Digitalization and academic research: knowing of and using digital services and software to develop scientific papers

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Abstract

Purpose – This paper explores how digitalization affects the academic research publication process by taking into account the perspective of management scholars. It provides an overview of the digital professional services dedicated to academic research, and investigates academics' awareness of, the impact on the publication process of, and scholars' expectations regarding digital services and software.

Design/methodology/approach – This explorative study adopted a qualitative approach by performing direct observations of websites regarding digital professional research services and in-depth interviews with national and international management scholars.

Findings – The multiple digital professional services dedicated to academic research enable authors to develop a scientific paper independently or with the support of professionals. The scholars' awareness regarding the digital services and software was limited, because of both the plethora of options on the market and the frequent use of the same digital tools over time. In impact terms, these tools enable scholars to improve research quality and to increase productivity. However, the negative effects led scholars to express different expectations about how they can be improved and what difficulties should be overcome to favor the publication process.

Practical implications – The results of this study provide suggestions both for scholars who engage in academic research and digital services and software providers.

Originality/value – To the best of the authors' knowledge, this is the first study to examine the ongoing development of digitalization in support of the research publication process from the perspective of academics.

Keywords Digital professional services, Online research tools, Web technology, Scholarly publication, Writing and publication process, Academicians' awareness, Scholars' expectations, Impact

Paper type Research paper

1. Introduction

Scientific and technological advancement – a critical driving force behind economic growth and societal wellbeing (e.g. Jin and Jin, 2013; Odhiambo and Ntenga, 2016) – is the result of scientific research across various disciplinary sectors. Higher education institutions worldwide, such as research centers and universities, play their part, contributing via publications and multi/interdisciplinary partnerships to innovate in favor of – and satisfy – the needs of society.

With specific reference to public universities, scientific research quality and productivity are fundamental goals for each university in the today's academic environment (Edvardsen *et al.*, 2017), in which resources are limited and competition is fierce. Different indicators are considered in international measurement systems to achieve impactful levels of research (quality) and a large number of publications (productivity) in both individual and department/

faculty terms (e.g. Rhaiem, 2017; De Witte and López-Torres, 2017). Accordingly, to write and publish are key research-related activities for academics (Seiler *et al.*, 2011), to which are added dissemination of such scholarly knowledge to society (i.e. "third mission" activity; Davey, 2017; Knudsen *et al.*, 2021) and teaching (Giraud and Saulpic, 2019).

Digital transformation fits into this scenario by favoring scientific research in terms of research quality and productivity with reference to scientific projects and products. Existing literature focuses on project rather than product management, by highlighting the importance of equipping universities with resources, especially in terms of internal infrastructure or external digital services to assist their researchers (e.g. Russell-Simmons *et al.*, 2016; Al-Maadeed *et al.*, 2021). Several universities worldwide are also investing in alternative avenues, to help their (especially nonnative-English speaking) researchers develop and improve their project writing skills (Stephens and Campbell, 1995) – an aspect that is particularly challenging to improve (Henson, 2004; Porter, 2007). Some universities are internally creating departments or providing training courses/workshops or externally developing partnerships to offer their scholars a wide range of editorial, educational and publishing services. Past studies in project management have focused on the development of co-authorships across (multi/interdisciplinary) academics (Brocke and Lippe, 2015; Choudhury and Uddin, 2018), by outlining how universities are creating opportunities to build relationships between and among researchers in developed, emerging and developing economies (Sankaran *et al.*, 2021). Although a publication is the last phase of a research project – and a very important one, given that ultimately, this is what provides research quality and productivity outcomes – very little attention has been paid to research product management, which is mostly examined in terms of the reviewing process (e.g. Gilmore *et al.*, 2006). Digital transformation in support of research activities consists of the availability of software packages and/or solutions installed in the user's computer and services accessible mainly via web (online services); when such services are provided by a specialized organization – on a free, freemium or, particularly, paid-basis – we refer to as digital professional services. No empirical research to date has examined the ongoing development of digitalization in support of the research publication process. The importance of this topic, and the lack of related studies, implies it requires further research.

Following a qualitative approach, this explorative study aims to examine how digitalization affects the academic research publication process, by taking into account the perspective of management scholars. Our goal is fourfold: (1) to provide an overview of digital professional services dedicated to academic research, (2) to investigate academics' awareness of digital services and software, (3) to study the impact of these digital tools on the scientific publication process, and (4) to examine scholars' expectations regarding their future use.

The remainder of this paper is structured as follows. After presenting the theoretical background in terms of the research publication process, digitalization, and expectations, the research method is described, and results are proposed and discussed. Implications, limitations, and future lines for research then conclude the study.

2. Theoretical background

2.1 Research publication process

As an integral part of academic life, scholars are encouraged to write and publish (Gilmore *et al.*, 2006), and especially, to publish in top-ranked journals (Shchemeleva, 2021) – that is, journals that have a high impact factor or H-index, or three and four stars as major criteria of research output (Kuteeva and McGrath, 2014) – and, consequently, to be included in the most prestigious international bibliographic databases (e.g. Gralka *et al.*, 2019; Shchemeleva, 2021). Adding to the pressure to publish in top journals for not English-natives is anxiety regarding writing in English instead of the local language and having to account for non-Anglophone contexts (Curry and Lillis, 2014; Plo and Péres-Llantada, 2015). This can result in anxiety so

acute, academic writing is described as "a minefield, a roller coaster ride, or at least an obstacle course" (Leki, 2003, p. 136).

At the beginning of the 1900s, writing an academic paper was similar to writing an essay or prose with no structure. After the Second World War, specialization in different fields, especially scientific ones, brought more standardized papers, which must now follow the so-called IMRAD structure – that is, Introduction, Materials and Methods, Results, and Discussion (Wu, 2011). Nowadays, writing an academic paper is not like writing an essay (e.g. West, 1992); such activity requires much time (Aguinis and Vaschetto, 2011), commitment, and various aspects of research expertise (Neuhauser *et al.*, 2000) during the whole of the publication process (e.g. Caniato *et al.*, 2018; Adams, 2014). Some studies (e.g. Troutt, 1998) have emphasized the importance of quality improvement principles with reference to the scientific article writing process, especially by offering advice to PhD students who want to publish their research in peer-reviewed academic journals (Paltridge and Starfield, 2016).

The research publication process follows a complex and structured pattern (e.g. Levitt *et al.*, 2018) that incorporates several typical steps (Bordens and Abbott, 2002; Hair *et al.*, 2007), from planning the scope and content to final manuscript production (Perry *et al.*, 2003). During this process, each author develops an individual approach to planning, preparing, writing, and submitting articles to an academic journal (Gilmore *et al.*, 2006).

2.2 Academic research and digitalization

Before the advent of computers and the internet, academics used to submit typewritten manuscripts through snail mail to journals, facing all kinds of difficulties from corrections, quantitative calculations, linguistic translation, and proofreading (e.g. Turk and Björk, 2008). With the rise of computers, new specific pieces of software have been developed, and starting from the 1990s, web-based services have also thrived (Humphries, 2007). Nowadays, digitalization is widely integrated into scholars' professional life, many of whom began to use technology for its ease of use and their need to conduct research supported by information and communication technologies. As Davis *et al.* (1989, 1992) argued, in one of the various extensions of the technology acceptance model (TAM) – a model derived from the psychology-based theory of reasonable action and theory of planned behavior – human behavior toward potential acceptance or rejection of a technology depends on perceived ease of use, perceived usefulness, and behavioral intention. Actually, several software solutions and online services are helping researchers in many ways, from advanced proofreading, content enhancement, dataset provision, and statistical analysis to post-publication marketing. However, to the best of the authors' knowledge, no previous studies have examined which technologies (digital research tools and professional services) authors use for each phase of the research writing and publishing process.

Writing and publishing a scientific paper, hence, is a task that can fit well – at least to some degree – with online digital services and software. More, given the rapid development of Artificial Intelligence (AI) technology across many fields (Dwivedi *et al.*, 2021; Raisch and Krakowski, 2021), a further, even more provocative, question arises: could online digital services and software based on AI conduct research and write an entire academic paper? The answer from the academic literature is (for the moment) apparently negative, however some scholars have opened a debate especially on the Internet. For instance, the Massachusetts Institute of Technology (2019) claimed how a team of MIT scientists had developed a neural network, which could perform some work of a science writer. For a start, this system can read specialized journal papers and understand how to gather all the data and information needed for readership, even making the language more straightforward for anyone. The system can analyze many papers, dramatically reducing the time to review all of them and provide a

preliminary answer to possible topics. The MIT team had some difficulties with the neural network in correlating a long string of data, but it seems this system could ease the initial stage of choosing a topic, writing a simple summary and introduction of the paper, and performing the literature review. Similarly, McCook (2017) claimed that there are already pieces of AI software able to generate a first draft ready to be revised by the researcher. However, these pieces of software are not capable of writing the discussion section so far, which is considered the most important and original part of a paper. Mindzak (2020) discussed the pros and cons of using AI for writing academic papers. The author claimed that we are not sure of what AI will be able to do for the research field; regardless, there are already applications and systems heading in this direction. For instance, in 2005, another MIT team developed an algorithmic language generator that wrote some papers accepted by some predatory journals. According to the author, this could lead to an automation of publication and problems related to plagiarism, originality, and academic ethics.

In a "publish or perish" era – where a scholar's quest for and pursuit of productivity is continually exacerbated by intense international competition between academic institutions – online digital services and software could strongly affect research quality and productivity by helping obtain more research outputs and maximizing the metrics used to measure the impact of a research product. Although expertise in scientific article writing and academic publishing comes with practice, online digital services and software could enable authors to dramatically increase their efficiency and ease of research (Rubin, 2003). Specifically, they could help the researcher improve the research and its outputs, relieving the author of repetitive and – to some extent – non-value-added (but crucial for a successful publication) activities such as corrections, finding sources, reviewing and comparing literature, finding the right journal, collecting data, and performing calculations. On the other hand, all these advanced services could introduce issues that could affect the entire scientific endeavor. For instance, a dramatic increase in research productivity could result in the mass production of similar papers, only to maximize the metrics used to measure the impact of a research product.

To the best of the authors' knowledge, the background dedicated to digital services and software is mainly comprised of observation of increasing tools and services in the market rather than academic literature. Even if these services are broadly used, it is surprising that there is such scarce investigation. The lack of research on these digital tools and, especially, on scholars' awareness, impact and expectations regarding these services suggest a need for further research. Before filling this gap, in the next section, this study summarizes the expectations concept, to support the specific analysis approach of this research.

2.3 Expectations from service management studies
The term expectations indicates customer wants. Wants, in this sense, differ from needs, as several studies in service management literature have argued (Parasuraman *et al.*, 1985). In particular, expectations are conscious and accessible (Schneider and Bowen, 1995) while needs reside deeply in the human psyche, and are unconscious and global. Accordingly, needs underlie expectations (Chiu and Lin, 2004).

Many studies have proposed different classifications of expectations (Boulding *et al.*, 1993; Walker, 1995; Hubbert *et al.*, 1995; Lee *et al.*, 2000; Ojasalo, 2001), which, essentially, highlight their multidimensional nature. The multi-expectation framework (Zeithaml *et al.*, 1993), for instance, distinguishes between what customers consider acceptable (i.e. the minimum level of service performance that they can receive without being disappointed; adequate service level), and what they want or hope to receive, or what they believe can and should be provided to them according their personal needs (desired service level). A tolerance zone develops between these two levels of expectation. When the quality of a service falls below the

adequate level, customers are dissatisfied; on the contrary, if it increases beyond the desired service level, customers are more than satisfied, and may in fact be "delighted." This concept is well studied in both TQM and the service quality sector. For instance, Hiles (1994) was one of the first authors who examined the importance of service quality measurement using effective quality metrics and credible service quality monitoring as key factors for success. Mal Kong and Muthusamy (2011) studied the relationship between the perceptions of service performance and the service gaps in private higher education institutions. They found that the relationship can be used to map the quality attributes into four quality factors, namely satisfier, critical, dissatisfier, and neutral. Rönnbäck and Witell (2008) and Talib (2013) explored TQM concepts applied to service systems. They claimed there is an increased focus on the implementation of TQM principles in service organizations and especially in delivering high-quality service to customers. This can be achieved even using mechanization and automation at every organization level.

To meet customers' expectations, service providers "should offer" rather than "would like to offer" something to their customers (Parasuraman *et al.*, 1988, p. 17). This study aims to provide practical recommendations to service providers of digital services and software to satisfy scholars' expectations in using these digital tools for their research.

3. Method

3.1 Research design

In line with the exploratory nature of this study, we follow a qualitative approach (Creswell and Creswell, 2018) by making direct observations and conducting in-depth semi-structured interviews. Direct observations were employed to provide an overview of digital professional services dedicated to academic research. The interviews were organized with Italian and international management scholars to investigate academics' awareness of digital services and software, study their impact on the scientific publication process, and examine scholars' expectations regarding the future use of these digital tools.

Previous literature has considered both these methods suitable for conducting explorative research. Indeed, direct observation is a non-intrusive qualitative method that allows the researcher to understand a new phenomenon (Pantano and Vannucci, 2019; Grove and Fisk, 1992), while interviews provide the researcher with the opportunity to obtain a wide range of ideas and impressions regarding the subject by understanding individuals' perceptions and attitudes toward a phenomenon (e.g. Krueger and Casey, 2000). Further, interviews provide participants with the freedom and flexibility to communicate their ideas and beliefs in their own words and use storytelling to converse in a relaxed way (Creswell and Creswell, 2018). During the data analysis, an inductive approach was used (Saldaña, 2015).

3.2 Sampling procedure

This study adopted both purposeful and snowball sampling techniques (Miles *et al.*, 2014) to recruit knowledge-rich informants and capture their experiences with reference to digital professional services and research tools. These sampling techniques enable researchers (authors) to group participants according to preselected criteria. Based on the research purpose, this study has chosen the five following criteria: (1) high annual research productivity, (2) high research quality in terms of publications' impact, (3) different seniority of work, (4), to be digital technology user in (each of) the stages of the scientific publication process, and (5) academics who are operating (retired scholars excluded) in international research teams. Given that digitalization affects the research publication process especially of younger academics, we arbitrarily involved a greater number of researchers between 30 and 40 years in the composition of the sample. The remainder of the sample was distributed

between the other ranges of age, with a slight prevalence of age from 40 to 50 years Table 1 presents the profile of the respondents.

A saturation criterion was used to stop interviews; more precisely, the researchers continued to interview additional participants until saturation of interest field (i.e. until nothing new was being heard).

The Italian and international scholars that participated in this study were contacted via email to ask about their availability for an interview. The email contained a cover letter that clearly described the study's purpose. No financial incentives were offered for participation. Data confidentiality and participants' anonymity were guaranteed.

3.3 Direct observation
A list of possible digital professional services available for academics was derived by direct observation. In particular, the research identified 23 websites for digital professional research services through the Google search engine. To find these services, we used keywords such as "editing services," "manuscript editing services," "scientific manuscript writing services," "proofreading services," and "publication support services."

| Participants | Age range | Gender | Position in university | Geographical origin | Prevailing methods used in the research | | |
					Qualitative methods	Quantitative methods	Mixed method
R1	20–30	Male	Post doc researcher	Italy	X		
R2	30–40	Male	Assistant professor	Italy			X
R3	30–40	Female	Assistant professor	Italy			X
R4	30–40	Male	Assistant professor	Italy			X
R5	30–40	Male	Associate professor	UK		X	
R6	30–40	Male	Assistant professor	Italy			X
R7	30–40	Female	Assistant professor	Italy			X
R8	30–40	Female	Assistant professor	Italy			X
R9	40–50	Male	Associate professor	Italy	X		
R10	40–50	Female	Associate professor	Italy	X		
R11	40–50	Male	Associate professor	Italy			X
R12	40–50	Male	Full professor	Italy			X
R13	50–60	Male	Full professor	Italy		X	
R14	50–60	Male	Full professor	Italy			X
R15	60–70	Male	Full professor	Italy		X	
R16	60–70	Male	Full professor	Italy	X		

Table 1.
The profile of the scholars interviewed

Data were collected through researcher (author) observation of each website. The researcher observed the available digital services directly to understand their functions and possible benefits to academics. To ensure the correct recording data and limit collection bias, the researcher observed each website drawing on a research protocol based on website name, nationality, academic or non-academic source, type of service offered, main features, and stage of the research process. Observations were made between March and November 2021, with each observation lasting 20 minutes. Data for each website were systematically tabulated through an Excel file that further allowed a comparison among the websites. Finally, to assure validity and reliability of data collection, the dataset was shared with two independent researchers, who validated the research protocol and data collection procedure.

3.4 Interviews
Based on participants' availability, appointments were set for face-to-face semi-structured in-depth interviews with each respondent to obtain detailed information on their experiences regarding the digital research tools and professional services that they were using. The scholars were interviewed face-to-face or via telematics (Microsoft Teams or Zoom platform). Interviews were conducted between September and December 2021, and lasted between half an hour and one hour. During data collection, the informants were encouraged to provide more detail about the research technologies used during their professional life.

The interview protocol was designed based on the literature review. Before data collection, a pretest – based on open-ended conversations with three scholars – was undertaken to ensure that the meaning of the questions was clear and that the wording was unambiguous. No changes were suggested, and the designed protocol was submitted to the identified scholars. Briefly, interviewees were asked to present the online digital services and software that they know and use, their needs and expectations regarding these tools, and their effects on the scientific production process in terms of quality and productivity.

The interviews were audio-recorded and later transcribed and checked for accuracy for data analysis. Data were analyzed using thematic analysis through NVivo 11 software (Braun and Clarke, 2006). Following a comparison and discussion of coding generated separately by the researchers, a consensus on common codes was reached. The codes were clustered in more general analytical themes for the analysis.

4. Findings
This section presents how digitalization affects the publication process from the perspective of management scholars, by highlighting the following: (1) digital professional services dedicated to academic research, (2) academics' awareness of digital services and software, (3) impact of these digital tools on the scientific publication process, and (4) scholars' expectations regarding the future use of digital services and software.

4.1 Digital professional services dedicated to academic research
Based on direct observations of the digital professional services, a range of essential services are available to support scholars in their research work. Table 2 summarizes these services and their main characteristics, in addition to presenting the four phases of the research process (researching, writing, submission and review, and publication) and the activities to develop a scientific paper, which emerged from the joint analysis of the direct observations and the literature review. In relation to the research phase, multiple activities have to be undertaken by scholars to develop a scientific paper. In this regard, different digital professional services are offered on the market such as a service to carry out surveys independently, to obtain (reliable and tested) datasets, mailing list samples, surveys, and

Phases of the publication process	Research activities to develop a scientific paper	Characteristics of digital professional services

Researching	• Identifying the problem and the topic
	• Reviewing literature
	• Setting research questions and hypotheses
	• Designing research methodologically (sample, if needed, data collection, data analysis)
	• Presenting the results
	• Discussing the results
	• Providing (theoretical, practical, and social) implications
	• Identifying limitations and future research lines to conclude the study
		• Websites where users can develop surveys
		• Providers of datasets without a digital object identifier (DOI) or with a DOI (these last databases are typically more reliable, tested, and have already been used by other academics)
		• Professionals who provide surveys entirely developed by them, create specific mailing list samples administrating questionnaires, or offer a complete statistical analysis of survey data including:
		  — choosing the quantitative methodology
		  — analyzing data with a specific statistical software
		  — interpreting data
		  — creating statistical reports
		• Professional services that can select the right literature dedicated to the topic, writing the introduction and the literature review

Writing	• Selecting the appropriate academic journal • Reading the author guidelines • Writing the manuscript • Translating the manuscript into language required • Proofreading the manuscript	• Websites where authors can upload files using automatic real-time corrections • Professionals who directly receive the manuscript file by the authors to check different technicalities such as grammar, style, presentation, references, basic calculations, and plagiarism • Professionals who thoroughly read the manuscript from a typical academic standpoint, especially the structure and readability, to make it more readable, consistent, and academic

Submission and review	• Writing the cover letter
	• Preparing the files for submission according to the author guidelines
	• Following the online submission procedure
	• Following the steps of the review process
		• Services that can help the author in
		  — selecting the right journal
		  — rewording/rewriting the paper according to the journal guidelines
		  — reducing word count
		• More advanced services dedicated to
		  — pre-submission peer reviewing
		  — re-editing according to reviewers' comments

Publication	• Reviewing the resulting proof before the paper is published in its final form • Promoting the paper	• Services that can market the published paper through selected media, social media, and dedicated mailing lists to increase scientific performance indicators such as the number of citations and h-index

Table 2.
Digital professional services dedicated to academic research

complete statistical analysis from the professionals. Some digital professional services select literature dedicated to the topic and even write some sections of the paper.

With reference to the writing phase, services offered again enable authors to operate independently – using websites to automatic real-time corrections – or with the support of professionals who check the manuscripts' technical or other rigor, to make it more readable, consistent, and academic.

With regard to the submission and review phase, digital professional services help the authors both to submit their manuscript according to the journal guidelines and support them in re-submitting their research work according to reviewers' comments.

Finally, publication services support the authors in the marketing of the published paper to increase scientific performance indicators (e.g. number of citations and h-index).

4.2 Academics' awareness of digital services and software
All the respondents communicated that they are aware of multiple online digital services and software packages for academic research. However, they admitted that they do not know all the services offered on the market, but rather, only a limited section. This cognitive limitation is fundamentally related to the personal habit of using specific digital tools. Precisely, most interviewees said that they frequently and systematically use the same digital services and software for their research. Fewer interviewees do not use these services and software; they have only heard that these services exist or have seen them used by other colleagues. Therefore, their knowledge is purely abstract, without any technical expertise. In addition, a generational difference among interviewees emerged as a further cognitive limitation, as shown in the following two interview excerpts:

As a young researcher, I'm required to use different software packages and online digital services for my research. (R8)

I use content analysis software, but I prefer to keep track through notes or recordings, in a more artisanal way, but this is a problem related to my age. (R16)

Although the interviewees revealed an openness to improving their knowledge of these digital tools, difficulties emerged in the interviews. Specifically, scholars said that they only occasionally discovered the existence of digital services, as this interviewee highlighted:

It is not easy to oversee the entire offering because I come to know of the existence of specific digital services when I work with colleagues from other universities or when reading a paper and I see them cited/used. It is difficult to receive commercial offerings about these services or to have a departmental structure that takes care of evaluating/purchasing them for all members of the department. (R3)

The typologies of online digital services and software that scholars use for their studies are multiple. As Table 3 shows, the digital tools that emerged from the interviews are mainly used during the research phase to develop the theoretical framework and literature review, and to collect and examine the data in the empirical phase. Digital linguistic services and software, especially for nonnative-English speakers, are widely used during the writing phase, as this interviewee noted:

When I have research funds, I refer to the proofreading service, but I am often forced to adopt free tools because of the scarcity of economic resources. For example, I usually adopt Reverso Translation as linguistic software to identify the correct way of expressing concepts and idioms during my research. Since my department purchased a Grammarly license for all researchers, I use this software for the entire linguistic review of the manuscript. (R10)

Phases of the publication process	Phases of scientific paper development in which digitalization is applied	Digital services and software mainly used by the scholars interviewed
Researching	• Journal Selection	Enago; Editage
	• Literature review	Marketing Scales; Mendeley; Zotero; Google Scholar; Business source premier; Scopus; WOS; Editage
	• Data collection	Survey Monkey; Google Forms; Qualtrics; Toluna; Prolific; Upwork; Octoparse; Google Dataset Search
Writing	• Data analysis	NVivo; SPSS; SAS; R; Knime; Minitab; Lisrel
	• Manuscript writing	LaTeX
	• Manuscript references	Mendeley; EndNote; Zotero
	• Manuscript translation	Bibendo; Grammarly; Reverso Translation; Elite Editing; Editage
	• Manuscript proofreading	Elite Editing; private professionals native speakers; digital services offered by the single publisher
Submission and review	• Manuscript submission	Digital platforms of manuscript submission offered by the single publisher
Publication	• Paper copyediting and proof	Digital services offered by the single publisher
	• Paper promotion	ResearchGate; LinkedIn

Table 3.
Digital services and software emerged from the interviews regarding the academic research process

A few scholars reported contracting surveys to external specialized digital services and purchasing data, especially data aimed at a specific research goal, such as profile customers to administer questionnaires or organize experiments.

Manuscript submission as well as copyediting and proofing of papers are usually used through digital services offered by the single publisher.

After publishing their research, few scholars invested their time or effort in disseminating research results through social media or digital services, or to developing relationships with other researchers in the same research area.

4.3 Impact of digital services and software on the scientific production process
All the interviewees argued that digital services and software are beneficial in supporting scientific research work; in some cases, also preventing human error. They considered these digital tools as a means, not as an end, to conduct research, as this respondent said:

> We are not digital service or software oriented. We are research oriented, and then we go to check the opportunities offered; in some cases by the publishing house to which we want to submit the paper. (R14)

These digital tools enable scholars to improve the quality and to increase the number of research outputs, as these interviewees noted:

> Some digital services can help improve the quality of research and data. For instance, using Prolific academic, it is possible to reach large samples of respondents and apply filters to include appropriate participants. (R7)

> Speeding up the analysis means being able to obtain more insights from the same database because certain cores/evidence are faster to see using this software (in the analytical phase, of course). (R3)

The quality/quantity relationship was at the center of many of the interviews. Different opinions emerged, which can be summarized in terms of the importance of researchers' abilities rather than digital tools. Two views in this regard were proposed:

The research quality lies more on the quality of the research idea and the robustness of the conceptual framework, which is relatively independent of the tools used to support the research development. Of course, digital services can speed up the process. (R5)

The motivation for doing research should be not the quantitative element (to publish as much as possible and as quickly as possible). We would need supports not only to do first, in an assembly line logic, but rigorous, severe, and reliable unwinding and validation systems. (R15)

In addition to improved research quality and increased productivity, a further positive impact, and also negative effects, of using digital services and software for academic research emerged from the analysis (see Table 4).

Online digital services and software have not radically changed scholars' research approach because the reasoning, mental path, research setting, and evaluation of the results have not been modified. They have, however, changed habits applied in drafting papers and sometimes even scheduling research activities, as these scholars affirmed:

Data collection performed through online survey tools speeds up the timing of data collection and related processing. This means that productivity in the long term can be higher. (R2)

Often, the data are collected thinking about the software used to analyze it. For example, NVivo software has an extension for Google Chrome called NCapture, which only works with some social media platforms and not with others. This 'constraint' ensures that the search perimeter is defined, giving precedence to those particular social media platforms read by NCapture, and overshadowing others. (R10)

A difference for this topic emerged in terms of generational aspects. Younger researchers who started working in academia more recently found that digital services were widely diffused, and could not say if they had affected their research as they had always used them and learned to use them during their PhDs.

4.4 Scholars' expectations regarding the future use of digital services and software
The interviewees believed that there would be good opportunities for digital software and services development in the future. They believed that these tools would increase in number and use, especially across younger researchers. Expectations regarding the future amount of digital tools were conflicting – some expected growth, while others predicted convergence toward a few packages used by many, instead of plentiful but smaller software packages. According to some, software such as *R* would take over because it allows an excellent level of customization through the programming language and co-creation, requiring a lower cost (some packages are even free).

Regardless of this, the positive development of these digital tools fuels multiple expectations that can be distinguished into the following two categories: (1) the improvement of digital services features and functionalities, and (2) the overcoming of specific difficulties faced by scholars in carrying out their studies. Referring to the first, not all respondents contributed to this topic because of their limited awareness of the use of digital tools. Scholars who replied expected that digital services and software would become more flexible, user-friendly, intuitive, integrated, customizable, have more automated procedures, and be interconnected with other – not just academic but managerial – software. Some of the interviewees noted specific expectations, for example, to refine the search for academic papers:

There are several online libraries but finding the right papers still takes several requests. Indeed, even if it was possible to use different search filters, it is still difficult to find the combination of the right keywords to find suitable papers. (R8)

In addition, digital services and software could increase/improve their functionalities to detect topics relevant for the academic literature and not discussed in other papers, to identify

Table 4.
Positive and negative impacts of using digital services and software for academic research

Positive impacts	Negative impacts
• Time saving (e.g. accessing databases or processing quickly at low cost)	• High time input to learn how to use digital software; once learned, the literature may have developed forward to new methodologies with different software
• Ease of use	• High time input to manage digital software properly
• Accessibility (e.g. to recent information)	• High price to purchase software, updates, and connected training courses
• Provision of objectivity and scientificity to research	• Rigidity of some software (some are developed in English, and to analyze a certain corpus of words it is necessary to develop ad hoc semantic dictionaries in native language)
• Order across concepts	• No assistance service in case of need of support for free version of digital tools
• Research funds saving for free version of digital tools	• Risk of flattening the data
• Ease of interpretation and sharing of results with other scholars who use the same software	• Excessive standardization of many procedures, which might hinder the originality and the uniqueness of some research approaches
• Possibility of achieving a high number of respondents	• Lack of control
• Increased knowledge flow	• Digital tools not easily accessible in economic terms to all scholars
• Flexibility in the choice of provider; the best service at a reasonable price	
• Linguistic precision in case of proofreading	
• Language learning using specific digital services	

similarities or differences in comparison with content already included in other papers, and to collect specific topics or theories. All this would help scholars define a framework via which to understand topics not yet encountered and any research gaps, as this scholar stated:

> As there are online services such as Marketing Scales, which allow us to browse multiple scales, it would be valuable to have something similar for theories or broad topics. This would save time on searching for documents and could allow academics to have more time for the actual theoretical development. Of course, it is a challenging activity, but if performed well, it could bring immense value, especially to PhD students who tend to struggle with theory search and related development. (R2)

In relation to the end of the publication process, although some online copyediting services exist, some desired a more significant presence and efficiency in the online channel. Further, some suggested that a forum grouping scientists may be helpful to collect ideas and prevent research rejection (i.e. gathering suggestions and feedback).

Finally, scholars expected that academic journals and related publishers should improve their offering of digital services for managing sources, previous papers, and editing/formatting of papers both in the paper development phase and in the proof editing following acceptance of the manuscript. Some scholars further desired that automated services for grammar correction (such as Grammarly) improve their service for academic writing to reduce the "human" revision work done by proofreaders.

Concerning the overcoming of specific difficulties faced by scholars, some outlined how administrative procedures – e.g. payments and accounting procedures – that are needed to purchase online services slow down the development of these services because of non-alignment with current guidelines of universities. This mainly occurs when service providers are foreign companies, as this involves greater complexity in terms of communication and administrative agreements across universities. In addition to expecting these obstacles would be overcome, scholars highlighted their wish that service companies provide digital services and software at lower prices. There are universities and research centers with significant financial resources, but there are cases of researchers forced to buy these services and software at their own expense. As one respondent put it:

> I hope for greater democratization of their use among universities. I would expect all researchers to be placed on an equal footing in being able to use these tools/databases. And this is a topic that concerns all Italian and European research. Think of all the scholars as forming a cloud with all the national information assets inside. (R16)

During the interviews, some scholars emphasized that in the future, an increasingly heavy intervention of machine learning and all related forms of artificial intelligence may increase, as these testimonials claimed:

> There are even cases in which some artificial intelligence systems have managed to write papers with the same methods and techniques. It is impressive, but it could be possible to develop toward this direction. (R9)

> The most advanced form of research that exists today is the processing of data done by large companies and platforms (e.g. Google) that they collected worldwide. This is applied research, which is done almost automatically; it's different from scientific research. (R15)

> The development of these systems carries the enormous risk of flattening research. (R4)

However, it was commonly agreed that scholars' skills are important, as these respondents argued:

> I think we are approaching the top of the evolution scale, as research is still and will always be human-centered. You cannot replace researchers. (R6)

Higher integration of AI features in the identification of coherent papers which might constitute the theoretical background, and in data analysis. (R5)

Findings are summarized in Table 5

5. Discussion

This study explored how digitalization affects the academic publication process by taking into account the perspective of management scholars. Overall, digitalization emerged as pervasive throughout the entire scientific research publication process, given that it can be used in each phase of this process. This study, thus, confirms that digitalization helps authors overcome the different kinds of difficulties inherent in publishing a scientific paper (e.g. Turk and Björk, 2008) and, at the same time, favors the authors themselves in each phase of the publication process (Rubin, 2003).

In relation to the first research objective (i.e. to provide an overview of the digital professional services dedicated to academic research), some already well-known and taken-for-granted in daily practice emerged, such as translations and grammar checking, proofreading, improvement of a paper's structure and readability, and sample generation and data collection and analysis services. Further, a growing offering of services, resulting in de facto outsourcing of some core research activities, such as data analysis, data presentation, and report generation, can now also be found. In particular, Table 3 highlights how some of the digital professional services can be considered advanced, simulating the peer-review process by suggesting the kind of journal for submission and revising the paper according to reviewers' comments. Therefore, we consider these services far from basic corrections or proofreading, and they may ultimately substitute for the core activities of research.

With reference to the investigation of academics' awareness (the second objective), this study highlights that the scholars interviewed did not know all the professional digital services and software that could help them in developing a scientific paper. As Table 4 shows, they mainly used digital tools with regard to the following two phases of the research process: (1) research to develop a literature review, data collection, and data analysis, and (2) writing to manage the manuscript's references, translation, and proofreading. This last service is particularly adopted by scholars that are nonnative-English speakers to reduce their anxiety in writing in English and to make their manuscripts more reliable, as argued in literature (Leki, 2003; Curry and Lillis, 2014; Plo and Péres-Llantada, 2015). Essentially, this analysis outlines that digital services and software are not used in relation to the entire research process not because they are not useful, but because they are unknown.

Regarding the impact of these digital tools on the publication process (the third objective of this research), the findings show that these technologies cover practically all phases of the research process, and that they have a profound effect on it – greater in some aspects than others, but certainly not neutral. In line with previous studies, this explorative research confirms that scholars have benefited from these digital tools to improve research quality and increase their productivity (e.g. De Witte and López-Torres, 2017; Edvardsen et al., 2017; Rhaiem, 2017). Fundamentally, this study outlines that digital tools do not substitute for, but rather, support scholars' research work. This aspect is shared across all generations of academics interviewed, though the younger researchers perceived these tools as fundamental to develop a scientific paper.

With regard to the last objective of this research – to examine scholars' expectations regarding the future use of digital tools – this study highlights a common opinion regarding the positive development of these tools, in that the scholars had formulated expectations especially regarding improvements to features and functionalities of digital services. The interviews also provided an opportunity to discuss the overcoming of difficulties face by

Digitalization and publication process	Findings
Digital professional services dedicated to academic research	• For the research phase, different digital professional services are offered on the market, such as carrying out surveys independently, obtaining (reliable and tested) datasets, mailing list samples, surveys, and complete statistical analysis from the professionals
	• For the writing phase, services offered enable authors to operate independently with automatic real-time corrections or with the support of professionals to check the manuscript quality
	• For the submission and review phase, professional digital services help the authors submit and re-submit their manuscript according to reviewers' comments
	• Publication services support the authors in marketing the published paper to increase scientific performance indicators
Academics' awareness of digital services and software	• Academics are aware of multiple online digital services and software for academic research, but they adopt only a limited section
	• Differences exist according to different academic positions and ages
	• Scholars usually adopt the publisher's digital services to submit, copyedit and proofread the manuscript
	• Few scholars invested their time or effort in disseminating research results through social media or digital services or developing relationships with other researchers in the same research area
Impact of digital tools on the scientific publication process	• For scholars, digital services and software are beneficial in supporting scientific research work and preventing human error
	• Digital tools enable scholars to improve the quality and increase the number of research outputs
	• Online digital services and software have not radically changed scholars' research approach because the reasoning, mental path, research setting, and evaluation of the results have not been modified
	• Younger researchers who recently started working in academia are more familiar with digital services as they learned to use them during their PhDs
Scholars' expectations on the future use of digital services and software	• Scholars believe that digital services and software would increase in number and use, especially among younger researchers
	• Digital services and software would become more flexible, user-friendly, intuitive, integrated, customizable, have more automated procedures, and be interconnected with other software
	• Digital services and software would increase/improve their functionalities to detect topics relevant to the academic literature and not discussed in other papers, identify similarities or differences in comparison with content already included in other papers, and collect specific topics or theories
	• Some scholars suggest creating a forum grouping scientists to help to collect ideas and prevent research rejection
	• Scholars expect that academic journals and related publishers would improve their offering of digital services
	• Scholars expect efforts to facilitate the payment process for digital services, not to slow down the manuscript writing process
	• Scholars emphasized that in the future, machine learning and all related forms of artificial intelligence may improve the overall quality of the digital services and software

Table 5.
Main findings

scholars in carrying out their studies. There was agreement that scholars are essential to state hypotheses, to explain results, to develop theoretical models, and to present novelties by enhancing the scientific debate. However, the wide development of digital research services and software have accentuated the trend of writing more standardized papers following the IMRAD structure (Wu, 2011), making cognitive work highly fragmented and impersonal. Although this opinion is not particularly developed across young researchers, multiple scholars believed that future research could end up with modular and very standardized papers that provide insignificant advances and few groundbreaking impacts, differing from each other only marginally. A phenomenon that could be identified and named "mass science" surely needs to be investigated. Engber (2017) named this phenomenon "sameness," and claimed that this is strictly connected with the use of AI, which could make all papers similar in their structure, with no errors, with no "prose," though surely more efficient and effective in terms of "publishability."

An even more delicate issue is related to outsourcing to specialized academic writers or AI applications to obtain a complete draft of a paper, possibly including the more valuable and original parts of the article. We did not find services advertising that they could write an entire paper; however, Tatalovic (2018) wrote about an AI academic writer service able to write complete drafts of papers, though it was not clear from the website of the provider or the authors the level of completeness achieved. This opens a debate about loss of author control and dilution of his or her contribution and establishing "unfair competition" among researchers. Outsourcing more and more parts of the work needed to complete a paper – and ever more substantial parts – makes the author more an assembler of research pieces than an author in the proper – or at least traditional – sense. A question emerges as to what is left of authorship when a paper collects research pieces that the author did not personally conduct, but rather, bought from various providers.

6. Implications
6.1 Theoretical implications
This study makes several theoretical contributions. First, despite the growing popularity of digital professional services and software dedicated to academic research, there is not much scientific literature published on this topic. In fact, most of the available research has focused on scientific projects (e.g. Russell-Simmons *et al.*, 2016; Al-Maadeed *et al.*, 2021) rather than research product management.

Second, this study contributes to advancing the knowledge on this topic by investigating how digitalization affects the academic research publication process. In this regard, this research takes into account the perspective of not reviewers, who are already widely examined in the literature (e.g. Gilmore *et al.*, 2006), but the management scholars, which was hitherto unexplored.

Third, the interviewees of this research confirmed in general terms the TAM model (Davis *et al.*, 1989, 1992), because perceived ease of use and perceived usefulness were reported as the drivers of the adoption of such digital services and software. Thus, a contribution has been made to expectation theory, in the sense of having expanded the theory in a special field of customers – management scholars.

6.2 Practical implications
The results of this study provide suggestions both to scholars who professionally deal with academic research and digital services and software providers. In terms of scholars, this analysis has made explicit and hopefully created greater awareness around the usefulness of using a range of services that are easily and quickly adopted, but on which attention is not

always sufficiently focused. To move in this direction, scholars should learn to use these technologies. As some scholars proposed during the interviews, it may be useful to create quality circles among academics to circulate knowledge and acquire sharing regarding the best use of these tools. Essentially, this study invites scholars to make good use of digital tools for their research, by continuing to develop individual critical skill to reflect. In particular, younger researchers are encouraged not to rely too much on such services but, first of all, to gain sound epistemological and methodological basis in order to be in a position of mastering such digital instruments and not to be mindlessly dependent on them. Research at its core is essentially a matter of curiosity, of scientific acquaintance and of desire to contribute to improve people's quality of life, all things that cannot come with a software or a digital tool.

As for digital services providers, it is suggested to disseminate information about their services to optimize their use; often, it seems researchers use just a fraction of the features these services include. In this respect, a kind of community of practice could be built around the most popular services. In addition, customization is emerging, and service providers could invest in developing more personalized versions of their software. However, it is also important to note that the multiple positive effects of using digital services and software for academic research that emerged from this analysis (Table 5) are accompanied by many negative effects, which service providers should examine to design improved digital tools.

6.3 Social implications

Equally important are the social implications since academic research ultimately produces benefits for the whole society. There are several points to note in this regard. First, the possible negative consequence of "sameness" could also operate at an aggregate level; "sameness" or "mass science" would have repercussions not only in the specific field or discipline but in general, thus making the entirety of scientific activity less effective and meaningful.

The second issue concerns using public funds to acquire these services for conducting research and publishing papers. The question of ownership of research carried out by researchers who are public employees is already debated; if publicly employed researchers use additional resources to publish their work, the matter becomes even more complicated.

7. Limitations and avenues for further research

This paper has, no doubt, several limitations. First, given that a well-established base of scientific knowledge on the topic was not available, an exploratory research was undertaken with a small number of scholars interviewed, which limits the generalizability of the results. Second, only a few international scholars were interviewed, and not all generations were considered for this study. This research would have benefited from a larger number of interviewees worldwide and the inclusion of researchers of different ages.

Given the exploratory nature of the study, it may be a starting point for future academic research and may indeed lead to practical implications for digital service providers and act as a pathfinder for a topic that is still little explored.

Avenues for future research can include the following. Although these services are thought to be widely used and widespread, there are no surveys available to measure their degree of diffusion more precisely. Research on this would, therefore, undoubtedly be helpful for a better understanding of it. A second aspect worthy of further study is related to the judgment that researchers who employ digital research services made toward them. Use does not necessarily imply satisfaction or even inner intellectual approval. Further, this type of analysis should be conducted not in an aggregate manner with a generic reference to all

digital research services but analytically, concerning each of them. Relatedly, it would be interesting to know why researchers who do not use digital research services have made this choice. The reasons for non-use may reveal aspects that are not necessarily the opposite of their use. Further, it would be essential to understand the effects that can be observed in scientific production assisted by digital research services from a quantitative point of view and, if possible, also from a qualitative point of view. Finally, as often happens when it comes to digital technologies – and even more so in technologies that involve AI – it would be interesting to analyze the implications of an ethical nature that emerge.

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