inclusivity, equity, and security, highlighting how NPOs adopt digital solutions to respond to societal challenges while prioritizing mission-driven and community-oriented objectives.

To summarize, drawing on this understanding, we develop Fig. 9, where the previous thematic map (see Fig. 7) is redesigned by showing

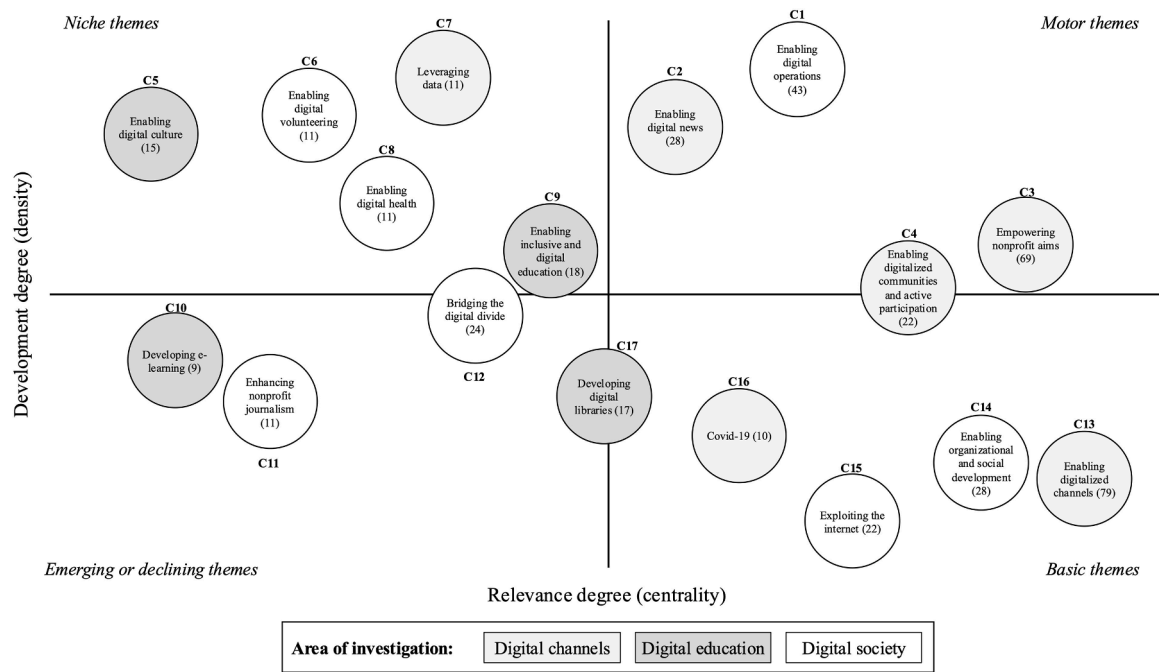


Fig. 9. Revised thematic map in which the clusters are colored on the basis of the area of investigation (the number of papers belonging to each cluster in brackets).

every cluster labeled with the identified name and colored on the basis of the area of investigation to which it belongs. In Fig. 9, we also report the number of papers belonging to each cluster in brackets. Thus, for each of these three areas, we sought to suggest some future directions (in accordance with the strategic analysis based on the thematic map and the relative clusters (see Table 6)) that could contribute to supporting research development toward a better understanding of the factors influencing the operationalization of DT initiatives in NPOs.

6. Conclusions

This article contributes to the literature examining organizations' unequal development and digital presence by performing a literature analysis of the papers discussing the digital transformation debate in nonprofit organizations closely. To this end, it provides a bibliometric analysis to examine the evolutionary trend of this specific stream of research. Based on 586 contributions, we first developed a performance analysis and then a science mapping analysis [55,65,66]. The descriptive analysis depicts the growing interest in DT research in NPOs. In particular, a significant impact is assigned to the last five years, with approximately 50 % of the total number of papers in the local dataset (286 of 586). Also, among the 462 sources included in our dataset, this study reveals that only 19 conference proceedings, one book chapter, and 15 journal articles are directly connected to a source that is relevant to the IS field of study (considering all available and recommended sources on the AIS (e-Library) repository, as well as the 21 top- and second-tier IS journals, as suggested by Lowry et al., [128]. We then performed a co-word analysis based on the authors' keyword co-occurrences. We analyzed the 41 most frequent keywords and then described the resulting network of the co-occurrences in relation to their clusters. Finally, we focused on the thematic map to recognize the topics summarizing the debate, identifying gaps and research priorities for proposing an interdisciplinary understanding of DT in NPOs [22–24,80].

As a result, we highlighted multiple research themes related to the specific context of NPOs, providing insights into the evolution of these themes and their relevance and relations [57]. Specifically, we described some novel discussions based on the different allocations of themes in the thematic map [115]. We recognized some recurring topics that are pertinent to the NPS discipline [37,41,42] and highlighted themes

concerning NPOs that have not yet appeared. For example, we identified other forms of collaboration or partnerships between different organizations in addition to NPOs [173,174] (related to the DT debate). In contrast to previous studies, we recognized additional themes in the conversation introducing artificial intelligence, the Internet of Things, and blockchain technologies and further problematizations concerning more advanced analytics tools and their use [144,151,173]. Furthermore, the different analyses show that, as far as NPOs are concerned, the DT debate has been affected significantly by the need to manage uncertainty and unexpected events triggered by the COVID-19 pandemic [179,180]. Finally, by bridging insights from information systems and nonprofit studies disciplines, we defined three main areas of investigation that seem significant yet still underdeveloped to conceptualize theoretical diversity (considering the mutual analysis of all the keywords in a cluster) emphasizing people-centered factors, nonprofit-related problematization themes, and key dynamics of DT within NPOs [22–24,80]. Named with representative labels that would stress the relevance given to certain nonprofit objectives, civil and social aspects, and interconnection within the DT conversation, this research propose assumptions and future directions based on an overarching categorization of the debate, recognizing specific areas of scientific interest in the commitment of NPOs to leverage DT initiatives as “digital channels,” “digital education,” and “digital society” purposes.

6.1. Implications for research and practice

This research investigates whether the existing literature sufficiently supports the analysis and advancement of the DT debate in relation to NPOs. The aim is to extend the understanding of DT along specific lines of inquiry [42,60], such as exploring new frontiers through a nexus of change and considering the diversity of DT applications [25,47,48]. Drawing on Vial's [13] definition of DT, this research highlights the unique challenges and nuances of NPOs, shifting the analytical lens from a predominantly for-profit perspective to a nonprofit-centered approach enriched by the distinct characteristics of NPOs. These unique traits (as components and themes characterizing such a conversation), including mission-driven objectives, resource constraints, and volunteer-based operations, significantly shape the way NPOs engage with and implement DT.

Table 6
Future research directions based on the thematic map (see Fig. 7 and Fig. 9).

Area of investigation	Future research directions
Digital Channels	<ol style="list-style-type: none"> 1. How NPOs can efficiently manage the use of digital channels for collecting and sharing information, balancing operative, strategic and financial needs. 2. How NPOs can exploit web technologies in order to improve their visibility among different stakeholders, and how those technologies can support grant opportunities. 3. How NPOs can exploit digital collaboration in order to foster the engagement and participation of external actors creating or expanding their communities (e.g. handling different issues concerning the management of the traditional vs hybrid community). 4. How AI can bring value to NPOs acting in different sectors, always taking into consideration financial constraints. 5. How social media can affect or transform the coordination routines of NPOs. 6. How digital technologies affect the NPOs' operations (e.g. teleworking), support the discovery of new business opportunities, and foster long-term changes.
Digital Education	<ol style="list-style-type: none"> 1. How NPOs can exploit digital technologies to foster competence (not only digital) acquisition for internal actors and citizens or selected population groups. 2. How NPOs can use digital technology in order to overcome limitations/constraints affecting the possibility of providing educational processes due to users' disability (user side) or users living in rural areas (location side). 3. How NPOs can provide and promote online courses to improve awareness about specific social challenges, such as circular economy, sustainability, diversity and inclusion issues. 4. How citizens' use of <i>geoweb</i> applications influences NPOs' operations, specifically those focused on civic issues and relations with governmental institutions.
Digital Society	<ol style="list-style-type: none"> 1. How NPOs adopt digital technology to change their value proposition intentionally. 2. How NPOs can exploit new digital technologies to enhance crowdsourcing work and volunteer participation. 3. How can NPOs redefine their collaboration through the use of digital technologies to provide public health services and develop digital health. 4. How NPOs can deal with the financial aspects concerning the core activities (e.g., journalism), looking to reach a good balance between the market perspective (focused on satisfying the financial/economic needs) and the mission perspective (e.g., emphasizing the journalistic mission and adopting a democratic approach for producing the contents). 5. How can NPOs contribute to reducing the digital divide phenomenon, not only from the infrastructure point of view but mainly considering services availability and competence needed for proper usage (reducing, for example, digital inequality). 6. How digital technology can enhance innovative and social development aims for NPOs 7. How can Internet service affect and reshape the relationships among NPOs and other institutions such as for-profit organizations, governments, and public benefit organizations, and which new aspects need to be taken into consideration (e.g., Internet safety and risk).

The bibliometric approach adopted in this study provides a comprehensive quantitative analysis [55,56,65–67], identifying trends and gaps often overlooked by the more fragmented perspectives of qualitative approaches [66]. By integrating diverse sources, including conference proceedings and book chapters [108,109], this research develops an understanding of DT in the NPO context and opens avenues for exploring underrepresented and emerging themes (considering the restricted publishing timeframe associated with such sources). The interdisciplinary nature of this research positions it at the intersection of IS studies and NPS studies, fostering conceptual interdisciplinary overlap that enriches both fields [24]. This cross-disciplinary approach is particularly valuable for addressing complex phenomena like DT, where the interplay of technological, organizational, and societal dimensions intersects [22,23].

A distinctive contribution of this paper is represented by the future

research directions distributed among the three main groups of clusters, as detailed in Table 6, highlighting several aspects requiring further investigation to progress examinations on the two topics (e.g., objects of interest) under study (DT and NPOs). Additionally, the study's thematic mapping identifies areas of convergence across disciplines [139,140], progressing the scholarly conversation and providing a granular view of this evolving research conversation [136,141,142]), given the conceptual and manual analysis of the most representative documents included in the different clusters [67,68]. These directions could be integrated by deeper investigation into specific disciplines, communities, or groups of interest [126,138,181]. For instance, conducting historiography analyses to identify seminal papers within relevant thematic clusters could enhance understanding of the intellectual and social structures shaping DT in NPOs [65,137,182].

The implications of this research extend to both academic and practical domains. For scholars, these findings offer a thematic analysis and research agenda extending the understanding of DT in NPOs while addressing theoretical and methodological gaps. By contextualizing DT within the distinctive frameworks of NPOs, this study advances the argument for tailoring DT strategies to align with the unique value systems and human-centered dynamics of the nonprofit construct [24, 126] (in line with the arguments of Tarafdard and Davison [24] about contextualizing DT within diverse organizational settings). This perspective builds on prior explorations of NPOs and the nonprofit construct [26,41,42,60,77] and identifies thematic convergence as a critical step in refining the conceptual understanding of DT [136,141, 142]. Furthermore, the insights provided can help researchers explore cross-sectoral and cross-national variations, shedding light on how regional differences influence DT adoption in NPOs [50,62] (given the different connotations NPOs could assume in various regions around the globe).

From a practical standpoint, this research offers insights for decision-makers and managers in NPOs that could support them in designing and implementing a more effective and strategic design of their DT initiatives. In other words, by aligning these initiatives with the unique needs and objectives of NPOs, DT can be leveraged to maximize operational efficiency, enhance social impact, and ensure sustainability in nonprofit operations [26,30]. Emerged managerial implications are that some of the primary challenges in DT for NPOs concern the lack of resources and dedicated know-how, resulting in relevant prerequisites for designing and developing a DT initiative. Accordingly, particular attention should be paid to such general unawareness among NPO operators, stressing the importance of balancing and mitigating organizational changes and the nature of specific social objectives of an NPO. Therefore, beyond the cultural implications triggered by DT in the social domain, managers and policymakers of NPOs should pay even closer attention to the internal changes and transformations impacting their operational and organizational design (such as shifts in mindset, attitudes, and practices). For example, investment in digital technologies should also be recognized in terms of awareness of digital tools (such as understanding their use, importance, impact, and security), as well as the training and skills required to enable organizational change (e.g., work adaptability, digital inclusion). Furthermore, understanding the potential of digital initiatives can help develop personalized and targeted fundraising strategies by adopting analytical tools to anticipate donor behaviors. To summarize, managers should prioritize investments in digital competencies, including training and cybersecurity, to safeguard sensitive data and build an innovation-oriented culture that supports collaborative practices and responsive service redesign (e.g., ensuring that staff are adequately trained to protect the organization's and donors' sensitive data while integrating new technologies and collaborative work practices for redesigning services to respond more effectively to community needs).

Accordingly, this research emphasizes the role of strategic alignment with social objectives. It highlights the potential of DT initiatives to expand NPOs' networks, improve beneficiary services, and engage new

audiences, particularly younger generations. From this perspective, a holistic approach is recommended for defining multi-level strategic objectives, integrating digital tools to enhance fundraising efforts, and anticipating donor behavior through data analytics. Moreover, fostering collaborations between NPS operators and public administrations could amplify social impact by optimizing resource use and addressing persistent issues like the digital divide.

6.2. Limitations

Finally, this paper has some limitations. First, although we thoroughly explained the choice to use the Scopus database, we acknowledge a potential limitation in this research not integrating collections retrieved from other databases (e.g., WoS, EBSCO, ProQuest). In particular, we acknowledge acquiring the Anglo-Saxon tropism of Scopus [119] and the limitation of the heterogeneity of the sources explored by the query and, therefore, referenced by Scopus. Future research could extend such investigation by integrating the corpus from other databases, where particular attention should be given to different levels of reference metadata quality (in terms of raw data to be downloaded, including the bibliographic information of the papers [122,124], as done in the present study. This could be an opportunity to integrate the understanding with updated data and perform a complementary study, especially in light of the disruptive promises of artificial intelligence (AI) technology and related applications (including generative AI), seeking to explore further developments on such increasingly growing discussion, and how this affects scholarly attention with regard to NPOs.

Second, we focused on co-word analysis, providing a preliminary citation analysis. Therefore, at a future stage, it could be interesting to conduct a complete citation and co-citation analysis (as further bibliographic coupling techniques) to better describe the evolution of citation patterns and identify the theoretical building blocks through the co-citation networks. In other words, these complementary bibliometric approaches (concerning intellectual structure investigations [65]) based on the study of references [137] could offer additional granularity in the analysis and make it possible to map such a field by taking articles as the unit of analysis rather than keywords [138]. In addition, further analysis

could consider using bibliometric methods for social structure investigations [65] focusing on the examination of specific disciplines, communities, or groups of interest (e.g., focusing on NPOs, understanding could be advanced about identifying patterns concerning the debate on DT in NPOs in certain region or group of scholars [126,138,181]).

At the same time, further research advancements could be focusing on additional complementary bibliometric analysis adopting mixed techniques [56,87,90]. Among others, the multiple correspondence analysis (MCA) can be adopted to investigate the relationship between keywords and citations [56,87,90].

Ultimately, although this research leverages various approaches and techniques extensively to study the conceptual structure of research on DT and NPOs, based mainly on authors' keywords, considering the large number of contributions, it might be helpful to perform a computational literature review (CLR) as a further complementary method. From this perspective, CLR methodology enables quantitative and qualitative analyses using topic modeling on extensive datasets through a top-down, inductive strategy, offering a detailed understanding of a field [183]. Accordingly, CLR could be more fitting than systematic reviews or meta-syntheses, and compared with bibliometric analysis, it is not limited to focusing mainly on a quantitative exploration of research publications. That is, CLR employs text mining and machine learning techniques to improve the process of analyzing large volumes of data and identifying significant trends [184] by increasing the process's efficiency and output quality when inspecting several documents.

CRediT authorship contribution statement

Michele Cipriano: Writing – review & editing, Writing – original draft, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Stefano Za:** Writing – review & editing, Supervision, Software, Methodology, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors have no known conflict of interest to disclose.

Appendix A

List of the sets of keywords with respective frequencies for each cluster in the thematic map.

Thematic map theme	Cluster (keywords occurrences)	Keywords with respective frequencies in brackets
Motor themes (assigned four clusters)	C1. Enabling digital operations (82)	Technology (34), industry (9), geographic information system (7), government (7), blockchain (5), digital tools (5), sharing economy (5), smart city (5), textual analysis (5)
	C2. Enabling digital news (57)	Innovation (11), digital news (10), digital journalism (8), journalism (7), public journalism (6), digital advertising (5), entrepreneurial journalism (5), network (5)
	C3. Empowering nonprofit aims (77)	Nonprofit (77), archiving (17), standards (13), knowledge sharing (11), open source (11), digital data (8), digital preservation (8), foundations (7), design (6), digital infrastructure (6), interoperability (6), service learning (6), cultural heritage (5), digital storage (5), metadata (5)
	C4. Enabling digitalized communities and active participation (51)	Community (14), case study (10), sustainability (9), digital marketing (8), ethnography (5), social marketing (5)
Niche themes (assigned five clusters)	C5. Enabling digital culture (18)	Digital culture (8), curriculum (5), media literacy (5).
Thematic map theme	Cluster (keywords occurrences)	Keywords with respective frequencies in brackets
	C6. Enabling digital volunteering (18)	Volunteer (7), survey (6), crowdsourcing (5)
	C7. Leveraging data (17)	Artificial intelligence (6), public health (6), data protection (5)
	C8. Enabling digital health (21)	Digital health (10), public-private sector partnership (6), hospitals (5)
Emerging or declining themes (assigned three clusters)	C9. Enabling inclusive and digital education (37)	Education (16), open access (10), publishing (6), e-publishing (5)
	C10. Developing e-learning (15)	E-learning (10), collaboration (5)
	C11. Enhancing nonprofit journalism (15)	Nonprofit journalism (9), analytics (6)
	C12. Bridging the digital divide (48)	Digital divide (30), digital literacy (7), homeless (6), digital inequality (5)

(continued on next page)

(continued)

Thematic map theme	Cluster (keywords occurrences)	Keywords with respective frequencies in brackets
Basic themes (assigned five clusters)	C13. Enabling digitalized channels (227)	Nonprofit organizations (91), social media (33), digital platforms (15), social networks (11), digital media (10), partnership (10), charity (9), facebook (9), website (9), technology adoption (8), communication (6), donation (6), fundraising (5), twitter (5)
	C14. Enabling organizational and social development (72)	Digital transformation (42), business models (13), preservation (6), social enterprise (6), business ventures (5)
	C15. Exploiting the Internet (60)	Ict (36), internet (11), e-government (7), educational technology (6)
	C16. Covid-19 (26)	Covid-19 (13), engagement (8), digital communication (5)
	C17. Developing digital libraries (29)	Digital libraries (16), civic engagement (8), conferences (5)

References

- [1] R.D. Gopal, H. Hidaji, S.N. Kutlu, R.A. Patterson, N. Yaraghi, Law, economics, and privacy: implications of government policies on website and third-party information sharing, *Inf. Syst. Res.* (2023) 1–23, <https://doi.org/10.1287/isre.2022.1178>.
- [2] A. Baiyere, V. Grover, K.J. Lyytinen, S. Woerner, A. Gupta, Digital “x”—charting a path for digital-themed research, *Inf. Syst. Res.* 34 (2023) 463–486, <https://doi.org/10.1287/isre.2022.1186>.
- [3] M. Werle, S. Laumer, Competitor identification: a review of use cases, data sources, and algorithms, *Int. J. Inf. Manage* 65 (2022) 102507, <https://doi.org/10.1016/j.ijinfomgt.2022.102507>.
- [4] M.L. Markus, F. Rowe, Guest editorial: theories of digital transformation: a progress report, *J. Assoc. Inf. Syst.* 22 (2021) 273–280, <https://doi.org/10.17705/1jais.00661>.
- [5] E. Monteiro, P. Constantinides, S. Scott, M. Shaikh, A. Burton-Jones, Qualitative research methods in information systems: a call for phenomenon-focused problematization, *MIS Quart.* 46 (2022) i–xviii.
- [6] R.A. Teubner, Information systems strategy: theory, practice, and challenges for future research, *Bus. Inf. Syst. Eng.* 5 (2013) 243–257, <https://doi.org/10.1007/s12599-013-0279-z>.
- [7] A. Bharadwaj, O.A. El Sawy, P.A. Pavlou, N. Venkatraman, Digital Business strategy: toward a next generation of insights, *MIS Quart.* 37 (2013) 471–482, <https://doi.org/10.25300/MISQ/2013/37/2.3>.
- [8] C. Matt, T. Hess, A. Benlian, Digital Transformation strategies, *Bus. Inf. Syst. Eng.* 57 (2015) 339–343, <https://doi.org/10.1007/s12599-015-0401-5>.
- [9] D. Schiliro, Digital economy and digital transformation. Digital Technologies for Entrepreneurship in INDUSTRY 4.0, IGI Global, Hershey, USA, 2022, pp. 26–42, <https://doi.org/10.4018/978-1-6684-4265-4.ch002>.
- [10] D. Schallmo, C.A. Williams, L. Boardman, Digital transformation of business models - best practice, enablers, and roadmap, *Int. J. Innov. Manage.* 21 (2017), <https://doi.org/10.1142/S136391961740014X>.
- [11] C. Legner, T. Eymann, T. Hess, C. Matt, T. Bo, N. Urbach, P. Drews, A. Ma, F. Ahlemann, Digitalisation: opportunity and challenge for the business and information systems engineering community, *Bus. Inf. Syst. Eng.* 59 (2017) 301–308, <https://doi.org/10.1007/s12599-017-0484-2>.
- [12] F. Wiesböck, T. Hess, Digital innovations, *Electron. Mark.* 30 (2020) 75–86, <https://doi.org/10.1007/s12525-019-00364-9>.
- [13] G. Vial, Understanding digital transformation: a review and a research agenda, *J. Strategic Inf. Syst.* 28 (2019) 118–144, <https://doi.org/10.1016/j.jsis.2019.01.003>.
- [14] A. Hanelt, R. Bohnsack, D. Marz, C.A. Marante, A systematic review of the literature on digital transformation: insights and implications for strategy and organizational change, *J. Manag. Stud.* 58 (2021) 1159–1197, <https://doi.org/10.1111/joms.12639>.
- [15] L. Wessel, A. Baiyere, R. Ologeanu-Taddei, J. Cha, T.B. Jensen, Unpacking the difference between digital transformation and IT-enabled organizational transformation, *J. Assoc. Inf. Syst.* 22 (2021) 102–129, <https://doi.org/10.17705/1jais.00655>.
- [16] A. Shirish, S.C. Srivastava, N. Panteli, Management and sustenance of digital transformations in the Irish microbusiness sector: examining the key role of microbusiness owner-manager, *Eur. J. Inf. Syst.* 32 (2023) 409–433, <https://doi.org/10.1080/0960085X.2023.2166431>.
- [17] N. Carroll, N.R. Hassan, I. Junglas, T. Hess, L. Morgan, Transform or be transformed: the importance of research on managing and sustaining digital transformations, *Eur. J. Inf. Syst.* 32 (2023) 347–353, <https://doi.org/10.1080/0960085X.2023.2187033>.
- [18] P.C. Verhoef, T. Broekhuizen, Y. Bart, A. Bhattacharya, J. Qi Dong, N. Fabian, M. Haenlein, Digital transformation: a multidisciplinary reflection and research agenda, *J. Bus. Res.* 122 (2021) 889–901, <https://doi.org/10.1016/j.jbusres.2019.09.022>.
- [19] B. Nicholson, P. Nielsen, J. Saebø, Special issue: digital platforms for development, *Inf. Syst. J.* 31 (2021) 863–868, <https://doi.org/10.1111/isj.12364>.
- [20] J. vom Brocke, R. Winter, A. Hevner, A. Maedche, Special issue editorial –accumulation and evolution of design knowledge in design science research: a journey through time and space, *J. Assoc. Inf. Syst.* 21 (2020) 520–544, <https://doi.org/10.17705/1jais.00611>.
- [21] N. Carroll, N.R. Hassan, I. Junglas, T. Hess, L. Morgan, Managing and sustaining digital transformations, *Eur. J. Inf. Syst.* (2021).
- [22] M.L. Markus, F. Rowe, The digital transformation Conundrum: labels, definitions, phenomena, and theories, *J. Assoc. Inf. Syst.* 24 (2023) 328–335, <https://doi.org/10.17705/1jais.00809>.
- [23] N. Carroll, K. Conboy, N.R. Hassan, T. Hess, I. Junglas, L. Morgan, Problematizing assumptions on digital transformation research in the information systems field, *Commun. Assoc. Inf. Syst.* 53 (2023) 508–531, <https://doi.org/10.17705/1CAIS.05322>.
- [24] M. Tarafdar, R. Davison, Research in Information systems: intra-disciplinary and inter-disciplinary approaches, *J. Assoc. Inf. Syst.* 19 (2018) 523–551, <https://doi.org/10.17705/1jais.00500>.
- [25] W. Currie, C. Hsu, B. Van Vliet, V. Weerakkody, Digital transformation as geopolitical, organizational and technological nexus, *J. Inf. Technol.* (2022).
- [26] J.M. Ponzoa, A. Gómez, J.M. Mas, EU27 and USA institutions in the digital ecosystem: proposal for a digital presence measurement index, *J. Bus. Res.* 154 (2023) 113354, <https://doi.org/10.1016/j.jbusres.2022.113354>.
- [27] S. Chanias, M.D. Myers, T. Hess, Digital transformation strategy making in pre-digital organizations: the case of a financial services provider, *J. Strateg. Inf. Syst.* 28 (2019) 17–33, <https://doi.org/10.1016/j.jsis.2018.11.003>.
- [28] C. Avgerou, Contextual explanation: alternative approaches and persistent challenges, *MIS Quart.* 43 (2019) 977–1006, <https://doi.org/10.25300/MISQ/2019/13990>.
- [29] M. Alvesson, J. Sandberg, Generating research questions through problematization, *Acad. Manag. Rev.* 36 (2011) 247–271, <https://doi.org/10.5465/amr.2009.0188>.
- [30] M.F.G. Trischler, J. Li-Ying, Exploring the relationship between multi-dimensional digital readiness and digital transformation outcomes, *Int. J. Innov. Manag.* 26 (2022), <https://doi.org/10.1142/S136391962240014X>.
- [31] G. Remane, A. Hanelt, F. Wiesboeck, L. Kolbe, Digital maturity in traditional industries: an exploratory analysis, in: 25th European Conference on Information Systems (ECIS), Guimarães, Portugal, 2017.
- [32] Y. Li, B. Tan, G. Ha, E. Park, Exploiting resource fluidity for digital transformation: a revelatory case study, in: 43rd International Conference on Information Systems (ICIS), Copenhagen, Denmark, 2022.
- [33] S. Nadkarni, R. Prügl, Digital transformation: a review, synthesis and opportunities for future research, *Manag. Rev. Quart.* 71 (2021) 233–341, <https://doi.org/10.1007/s11301-020-00185-7>.
- [34] N. Carroll, Theorizing on the normalization of digital transformations, in: 28th European Conference on Information Systems (ECIS), Virtual Conference, 2020.
- [35] F. Rowe, Being critical is good, but better with philosophy! from digital transformation and values to the future of IS research, *Eur. J. Inf. Syst.* 27 (2018) 380–393, <https://doi.org/10.1080/0960085X.2018.1471789>.
- [36] M. Cipriano, S. Za, A cluster analysis for research on digital transformation in non-profit organisations, in: 30th European Conference on Information Systems (ECIS), Timișoara, Romania, 2022, p. 13. https://aisel.aisnet.org/ecis2022_rfp/54.
- [37] M. Cipriano, S. Za, Which digital transformation strategy for non-profit organisations non-profit organisations ?, in: 30th European Conference on Information Systems (ECIS), Timișoara, Romania, 2022. https://aisel.aisnet.org/ecis2022_rfp/153.
- [38] A. Majchrzak, M. Lynne Markus, J. Wareham, Designing for digital transformation: lessons for information systems research from the study of ICT and societal challenges, *MIS Q.* 40 (2016) 267–277, <https://doi.org/10.25300/MISQ/2016/40>.
- [39] K.S.R. Warner, M. Wäger, Building dynamic capabilities for digital transformation: an ongoing process of strategic renewal, *Long. Range Plann.* 52 (2019) 326–349, <https://doi.org/10.1016/j.lrp.2018.12.001>.
- [40] M. Cipriano, S. Za, Exploring the discourse on digital transformation in the domain of non-profit organisations, in: F. Ceci, A. Prencipe, P. Spagnoletti (Eds.), Exploring Innovation in a Digital World, Lecture Notes in Information Systems and Organisation, Vol 51, Springer, Cham, 2021, pp. 198–231, https://doi.org/10.1007/978-3-030-87842-9_15.
- [41] K. Vogelsang, S. Packmohr, H. Brink, Challenges of the digital transformation – comparing nonprofit and industry organizations. Lecture Notes in Information Systems and Organisation, 2021, pp. 297–312, https://doi.org/10.1007/978-3-030-86790-4_21.
- [42] H. Brink, S. Packmohr, K. Vogelsang, Fields of action to advance the digital transformation of NPOs – development of a framework. Lecture Notes in Business

- Information Processing, 2020, pp. 82–97, https://doi.org/10.1007/978-3-030-61140-8_6.
- [43] S.S. Nahrkhalaji, S. Shafiee, M. Shafiee, L. Hvam, Challenges of digital transformation: the case of the non-profit sector, in: 2018 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), Bangkok, Thailand, 2019, <https://doi.org/10.1109/IEEM.2018.8607762>.
- [44] R. Taylor, Moving beyond empirical theory. Third Sector Research, Springer, New York, 2010, pp. 1–9, https://doi.org/10.1007/978-1-4419-5707-8_1.
- [45] R. Bekkers, P. Wiepking, A literature review of empirical studies of philanthropy: eight mechanisms that drive charitable giving, Nonprofit. Volunt. Sect. Q. 40 (2011) 924–973, <https://doi.org/10.1177/0899764010380927>.
- [46] H.B. Hansmann, Reforming Nonprofit Corporation Law, HeinOnline, 1981.
- [47] A. Baiyere, E. Mosconi, L. Wessel, M. Indulska, Frontiers in digital transformation research, *Inf. Syst. J.* (2022).
- [48] Z. Tekic, D. Koroteev, From disruptively digital to proudly analog : a holistic typology of digital transformation strategies, *Bus. Horiz.* 62 (2019) 683–693, <https://doi.org/10.1016/j.bushor.2019.07.002>.
- [49] T. Hess, C. Matt, A. Benlian, F. Wiesböck, Options for formulating a digital transformation strategy, *MIS Quart. Executive* 15 (2016) 123–139, <https://doi.org/10.1108/10878571211209314>.
- [50] L.M. Salamon, S.W. Sokolowski, Beyond nonprofits: re-conceptualizing the Third sector, *Voluntas* 27 (2016) 1515–1545, <https://doi.org/10.1007/s12666-016-9726-z>.
- [51] J. Jöhnk, P. Ollig, S. Oesterle, L.-N. Riedel, The complexity of digital transformation – Conceptualizing multiple concurrent initiatives. WI2020 Zentrale Tracks, GITO Verlag, Potsdam, Germany, 2020, pp. 1051–1066, https://doi.org/10.30844/wi_2020_j8-joehnk.
- [52] L. Selander, S.L. Jarvenpaa, Digital action repertoires and transforming a social movement organization, *MIS Quart.* 40 (2016) 331–352.
- [53] S. Hofmann, Ø. Sæbø, A.M. Braccini, S. Za, The public sector's roles in the sharing economy and the implications for public values, *Gov. Inf. Q.* 36 (2019) 101399, <https://doi.org/10.1016/j.giq.2019.101399>.
- [54] A. Belfiore, C. Cuccurullo, M. Aria, IoT in healthcare: a scientometric analysis, *Technol. Forecast. Soc. Change* 184 (2022) 122001, <https://doi.org/10.1016/j.techfore.2022.122001>.
- [55] M. Aria, C. Cuccurullo, L. D'Aniello, M. Misuraca, M. Spano, Comparative science mapping: a novel conceptual structure analysis with metadata, *Scientometrics* 129 (2024) 7055–7081, <https://doi.org/10.1007/s11192-024-05161-6>.
- [56] M. Aria, C. Cuccurullo, L. D'Aniello, M. Misuraca, M. Spano, Thematic analysis as a new culturomic tool: the social Media coverage on COVID-19 pandemic in Italy, *Sustainability* 14 (2022) 3643, <https://doi.org/10.3390/su14063643>.
- [57] Z. Kataeva, N. Durrani, Z. Izenkova, A. Rakhimzhanova, Evolution of gender research in the social sciences in post-Soviet countries: a bibliometric analysis, *Scientometrics* (2023), <https://doi.org/10.1007/s11192-022-04619-9>.
- [58] A. Di Vaio, R. Hassan, R. Palladino, Blockchain technology and gender equality: a systematic literature review, *Int. J. Inf. Manage* 68 (2023) 102517, <https://doi.org/10.1016/j.ijinfomgt.2022.102517>.
- [59] C.L.K. Jong, A. Ganzaroli, Managing digital transformation for social good in non-profit organizations: the case of The Felix Project Zeroing Hunger in London, *Voluntas* (2023), <https://doi.org/10.1007/s11266-023-00597-5>.
- [60] V. Bartosova, I. Podhorska, The importance of non-profit organization in globalized world: international comparison of American and European continent, in: SHS Web of Conferences, 2021 07008, <https://doi.org/10.1051/shsconf/20219207008>.
- [61] R. Lauretti, J.J. Ferreira, Strategy in nonprofit organisations: a systematic literature review and agenda for future research, *Voluntas* 29 (2018) 881–897, <https://doi.org/10.1007/s11266-017-9933-2>.
- [62] L.M. Salamon, M.A. Haddock, S. Toepler, Conceptualizing, measuring, and theorizing the third sector: embedding statistical and methodological developments awaiting broader scholarly take-up, *Voluntas* 34 (2023) 115–125, <https://doi.org/10.1007/s11266-022-00468-5>.
- [63] S. Gregor, The nature of theory in information systems, *MIS Quart.* 30 (2006) 611–642.
- [64] S. Rivard, Theory building is neither an art nor a science. It is a craft, *J. Inf. Technol.* 36 (2021) 316–328, https://doi.org/10.1177/0268396220911938/ASSET/IMAGES/LARGE/10.1177_0268396220911938-FIG1.JPEG.
- [65] A. Di Vaio, S. Hasan, R. Palladino, F. Profita, I. Mejri, Understanding knowledge hiding in business organizations: a bibliometric analysis of research trends, 1988–2020, *J. Bus. Res.* 134 (2021) 560–573, <https://doi.org/10.1016/j.jbusres.2021.05.040>.
- [66] N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, W.M. Lim, How to conduct a bibliometric analysis: an overview and guidelines, *J. Bus. Res.* 133 (2021) 285–296, <https://doi.org/10.1016/j.jbusres.2021.04.070>.
- [67] M. Aria, C. Cuccurullo, bibliometrix : an R-tool for comprehensive science mapping analysis, *J. Informetr.* 11 (2017) 959–975, <https://doi.org/10.1016/j.joi.2017.08.007>.
- [68] M. Aria, C. Cuccurullo, Comprehensive Science Mapping Analysis, Package “Bibliometrix”, 2022.
- [69] N.J. van Eck, L. Waltman, Software survey: vOSviewer, a computer program for bibliometric mapping, *Scientometrics* 84 (2010) 523–538, <https://doi.org/10.1007/s11192-009-0146-3>.
- [70] M. Bastian, S. Heymann, M. Jacomy, Gephi: an open source software for exploring and manipulating networks, in: International AAAI Conference on Weblogs and Social Media, 2009, pp. 361–362.
- [71] A. Raghavan, M.A. Demircioglu, S. Orazgaliyev, COVID-19 and the new normal of organizations and employees: an overview, *Sustainability* 13 (2021) 11942, <https://doi.org/10.3390/su132111942>.
- [72] A. Munoz, J. Billsberry, V. Ambrosini, Resilience, robustness, and antifragility: towards an appreciation of distinct organizational responses to adversity, *Int. J. Manag. Rev.* 24 (2022) 181–187, <https://doi.org/10.1111/ijmr.12289>.
- [73] S. ElMassah, M. Mohieldin, Digital transformation and localizing the Sustainable Development Goals (SDGs), *Ecol. Econ.* 169 (2020), <https://doi.org/10.1016/j.ecolecon.2019.106490>.
- [74] X. Peng, S. Kurnia, D. Samson, T. Cui, Developing IT-enabled sustainable innovations: complementarity between sustainability and technology orientations, in: Australasian Conference on Information Systems (ACIS), Wellington, New Zealand, 2023 n.d., <https://aisel.aisnet.org/acis2023/118>.
- [75] A. Saidoun, C. Bodea, Digital transformation of non-profit organisations and the impact on their project performance, in: 9th Scientific Conference With International Participation All about People: Digital Transformation in Science, Education and Arts, 2021, pp. 30–39, <http://press.almamater.si/index.php/amp>.
- [76] A. Jabbar, C. Apostolidis, N. Baines, A. Devine, M. Christofi, S. Trivedi, Help those helping others - the role of universities in facilitating digitalisation and virtualisation in non-profit organisations, *J. Technol. Transf.* (2024), <https://doi.org/10.1007/s10961-024-10109-2>.
- [77] V. Amawate, Adoption of digital platforms by sponsoring organisations and NPOs for cause-related B2B marketing programs: a fsQCA exploration, *J. Bus. Ind. Market.* 39 (2024) 617–632, <https://doi.org/10.1108/JBIM-09-2022-0429>.
- [78] J. Friedrich, V. Römer, C. Zinke-Wehlmann, Participation as fuel for transformation - an approach to the interrelations between digitalization. Participation and Values in NPOs, 2024, pp. 351–364, https://doi.org/10.1007/978-3-031-71739-0_23.
- [79] M.-E. Zubler, J. Koch, R. Plattfaut, User-driven technology in NGOs: a computationally intensive theory approach, *Int. J. Inf. Manag. Data Insights* 5 (2025) 100307, <https://doi.org/10.1016/j.ijmei.2024.100307>.
- [80] B. Mueller, N. Urbach, Understanding the why, what, and how of theories in IS research, *Commun. Assoc. Inf. Syst.* 41 (2017) 349–388, <https://doi.org/10.17705/1CAIS.04117>.
- [81] A. Zaitsev, S. Mankinen, Designing financial education applications for development: applying action design research in Cambodian countryside, *Eur. J. Inf. Syst.* 31 (2022) 91–111, <https://doi.org/10.1080/0960085X.2021.1978341>.
- [82] G. Krlev, A.B. Lund, Social innovation ignored: framing nonprofit activities in European news Media, *Voluntas* 31 (2020) 949–965, <https://doi.org/10.1007/s11266-020-00224-7>.
- [83] S. Nambisan, M. Wright, M. Feldman, The digital transformation of innovation and entrepreneurship: progress, challenges and key themes, *Res. Policy* 48 (2019) 103773, <https://doi.org/10.1016/j.respol.2019.03.018>.
- [84] S. Za, A.M. Braccini, Tracing the roots of the organizational benefits of IT services. Exploring Services Science, 2017, pp. 3–11, https://doi.org/10.1007/978-3-319-56925-3_1.
- [85] N. Donthu, S. Kumar, D. Pattnaik, Forty-five years of Journal of Business Research: a bibliometric analysis, *J. Bus. Res.* 109 (2020) 1–14, <https://doi.org/10.1016/j.jbusres.2019.10.039>.
- [86] E. Scornavacca, F. Paolone, S. Za, L. Martiniello, Investigating the entrepreneurial perspective in smart city studies, *Int. Entrep. Manag. J. Publ.* (2020), <https://doi.org/10.1007/s11365-019-00630-4>.
- [87] R. Lamboglia, D. Lavorato, E. Scornavacca, S. Za, Exploring the relationship between audit and technology. A bibliometric analysis, *Med. Account. Res.* 29 (2021) 1233–1260, <https://doi.org/10.1108/MEDAR-03-2020-0836>.
- [88] M.J. Cobo, B. Jürgens, V. Herrero-Solana, M.A. Martínez, E. Herrera-Viedma, Industry 4.0: a perspective based on bibliometric analysis, *Procedia Comput. Sci.* 139 (2018) 364–371, <https://doi.org/10.1016/j.procs.2018.10.278>.
- [89] N. Bracarense, R. Bawack, S.F. Wamba, K.D.A. Carillo, Artificial Intelligence and sustainability: a bibliometric analysis and future research directions, *Pac. Asia J. Assoc. Inf. Syst.* 14 (2022) 136–159, <https://doi.org/10.17705/1pais.14209>.
- [90] M. Aria, M. Misuraca, M. Spano, Mapping the evolution of social research and data science on 30 years of social indicators research, *Soc. Indic. Res.* 149 (2020) 803–831, <https://doi.org/10.1007/s11205-020-02281-3>.
- [91] M.J. Cobo, A.G. López-Herrera, E. Herrera-Viedma, F. Herrera, An approach for detecting, quantifying, and visualizing the evolution of a research field: a practical application to the Fuzzy Sets Theory field, *J. Informetr.* 5 (2011) 146–166, <https://doi.org/10.1016/j.joi.2010.10.002>.
- [92] S. Za, C. Ghiringhelli, F. Virili, Organizational change and learning: an explorative bibliometric-based literature analysis. Lecture Notes in Information Systems and Organisation, 2020, pp. 429–442, https://doi.org/10.1007/978-3-030-23665-6_31.
- [93] N. Donthu, S. Kumar, N. Pandey, P. Gupta, Forty years of the International Journal of Information Management: a bibliometric analysis, *Int. J. Inf. Manage* 57 (2021) 102307, <https://doi.org/10.1016/j.ijinfomgt.2020.102307>.
- [94] H.D. White, K.W. McCain, Visualizing a discipline: an author co-citation analysis of information science, 1972–1995, *J. Am. Soc. Inf. Sci.* 49 (1998) 327–355, [https://doi.org/10.1002/\(SICI\)1097-4571\(199804\)49:4<327::AID-ASIA>3.0.CO;2-W](https://doi.org/10.1002/(SICI)1097-4571(199804)49:4<327::AID-ASIA>3.0.CO;2-W).
- [95] H. Small, Visualizing science by citation mapping, *J. Am. Soc. Inf. Sci.* 50 (1999) 799–813, [https://doi.org/10.1002/\(SICI\)1097-4571\(1999\)50:9<799::AID-ASIA>3.0.CO;2-G](https://doi.org/10.1002/(SICI)1097-4571(1999)50:9<799::AID-ASIA>3.0.CO;2-G).
- [96] K. Börner, C. Chen, K.W. Boyack, Visualizing knowledge domains, *Ann. Rev. Inf. Sci. Technol.* 37 (2005) 179–255, <https://doi.org/10.1002/aris.1440370106>.
- [97] P. Chinotaiikul, S. Vinayavekhin, Digital transformation in business and management research: bibliometric and co-word network analysis, in: 2020 1st

- International Conference on Big Data Analytics and Practices (IBDAP), IEEE, 2020, pp. 1–5, <https://doi.org/10.1109/IBDAP50342.2020.9245456>.
- [98] S. Kraus, S. Durst, J.J. Ferreira, P. Veiga, N. Kailer, A. Weinmann, Digital transformation in business and management research: an overview of the current status quo, *Int. J. Inf. Manage* 63 (2022) 102466, <https://doi.org/10.1016/j.ijinfomgt.2021.102466>.
- [99] R.N. Chawla, P. Goyal, Emerging trends in digital transformation: a bibliometric analysis, *Benchmarking* 29 (2022) 1069–1112, <https://doi.org/10.1108/BLJ-01-2021-0009>.
- [100] A. de Bem Machado, S. Secinaro, D. Calandra, F. Lanzalonga, Knowledge management and digital transformation for industry 4.0: a structured literature review, *Knowl. Manag. Res. Pract.* 20 (2022) 320–338, <https://doi.org/10.1080/14778238.2021.2015261>.
- [101] S. Kraus, P. Jones, N. Kailer, A. Weinmann, N. Chaparro-Banegas, N. Roig-Tierno, Digital Transformation: an overview of the current State of the art of research, *Sage Open*. 11 (2021) 215824402110475, <https://doi.org/10.1177/21582440211047576>.
- [102] S.A. Adekunle, C.O. Aigbavboa, O. Ejohwomu, E.A. Adekunle, W.D. Thwala, Digital transformation in the construction industry: a bibliometric review, *J. Eng. Des. Technol.* (2021), <https://doi.org/10.1108/JEDT-08-2021-0442>.
- [103] S. Pizzi, A. Venturelli, M. Variale, G.P. Macario, Assessing the impacts of digital transformation on internal auditing: a bibliometric analysis, *Technol. Soc.* 67 (2021) 101738, <https://doi.org/10.1016/j.techsoc.2021.101738>.
- [104] M. Castriotta, M. Loi, E. Marku, L. Naitana, What's in a name? Exploring the conceptual structure of emerging organizations, *Scientometrics* 118 (2019) 407–437, <https://doi.org/10.1007/s11192-018-2977-2>.
- [105] I. Zupic, T. Čater, Bibliometric methods in management and organization, *Organ. Res. Methods* 18 (2015) 429–472, <https://doi.org/10.1177/1094428114562629>.
- [106] M.P. Ferreira, J.C. Santos, M.I.R. de Almeida, N.R. Reis, Mergers & acquisitions research: a bibliometric study of top strategy and international business journals, 1980–2010, *J. Bus. Res.* 67 (2014) 2550–2558, <https://doi.org/10.1016/j.jbusres.2014.03.015>.
- [107] I. Ali, M. Balta, T. Papadopoulos, Social media platforms and social enterprise: bibliometric analysis and systematic review, *Int. J. Inf. Manage* 69 (2023) 102510, <https://doi.org/10.1016/j.ijinfomgt.2022.102510>.
- [108] S. Secinaro, V. Brescia, F. Lanzalonga, G. Santoro, Smart city reporting: a bibliometric and structured literature review analysis to identify technological opportunities and challenges for sustainable development, *J. Bus. Res.* 149 (2022) 296–313, <https://doi.org/10.1016/j.jbusres.2022.05.032>.
- [109] A. Khare, R. Jain, Mapping the conceptual and intellectual structure of the consumer vulnerability field: a bibliometric analysis, *J. Bus. Res.* 150 (2022) 567–584, <https://doi.org/10.1016/j.jbusres.2022.06.039>.
- [110] M.-Hh. Delmond, F. Coelho, A. Keravel, R. Mahl, How information systems enable digital transformation: a focus on business models and value co-production, *IUP J. Bus. Strat* 14 (2017) 7–40, <https://doi.org/10.2139/ssrn.2806887>.
- [111] G.S. Schiavi, A. Behr, C.B. Marcolin, Institutional theory in accounting information systems research: shedding light on digital transformation and institutional change, *Int. J. Account. Inf. Syst.* 52 (2024) 100662, <https://doi.org/10.1016/j.accinf.2023.100662>.
- [112] A. Caputo, G. Marzi, J. Maley, M. Silic, Ten years of conflict management research 2007–2017, *Int. J. Conf. Manag.* 30 (2019) 87–110, <https://doi.org/10.1108/IJCMSA-06-2018-0078>.
- [113] J.-H. Huang, X.-Y. Duan, F.-F. He, G.-J. Wang, X.-Y. Hu, A historical review and bibliometric analysis of research on weak measurement research over the past decades based on Biblioshiny, (2021) 1–19.
- [114] M. Callon, J.P. Courtial, F. Laville, Co-word analysis as a tool for describing the network of interactions between basic and technological research: the case of polymer chemistry, *Scientometrics* 22 (1991) 155–205, <https://doi.org/10.1007/BF02019280>.
- [115] J.R. López-Robles, J.R. Otegi-Olaso, I. Porto Gómez, M.J. Cobo, 30 years of intelligence models in management and business: a bibliometric review, *Int. J. Inf. Manage* 48 (2019) 22–38, <https://doi.org/10.1016/j.ijinfomgt.2019.01.013>.
- [116] A. Rahal, M. Zainuba, The rating dilemma of academic management journals: attuning the perceptions of peer rating, *Adv. Bus. Res.* 9 (2019) 26–45.
- [117] J. Baas, M. Schotten, A. Plume, G. Côté, R. Karimi, Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies, *Quant. Sci. Stud.* 1 (2020) 377–386, https://doi.org/10.1162/qss_a.00019.
- [118] T. Bartol, G. Budimir, D. Dekleva-Smrekar, M. Pusnik, P. Juznic, Assessment of research fields in Scopus and Web of Science in the view of national research evaluation in Slovenia, *Scientometrics* 98 (2014) 1491–1504, <https://doi.org/10.1007/s11192-013-1148-8>.
- [119] R. Franckutė, Web of Science (WoS) and scopus: the Titans of bibliographic information in today's academic world, *Publications* 9 (2021) 12, <https://doi.org/10.3390/PUBLICATIONS9010012>.
- [120] F.B. Tigre, C. Curado, P.L. Henriques, Digital leadership: a bibliometric analysis, *J. Leadersh. Organ. Stud.* 30 (2023) 40–70, <https://doi.org/10.1177/15480518221123132>.
- [121] A. Perianes-Rodriguez, L. Waltman, N.J. van Eck, Constructing bibliometric networks: a comparison between full and fractional counting, *J. Informetr.* 10 (2016) 1178–1195, <https://doi.org/10.1016/j.joi.2016.10.006>.
- [122] N.J. van Eck, L. Waltman, Visualizing bibliometric networks. *Measuring Scholarly Impact*, Springer International Publishing, Cham, 2014, pp. 285–320, https://doi.org/10.1007/978-3-319-10377-8_13.
- [123] M. Bastian, S. Heymann, Gephi: an open source software for exploring and manipulating networks, (2014) 4–6, <https://doi.org/10.13140/2.1.1341.1520>.
- [124] F. Ricciardi, S. Za, Smart City research as an interdisciplinary crossroads: a challenge for management and organization studies. *Lecture Notes in Information Systems and Organisation*, 2015, pp. 163–171, https://doi.org/10.1007/978-3-319-09450-2_14.
- [125] V.A. Traag, L. Waltman, N.J. van Eck, From Louvain to Leiden: guaranteeing well-connected communities, *Sci. Rep.* 9 (2019) 5233, <https://doi.org/10.1038/s41598-019-41695-z>.
- [126] Y.-J. Thoo, M.J. Medina, J.E. Froehlich, N. Ruffieux, D. Lalanne, A large-scale mixed-methods analysis of blind and low-vision research in ACM and IEEE, in: *The 25th International ACM SIGACCESS Conference on Computers and Accessibility*, ACM, New York, NY, USA, 2023, pp. 1–20, <https://doi.org/10.1145/3597638.3608412>.
- [127] J. Feng, Y.Q. Zhang, H. Zhang, Improving the co-word analysis method based on semantic distance, *Scientometrics* 111 (2017) 1521–1531, <https://doi.org/10.1007/s11192-017-2286-1>.
- [128] P.B. Lowry, J. Gaskin, S.L. Humpherys, G.D. Moody, D.F. Galletta, J.B. Barlow, D. W. Wilson, Evaluating journal quality and the association for information systems senior scholars' journal basket via bibliometric measures: do expert journal assessments add value? *MISQ* 37 (2013) 993–1012.
- [129] J. Walker, G. Wood, *Methodology. Academic Journal Guide 2021*, 2021, <https://doi.org/10.36548/jitdw.2021.2>.
- [130] J.M. Merigó, A. Mas-Tur, N. Roig-Tierno, D. Ribeiro-Soriano, A bibliometric overview of the Journal of Business Research between 1973 and 2014, *J. Bus. Res.* 68 (2015) 2645–2653, <https://doi.org/10.1016/j.jbusres.2015.04.006>.
- [131] H. Baier-Fuentes, J.M. Merigó, J.E. Amorós, M. Gaviria-Marín, International entrepreneurship: a bibliometric overview, *Int. Entrepr. Manag. J.* 15 (2019) 385–429, <https://doi.org/10.1007/s11365-017-0487-y>.
- [132] P. Ferrucci, Public journalism no more: the digitally native news nonprofit and public service journalism, *Journalism* 16 (2015) 904–919, <https://doi.org/10.1177/1464884914549123>.
- [133] S.L. Alam, J. Campbell, Temporal motivations of volunteers to participate in cultural crowdsourcing work, *Inf. Syst. Res.* 28 (2017) 744–759, <https://doi.org/10.1287/isre.2017.0719>.
- [134] V. Mato-Santiso, M. Rey-García, M.J. Sanzo-Pérez, Managing multi-stakeholder relationships in nonprofit organizations through multiple channels: a systematic review and research agenda for enhancing stakeholder relationship marketing, *Public Relat. Rev.* 47 (2021) 102074, <https://doi.org/10.1016/j.pubrev.2021.102074>.
- [135] V. Bakir, A. McStay, Fake news and the economy of emotions, *Digit. Journal.* 6 (2018) 154–175, <https://doi.org/10.1080/21670811.2017.1345645>.
- [136] G. Remane, R.C. Nickerson, A. Hanelt, J.F. Tesch, L.M. Kolbe, A taxonomy of carsharing business models, in: *2016 International Conference on Information Systems*, ICIS 2016, 2016, pp. 1–19.
- [137] I. Walsh, A. Renaud, Reviewing the literature in the IS field: two bibliometric techniques to guide readings and help the interpretation of the literature, *Syst. D'inf. Manag.* Vol. 22 (2017) 75–115, <https://doi.org/10.3917/sim.173.0075>.
- [138] R. Maucuer, A. Renaud, S. Ronteau, L. Muzellec, What can we learn from marketers? A bibliometric analysis of the marketing literature on business model research, *Long. Range Plann.* 55 (2022) 102219, <https://doi.org/10.1016/j.lrp.2022.102219>.
- [139] S. Kraus, M. Breier, W.M. Lim, M. Dabić, S. Kumar, D. Kanbach, D. Mukherjee, V. Corvello, J. Piñeiro-Chousa, E. Liguori, D. Palacios-Marqués, F. Schiavone, A. Ferraris, C. Fernandes, J.J. Ferreira, Literature reviews as independent studies: guidelines for academic practice, *Rev. Manag. Sci.* 16 (2022) 2577–2595, <https://doi.org/10.1007/s11846-022-00588-8>.
- [140] P.C. Sauer, S. Seuring, How to conduct systematic literature reviews in management research: a guide in 6 steps and 14 decisions, *Rev. Manag. Sci.* 17 (2023) 1899–1933, <https://doi.org/10.1007/s11846-023-00668-3>.
- [141] D. Te'eni, D.R. Young, The changing role of nonprofits in the network economy, *Nonprofit. Volunt. Sect. Q.* 32 (2003) 397–414, <https://doi.org/10.1177/0899764003254900>.
- [142] J. McNutt, C. Guo, L. Goldkind, S. An, Technology in Nonprofit Organizations and voluntary action, *Voluntarist. Rev.* 3 (2018) 1–63, <https://doi.org/10.1163/24054933-12340020>.
- [143] A. Anand, L.B. Kringelum, C.Ø. Madsen, L. Selivanovskikh, Interorganizational learning: a bibliometric review and research agenda, (n.d.), <https://doi.org/10.1108/TLO-02-2020-0023>.
- [144] Y.-C. Wang, C.-L. Chen, Y.-Y. Deng, Authorization mechanism based on blockchain technology for protecting museum-digital property rights, *Appl. Sci.* 11 (2021) 1085, <https://doi.org/10.3390/app11031085>.
- [145] M.W. Wilson, Paying attention, digital media, and community-based critical GIS, *Cult. Geogr.* 22 (2015) 177–191, <https://doi.org/10.1177/1474474014539249>.
- [146] P. Bakker, Aggregation, content farms and huffinization, *Journal. Pract.* 6 (2012) 627–637, <https://doi.org/10.1080/17512786.2012.667266>.
- [147] B. Creech, A.M. Nadler, Post-industrial fog: reconsidering innovation in visions of journalism's future, *Journalism* 19 (2018) 182–199, <https://doi.org/10.1177/1464884916689573>.
- [148] W.W. Powell, A. Horvath, C. Brandtner, Click and mortar: organizations on the web, *Res. Organ. Behav.* 36 (2016) 101–120, <https://doi.org/10.1016/j.riob.2016.07.001>.
- [149] V. Özdemir, K.F. Badr, E.S. Dove, L. Endrenyi, C.J. Geraci, P.J. Hotez, D. Milius, M. Neves-Pereira, T. Pang, C.N. Rotimi, R. Sabra, C.N. Sarkissian, S. Srivastava, H. Tims, N.K. Zgheib, I. Kickbusch, Crowd-funded micro-grants for genomics and "big data, An Actionable Idea Connecting Small (Artisan) Science, Infrastructure Science, and Citizen Philanthropy 17 (2013) 161–172, <https://doi.org/10.1089/omi.2013.0034>. OMICS.

- [150] L. Dobusch, J. Kapeller, Open strategy-making with crowds and communities: comparing Wikimedia and Creative Commons, *Long. Range Plann.* 51 (2018) 561–579, <https://doi.org/10.1016/j.lrp.2017.08.005>.
- [151] D. Petranová, M. Hossová, P. Velický, Current development trends of media literacy in European Union countries, *Commun. Today* 8 (2017) 52–64.
- [152] E. Hafen, Personal Data Cooperatives – A new data governance framework for data donations and precision health, *The Ethics of Medical Data Donation*, in: J. Krutzinna, L. Floridi (Eds.), *Personal Data Cooperatives – A new data governance framework for data donations and precision health*, Springer Open (2019) 141–149, https://doi.org/10.1007/978-3-030-04363-6_9.
- [153] H. Ratanjee-Vannali, D.W. Swanepoel, A. Laplante-Lévesque, Characteristics, behaviours and readiness of persons seeking hearing healthcare online, *Int. J. Audiol.* 58 (2019) 107–115, <https://doi.org/10.1080/14992027.2018.1516895>.
- [154] G.P. Gasca-Hurtado, M.C. Gomez-Alvarez, J.A. Hincapie, V.V. Zepeda, Gamification of an educational environment in software engineering: case study for digital accessibility of people with disabilities, *IEEE Rev. Iberoam. Tecnol. Apend.* 16 (2021) 382–392, <https://doi.org/10.1109/RITA.2021.3137372>.
- [155] J. Jeong, T.S. Cui, The density of nonprofit organizations: beyond community diversity and resource availability, *Voluntas* 31 (2020) 213–226, <https://doi.org/10.1007/s11266-019-00175-8>.
- [156] L.S. Henriksen, S.R. Smith, A. Zimmer, At the eve of convergence? Transformations of social service provision in Denmark, Germany, and the United States, *Voluntas* 23 (2012) 458–501, <https://doi.org/10.1007/s11266-011-9221-5>.
- [157] J. Brusik, H. Engström, Marvinter: a case study of an inclusive transmedia storytelling production, *Convergence* 27 (2021) 103–123, <https://doi.org/10.1177/1354856520923972>.
- [158] T. Van Caneghem, NPO Financial Statement quality: an empirical analysis based on Benford's law, *Voluntas* 27 (2016) 2685–2708, <https://doi.org/10.1007/s11266-015-9629-4>.
- [159] W. Shin, Being a truth-teller who serves only the citizens: a case study of Newstapa, *Journalism* 16 (2015) 688–704, <https://doi.org/10.1177/1464884914525565>.
- [160] H. Kang, S. An, Do websites contain factors to aid older adults' adoption of health-related information and communication technology? *J. Commun. Healthc.* 13 (2020) 89–101, <https://doi.org/10.1080/17538068.2020.1761691>.
- [161] R.G. Lentz, M.D. Oden, Digital divide or digital opportunity in the Mississippi Delta region of the US, *Telecomm. Policy* 25 (2001) 291–313, [https://doi.org/10.1016/S0308-5961\(01\)00006-4](https://doi.org/10.1016/S0308-5961(01)00006-4).
- [162] J.P. Woelfer, D.G. Hendry, Designing ubiquitous information systems for a community of homeless young people: precaution and a way forward, *Pers. Ubiquitous. Comput.* 15 (2011) 565–573, <https://doi.org/10.1007/s00779-010-0341-5>.
- [163] Y.M. Kim, J. Hsu, D. Neiman, C. Kou, L. Bankston, S.Y. Kim, R. Heinrich, R. Baragwanath, G. Raskutti, The stealth Media? Groups and targets behind divisive issue campaigns on Facebook, *Polit. Commun.* 35 (2018) 515–541, <https://doi.org/10.1080/10584609.2018.1476425>.
- [164] E.G. Popkova, B.S. Sergi, Social entrepreneurship in Russia and Asia: further development trends and prospects, *On Horizon* 28 (2020) 9–21, <https://doi.org/10.1108/OTH-09-2019-0065>.
- [165] L.F. Jorge, E. Mosconi, L.A. de Santa-Eulalia, 26th Americas Conference on Information Systems, AMCIS 2020, Overcoming the barriers of an enterprise social media initiative (2020) 0–10.
- [166] F.A. Machado, J.P.M. Delatorre, R.C. Ruschel, BIM in Latin American countries: an analysis of regulation evolution, in: E.T. Santos, S. Scheer (Eds.), *Lecture Notes in Civil Engineering*, Springer Nature, Switzerland, 2021, pp. 425–451, https://doi.org/10.1007/978-3-030-51295-8_30.
- [167] L. Zekanovic-Korona, J. Grzunov, Evaluation of shared digital economy adoption: case of Airbnb, in: 2014 37th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), IEEE, 2014, pp. 1574–1579, <https://doi.org/10.1109/MIPRO.2014.6859816>.
- [168] E. Chiner, M. Gómez-Puerta, M.C. Cardona-Moltó, Internet and people with intellectual disability: an approach to caregivers' concerns, prevention strategies and training needs, *J. New Approach. Educ. Res.* 6 (2017) 153–158, <https://doi.org/10.7821/naer.2017.7.243>.
- [169] R.E. Sieber, P.J. Robinson, P.A. Johnson, J.M. Corbett, Doing public participation on the geospatial web, *Ann. Am. Assoc. Geogr.* 106 (2016) 1030–1046, <https://doi.org/10.1080/24694452.2016.1191325>.
- [170] A. Lamovšek, M. Černe, Past, present and future: a systematic multitechnique bibliometric review of the field of distributed work, *Inf. Organ.* 33 (2023) 100446, <https://doi.org/10.1016/j.infoandorg.2022.100446>.
- [171] M. Peteraf, G. Di Stefano, G. Verona, The elephant in the room of dynamic capabilities: bringing two diverging conversations together, *Strateg. Manage. J.* 34 (2013) 1389–1410, <https://doi.org/10.1002/smj.2078>.
- [172] S. Raghuram, N.S. Hill, J.L. Gibbs, L.M. Maruping, Virtual work: bridging research clusters, *Acad. Manag. Ann.* 13 (2019) 308–341, <https://doi.org/10.5465/annals.2017.0020>.
- [173] S. Joghee, Internet of things-assisted E-marketing and distribution framework, *Soft. comput.* 25 (2021) 12291–12303, <https://doi.org/10.1007/s00500-021-05920-0>.
- [174] A. Pawliczek, J. Chlopecký, O. Oberreiterová, L. Moravec, Havířov: “the City of Green” and its fourth sector sustainability activities. One case study from the Czech Republic, in: 2021: pp. 171–211, https://doi.org/10.1007/978-3-030-75714-4_10.
- [175] Y. Chang, X.-E. Peng, C. Liang, Transforming nonprofit organisations into social enterprises: an experience-based follow-up study, *Voluntas* 32 (2021) 3–12, <https://doi.org/10.1007/s11266-020-00261-2>.
- [176] J. Ihm, S. Lee, How perceived costs and benefits of initial social Media participation affect subsequent community-based participation, *Voluntas* 32 (2021) 1320–1331, <https://doi.org/10.1007/s11266-020-00200-1>.
- [177] C. Uzcanga, P.J. Oiarzabal, Associations of Migrants in Spain: an enquiry into their digital inclusion in the “network society” in the 2010s, *Voluntas* 30 (2019) 947–961, <https://doi.org/10.1007/s11266-019-00162-z>.
- [178] P. Ravi, A. Ismail, N. Kumar, The pandemic shift to remote learning under resource constraints, *Proc. ACM. Hum. Comput. Interact.* 5 (2021) 1–28, <https://doi.org/10.1145/3476055>.
- [179] T.N. Hai, Q.N. Van, M.N. Thi Tuyet, Digital transformation: opportunities and challenges for leaders in the emerging countries in response to Covid-19 pandemic, *Emerg. Sci. J.* 5 (2021) 21–36, <https://doi.org/10.28991/esj-2021-SPER-03>.
- [180] L. Nagel, The influence of the COVID-19 pandemic on the digital transformation of work, *Int. J. Sociol. Soc. Policy* 40 (2020) 861–875, <https://doi.org/10.1108/IJSSP-07-2020-0323>.
- [181] B.H. Leso, M.N. Cortimiglia, A. Ghezzi, V. Minatogawa, Exploring digital transformation capability via a blended perspective of dynamic capabilities and digital maturity: a pattern matching approach, *Rev. Manag. Sci.* 18 (2024) 1149–1187, <https://doi.org/10.1007/s11846-023-00692-3>.
- [182] R. Singh, P. Sibi, P. Sharma, M. Tamang, A.K. Singh, Twenty years of Journal of Quality Assurance in Hospitality & Tourism: a bibliometric assessment, *J. Qual. Assur. Hospital. Tour.* 23 (2022) 482–507, <https://doi.org/10.1080/1528008X.2021.1884931>.
- [183] J. Xie, T. Jain, Unpacking micro-CSR through a computational literature review: an identity heterogeneity view of internal stakeholders, *J. Bus. Res.* 172 (2024) 114451, <https://doi.org/10.1016/j.jbusres.2023.114451>.
- [184] D. Antons, C.F. Breidbach, A.M. Joshi, T.O. Salge, Computational literature reviews: method, algorithms, and roadmap, *Organ. Res. Methods* 26 (2023) 107–138, <https://doi.org/10.1177/1094428121991230>.

Michele Cipriano is a Postdoctoral Researcher in Organization and Human Resources Management and Adjunct Professor in IT Management at the Catholic University of the Sacred Heart, Piacenza (Italy). He has been a member of the Italian chapter of AIS <http://www.itaiss.org> since 2020 and has been the secretary since 2025. His research focuses on models and evaluation systems for implementing sustainability and circular economy, the digital transformation phenomena in non-profit organizations, and the social impact of renewable energy communities. His research has appeared in JIT and Personnel Review and presented at national and international conferences (such as ItAIS, MCIS, and ECIS), and book series.

Stefano Za is an Associate Professor of Organization Studies and Information Systems at the University of Chieti-Pescara (Italy). He is the president of the Italian chapter of the AIS. He has been a member of program committees for national and international conferences in the IS domain (e.g. ICIS, ECIS, and AMCIS). His research interests include the analysis and design of digital artefacts and organizational systems. He is currently focused on digital business transformation affecting people and organizations. He has published in international conference proceedings (e.g. ICIS, ECIS, HICSS), journals (e.g. JIT, GIQ, I&M, CAIS, ISeBM), and book series.