



# AN EXPLORATORY ANALYSIS ON DIGITAL SERVICES AND ARTIFICIAL INTELLIGENCE IN MANAGEMENT ACADEMIC RESEARCH

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## Abstract

The use of digital research services has brought a dramatic increase in efficiency and easiness in research for both authors and editors. The new frontier seems to be the use of Artificial Intelligence which could further improve the quality of the research process. This exploratory study employed a direct observation of academic and non-academic resources to orientate information and research to answer two simple but fundamental research questions. The first one is to provide a structured map of these research services; the second one is connected with the potential impacts on the academic community brought by these services, including AI, opening an agenda for further investigation. Therefore, after a first mapping of the current services available for authors and editors/publishers, we investigated both digital services currently used by researchers and potential AI applications still at the beginning of their development. Answering the two research questions, we aim to debate the effects, impacts, and consequences of using these digital services and AI for academic purposes.

## Keywords

digital services; artificial intelligence; academic research; management; direct observation

## 1. Introduction

Before the advent of computers and the Internet, academics used to send their typewritten papers through snail mail to journals facing all kinds of difficulties from corrections, quantitative calculations, English translation, and proofreading. Nowadays, several software solutions and online services are helping researchers in many ways, from advanced proofreading, content enhancement, dataset provision, statistical analysis until post-publication marketing. With the increase of the computational power of computers, new specific pieces of software have been developed, and starting from the 1990's services based on the web have been thrived as well. Simultaneously, applications based on artificial intelligence (AI) have been improved due to the new computers and web systems such as the cloud. Nowadays, many of these consolidated services are based on web applications and artificial intelligence (AI), and the latter has raised public interest not just in the academic sector. Indeed, over time, books and movies have depicted life in the future driven by robots and technologies like AI beyond human control, reporting almost apocalyptic scenarios. However, in hindsight, advances in technological development have shown how the current scenario is different from what has been hypothesized in old science fiction products. Technology and AI are the present; we regularly interact with them in our daily lives, in highly unpredictable ways, sometimes just like it had been imagined in the past.

Every day we come across chatbots that simulate human assistants, cars that are becoming more and more autonomous, intelligent security and surveillance systems, machines that diagnose diseases and specific therapies, machines that predict industrial failure, not to mention social media and apps on the smartphone. AI has even entered into controversial territory such as the judicial system, convincing authorities to make ethical and formal decisions on the phenomenon (CEPEJ, 2018). AI has also come to the education field, where innovative pieces of software are now employed for marking and grading, giving assistance to students, and even helping in writing their essays.

AI helps and supports humankind and has provided the impetus for innovation and progress in several fields (Dwivendi et al., 2021). AI technology is no longer the realm of futurologists; it is an integral component of the business model of many companies and gives support for many sectors of business, medicine, and governments on a global scale. Ordinary people too rely on AI-based services, sometimes without being fully aware – think, for instance, to apps like Waze or google maps.

If this is the state-of-art of the development, one could ask him/herself whether AI could do research and write an entire academic paper. Writing an academic paper is not indeed like writing an essay or whatever text. In essence, it implies using a complex but very structured pattern where we have to identify an interesting topic, find sources and read all the previous literature on the topic. Then we have to employ a specific methodology, collecting data and information, analyzing and discussing findings. The research pattern is not finished yet when the paper is submitted to a particular journal; in this stage, for instance, the editor and the publisher play a relevant role to check originality and plagiarism. Lastly, the published paper has to be advertised to gain citations and debate amongst scholars. Thence, writing an academic paper is a kind of task that can fit well – at least in some parts – with AI applications.

In a 'publish or perish' era where a scholar's quest/pursuit for productivity is continually exacerbated by intense international competition between academic institutions, these new services, including AI, could impact research. On the one hand, they could help the researcher improve the research and its outputs, relieving the author from repetitive and – to some extent – non-value-added activities such as corrections, finding the sources, reviewing and comparing literature, finding the right journal, collecting data, do calculations, etc. However, on the other hand, all these advanced services could introduce some issues that could affect the entire

scientific endeavor. For instance, the dramatic increase of performance 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.

In such a scenario, we aim to raise the debate on the use of these digital services in the entire research process, answering some basic but fundamental questions such as:

- What are the leading digital services available for management research?
- What are the potential impacts on the academic community brought by these services?

Being aware of such services is essential since they often become part of the work of researchers. Moreover, given their immediate and significant benefits and apparent no costs, they tend to be quickly adopted without overthinking their possible consequences.

The remainder of this paper is structured as it follows: in the next section, we provide a literature review about AI applications, then we map the research digital services from the more known and used to the more futuristic based on AI; then there is a discussion section, which opens to the agenda for further investigation, and finally, the conclusions.

## **2. Research background**

Industry 4.0, Internet of Things, social media, digital technology, and electronic mediated environment (EME) are widely used and known terms these days. Technology plays a priority role in daily lives and different professions (Leimeister, Österle, and Alter, 2014). Digital services facilitate professions and redefine workers' assignments, although it is still unclear how far they support the task and where they get in the way. AI arises from technological development and emerges as another tool to facilitate and even replace human labor.

Given the massive impact of AI on society at large, significant academic studies have been conducted over the years researching the implications and consequences of the technology and the performance implications of AI (Dwivendi et al., 2021; Raisch and Krakowski, 2021).

Several definitions of AI have been given in academic papers, all agreeing that AI refers to non-human intelligence programmed to perform specific tasks. Indeed, Min 2010 defines AI as “the use of computers for reasoning, recognizing patterns, learning or understanding certain behaviors from experience, acquiring and retaining knowledge, and developing various forms of inference to solve problems in decision-making situations where optimal or exact solutions are either too expensive or difficult to produce” (Min, 2010, pp. 14-15). Therefore, AI aims to comprehend human intelligence to create computer systems that can mimic human behavioral patterns and build knowledge relevant for problem-solving (Min, 2010). Moreover, AI can learn from experience, comprehend new concepts, perform reasoning, interpret data, and draw conclusions to facilitate human work. To this end, AI has been primarily applied in different areas, such as gaming, semantic modelling, human performance modelling, robotics, machine learning, data mining, neural networks, genetic algorithms, and expert systems (Luger 2005, Min, 2010; Russell and Norvig, 2016). Machines are increasingly capable of performing specific roles and tasks currently performed by humans within the workplace and society.

Even if researches on AI started back in the 1950s, the initial technological process was slow. Only in recent times researchers and practitioners discovered the advantages of artificial intelligence to replace humans in more routine activities and to work alongside them in activities where the presence of both allows for improved efficiency and service (Newell, Shaw, and Simon, 1959; Newell and Simon, 1956; Dwivendi et al., 2021). Müller and Bostrom (2016) predicted that AI systems are likely to reach overall human ability by 2075, which may not necessarily have a positive meaning. Indeed, AI has a strong impact not only on the economic system but on society in general, and this proves repercussions from an ethical point of view, especially when dealing with big data and related privacy concerns (Duan, Edwards, and

Dwivedi, 2019; Pappas et al., 2018). Furthermore, the advent and development of AI leads to revised roles in different professions and leads to unemployment, replacing human labor with machine labor. Manyika et al. (2017) estimate that up to a third of current work activities could be impacted by 2030. However, AI seems to be the future that organizations are moving toward; indeed, organizations attempting to use AI can either automate the task or use an augmentation approach (Raisch and Krakowski, 2021).

On the one hand, if they opt for automation, human involvement is minimal to allow more comprehensive, rational, and efficient processing (Davenport and Kirby, 2016; Raisch and Krakowski, 2021). On the other hand, augmentation implies continued close interaction between humans and machines. This approach allows for complementing a machine's abilities with humans' unique capabilities (Daugherty and Wilson, 2018; Raisch and Krakowski, 2021). To decide whether to opt for an automation or augmentation approach, it might be helpful to reflect on the nature of the task. Indeed, for routine and well-structured tasks might be better to opt for an automated approach, while for complex and ambiguous tasks might be better to choose an augmentation approach (Daugherty and Wilson, 2018; Davenport and Kirby, 2016; Raisch and Krakowski, 2021). These decisions can be read in the key of paradox theory, in which two interdependent and contradictory situations must coexist and be interchangeable depending on the period and role under consideration (Cunha and Putnam, 2019; Waldman et al., 2019; Raisch and Krakowski, 2021). Indeed, some organizational actors prefer augmentation (for example, managers that do not want to lose their jobs due to automation) while others individuals prioritize automation (for example, owners interested in increasing efficiencies or employees for routine activities) (Davenport & Kirby, 2016; Raisch and Krakowski, 2021).

Choices to adopt AI services in the education and research sector, defined as university knowledge management (KM), can also be read in light of paradox theory. KM refers to “a set of strategies, methods, practices, and tools for identifying, creating, sharing, and applying knowledge to better achieve the university's objectives. An efficient university KM system requires the use of intelligent software tools, based on artificial intelligence techniques” (Oprea, 2011, p. 58). However, although the topic of AI in education has been widely analyzed for quite some time, the current literature on the use of AI for academic research, particularly in management, is still scarce. Furthermore, the background dedicated to research services is mainly made up of web sources rather than academic literature. Even if these services are so broadly used, it is pretty ironic that there is scarce investigation.

Therefore, this research aims to explore the current digital tools that apply AI to facilitate scientific production. To this end, we used source criticism, or information evaluation (Hjørland, 2012), where non-academic sources are used to orientate information and research, and the credibility of the sources varies depending on the topic (Savolainen, 2007). Specifically, the present research aims to animate the scientific debate on the application of digital services for research, shedding some light on the benefits (but also risks) associated with the use of such tools, that are rarely considered even if widely adopted by researchers, coming to include in the analysis the more innovative services based on AI.

### **3. The research process**

From the literature (Gregar, 1994; Bordens and Abbott, 2002; Hair et al., 2007), we know that the research flow is typically structured into several steps resembling the scheme in Table 1; to this scheme, we added the more taken for granted steps connected with editing services and post-publication steps. We first mapped more traditional and consolidated services until reaching the more innovative ones based on AI.

**Table 1. Steps of a typical research process in management**

| <b>Stage</b> | <b>Steps</b>                              | <b>Process owner</b> |
|--------------|---|----------------------|
| Funding      | Funding                                   | Author               |
| Researching  | Identifying the problem and the topic     | Author               |
|              | Reviewing literature                      |                      |
|              | Setting research questions and hypotheses |                      |
|              | Research design/methodology               |                      |
|              | Sample design (if needed)                 |                      |
|              | Data collection                           |                      |
|              | Data analysis                             |                      |
|              | Data presentation                         |                      |
|              | Discussion                                |                      |
|              | Writing                                   |                      |
|              | Paper translation                         |                      |
|              | Paper proofreading                        |                      |
| Submission   | Journal selection                         | Author               |
|              | Paper submission                          | Author and Editor    |
|              | Review process                            | Author and Editor    |
| Publication  | Publication                               | Publisher            |
|              | Paper promotion                           | Author and Publisher |

#### 4. Method

Due to the exploratory nature of this study, the research adopts a qualitative approach aimed at mapping the actual digital services available for academics derived by direct observation. Particularly, the research is based on observing 23 websites of digital 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.

Direct observation is considered a non-intrusive qualitative research method that allows the researcher to understand a new phenomenon (Pantano and Vannucci, 2019; Grove and Fisk, 1992). Data have been collected through the participant observation of each available 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 the collection bias, the researcher observed each website with a research protocol based on the website name, nationality, academic or non-academic source, type of service offered, main features, and stage of the research process. Observations were made in March and April 2021, and each of them lasted 20 minutes. Data for each website were systematically tabulated through an Excel file that further allowed the comparison among the different websites. Finally, to assure validity and reliability of data collection, the dataset was shared with two independent researchers that validate the research protocol and data collection procedure.

#### 5. Findings

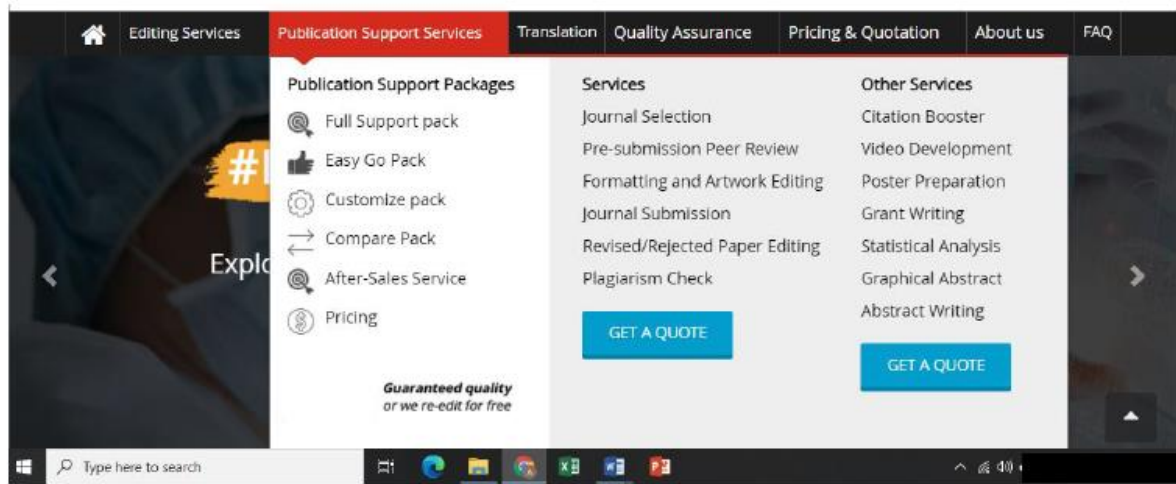
Letting aside the first step dedicated to funding, because it is not directly relevant to the conduct of the research even if web services are dealing with it already in place, we found the first range of essential services connected with proofreading, general editing as well as advanced editing services for submission and even specialized academic writing. Table 2 summarises these services and their main characteristics.

**Table 2. Digital services dedicated to research, characteristics**

| <b>Stage</b> | <b>Steps</b>   | <b>Characteristics of the service</b>  |
|--------------|--|--|
| Researching  | Identifying the problem and the topic  | Professional services which can select the right literature dedicated to the topic, writing the introduction and the literature review                   |
|              | Reviewing literature   | Services which range from:   |
|              | Setting research questions and hypotheses  | - Providers of datasets without a digital object identifier (DOI)  |
|              | Research design/methodology  | - Providers of academic datasets with a DOI; these databases are typically more reliable, tested and they have already been used by many other academics |
|              | Sample design (if needed)  | - Websites where users can develop their surveys   |
|              | Data collection  | - Surveys entirely developed by professionals  |
|              | Data analysis  | - Services which create specific mailing list samples administrating questionnaires  |
|              | Data presentation  | Professionals who provide a complete statistical analysis of survey data including:  |
|              | Discussion   | - choosing the quantitative methodology  |
|              |  | - analysing data with a specific statistical software  |
| Writing      | Paper writing  | - interpreting data  |
|              | Paper translation  | - creating statistical reports   |
|              | Paper proofreading   | - Websites where the author can upload his/her files using automatic real-time corrections   |
|              |  | - Professionals who directly receive the paper file improving it from a grammatical point of view. Usually, they do not have an academic background      |
|              |  | Service provided by sending the paper file to professionals who can, at different levels:  |
|              |  | - check grammar  |
|              | - style and presentation   |  |
|              | They can also check technicalities such as:  |  |
|              | - references   |  |
|              | - basic calculations   |  |
|              | - plagiarism   |  |
|              | - etc.   |  |
|              | Services provided by sending the paper file to professionals who thoroughly read the document from a typical academic standpoint, in particular the structure and readability. In this way the paper is revised in its entire structure, making it more readable, consistent and academic.     |  |
|              | Not verified pseudo - academic professionals able to write parts of an academic paper, according to Table 1 steps, under control and revision of the author(s). They do not belong to structured professional organisations but they tend to be freelancers take on through dedicated websites |  |
| Submission   | Journal selection  | Services which can help the author in:   |
|              | Paper submission   | - selecting the right journal  |
|              | Review process   | - rewording/rewriting the paper according to the journal guidelines  |
|              |  | - word count reduction   |
|              |  | More advanced services dedicated to  |
|              |  | - pre-submission peer reviewing  |
|              |  | - re-editing according to the reviewers' comments  |
| Publication  | Publication  | Services that can market the published paper through:  |
|              | Paper promotion  | - selected media   |
|              |  | - social media   |
|              |  | - dedicated mailing lists  |
|              |  | Etc.   |
|              |  | They increase scientific performance indicators such as the number of citations and h-index  |

Figure 1 shows an example of one of these digital services available on line.

**Figure 1. Example of the potential services provided on the web**



From Table 2, we can see how some providers can also offer advanced services, simulating the peer-review process, suggesting the kind of journal for the submission, and revising the paper according to the received reviewers' comments. Therefore, we are considering services far from a basic correction or proofreading, which might end to substitute core activities of researching.

Against expectations, we also found out professionals who can, to some extent, stand in for the real author. However, these professionals do not belong to "certified" and trusted organizations, but they typically are specialized freelancers. "Certified" or freelancers, they nonetheless exist, and it cannot be excluded that some authors make use of them.

So, an entire range of services and technologies is available, and many researchers probably use more than one of them in their research activity. The plain reality is that often we don't realize it because a very inherent character of technology is to provide ready-to-apply solutions that become thus often invisible.

And what about using AI in the research field? Can we go any further in terms of services and possibilities?

AI is a very complex and multifaceted technology, and its applications are very ample. Over the years, AI has been defined in many different ways, and nowadays, it is not that simple to determine what AI is (Bhatnagar et al., 2018). The reason lies in the fact the AI applications are increasing day by day along with the affected sectors. Engineers, economists, physicists, medical doctors, philosophers, and many other academics and practitioners have brought different perspectives and schemes. We found a simple and explicit definition according to Luckin et al. (2016, p. 14):

AI is a computer system that has been designed to interact with the world through capabilities and intelligent behaviors that we would think of as essentially human.

AI could be divided into machine learning (ML), where computers learn from data making increasingly better predictions using statistical models, and deep learning (DL), where computers use their own "brain," or better an artificial neural network, to learn from massive amounts of unstructured data (LeCun et al., 2015).

Starting from these simple definitions and classifications, we can immediately figure out the countless kinds of AI applications in the research field and the different steps of Table 1. However, the literature is just at the beginning of the investigation into the relationship between AI and research, and we had to review once more non-scholarly sources such as journal articles, websites, and blogs.

Retracing the steps in Table 1, we found from web sources how AI substantially affects all the process steps. For instance, the Massachusetts Institute of Technology (2019) claimed how a team of MIT scientists had developed a neural network belonging to the so-called DP, 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 DP neural network in correlating a long string of data, but it seems they have developed a different software called the “rotational unit of memory” (Massachusetts Institute of Technology, 2019). In any case, this DP system can 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 discussion so far, which is considered the most important and original part of a paper. This AI software is named “research-bots” or “Manuscript writer.” Tatalovic (2018) highlighted how the online provider SciNote had released a service named AI manuscript writer, which has already written more than 100 draft papers.

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.

Other authors (Barr and Feigenbaum, 2014; Pannu, 2015; Lu et al., 2018; The Royal Society, 2019) discussed how AI is widely used and consolidated in research fields for data collection and analysis activities such as:

- Finding patterns in data
- Cleaning data for further analysis
- Solving complex problems with extensive data sets
- Finding the proper method comparing different ones

Moreover, our field (online) research found several online providers dedicated to services similar to those presented in Table 2, which advertise they are already using AI for their services. In particular for the literature review, data extraction, and analysis, as well as post-publication surveillance.

We conclude by highlighting that AI could be of some help for authors and editors. According to DeVoss (2017), AI applications are underway in editorial activities such as:

- Identifying peer reviewers
- Checking bad reporting
- Checking bad statistics
- Finding data falsification (fabrication)
- Making final decisions regarding papers

From this first analysis and review of research services dedicated to authors, we can understand how scholars have today countless opportunities from basic proofreading to advanced and futuristic AI applications. The debate concerning the pros and cons of these services, especially the ones based on AI, is just beginning and dividing academics and practitioners. On the one hand, someone reckons most services helpful in making complex activities trivial. Still, on the other hand, someone else sees a future with many problems in terms of ethics, plagiarism, and other phenomena such as the standardization of science.



## 6. Discussion

Our analysis dealt with the various stages of a typical research process in management, trying to map the services available on the web for each one of them as accurately as possible. Such services are sometimes “simply” digital services and, less frequently but in a growing trend, services one way or other involving elements of artificial intelligence.

Remaining in the actual possibilities, we found interesting and unexpected results from our field research on the web. Apart from some already well-known and taken-for-granted services such as translations and grammar check, proofreading, improvement of the structure of the paper and its readability, and sample generation and data collection and analysis services, we observed some other services. Specifically, a growing offer of services, resulting in de facto outsourcing some core research activities, such as data analysis, data presentation, and report generation, can now be found.

More, when it comes to AI, it is not so difficult to figure out that, in a future that has already begun, AI will be able to presumably manage nearly the entire process described in Table 1, ending even in the very writing of the paper.

Despite the growing popularity of these services, somehow, surprisingly, there are not many works published in the academic field on such a phenomenon. The topic is relatively new, and therefore there is not much scientific literature on it. The sources we’ve been able to find are of a professional, consulting, or corporate nature. Our research, therefore, necessarily had an exploratory character.

The findings show that these technologies cover practically all stages of the research process, having a more or less profound impact on it but certainly not neutral. Therefore, the contribution of our work essentially consists of having extended to the research process an investigation on the digital tools that until now had mainly concerned teaching and in having provided a first purposeful observation of the phenomenon.

Then, our contribution can be seen in having opened the debate – or, at least, in having raised an issue – which until now, to the state of our knowledge, had not yet been the subject of reflection in the management literature.

Indeed, it is a “self-referential” theme, in the sense that it does not deal with the reality of companies, markets, and business, but it is aimed at the very way in which the research process in the managerial field is carried out.

In some circumstances, however, it is also essential to reflect on how researchers conduct their activities and arrive at their results. In the specific case, no epistemological or methodological aspects are called into question, but the operating conditions, and in particular the technological ones, within which the research activity takes place, are at stake. These conditions have changed to such an extent that it is reasonable and interesting to understand the phenomenon better. Operating conditions, after all, are not indifferent, and technology is not so neutral as it is – more or less naively – believed. Operating conditions and technology among them inevitably affect the processes they apply to.

Technology, after all, spreads quickly in practically all domains of society; even artistic expression, to quote a distant area, is invested by digital technology. Think, for example, of computer art or computer-produced music.

It is therefore not surprising that digitization also invests in scientific research. If this phenomenon is already well known for the hard sciences, it is less so for the social sciences or the human sciences. By the way, even the latter, in hindsight, are experiencing the spread of technologies as tools to support research (the so-called digital humanities); it is all too logical, then, that research in the management field is also affected by digitization, as our survey has shown.

A further element worth adding to the discussion consists of analyzing the effects of the diffusion of digital research services on the research process. As can be expected, these effects are both positive and negative.

As for the former, our contribution to this debate was to highlight some pros of this future situation which can be recapped as:

- an increase in research productivity for authors and editors/publishers
- speeding up the entire process for both authors and editors
- an increase in research and papers trustworthiness
- equal access to research from developed and developing countries
- While, as regards the negative aspects, these can be summarized as follows:
- the possibility of having a “mass science” with innumerable plain and insignificant papers
- the loss of the author’s contribution and an “unfair competition” among researchers
- new problems in terms of plagiarism, originality, and ethics

Reasonably enough, nobody can deny that over the years, research productivity and the speed of the publication process have considerably improved due to the digitalization of several, if not all, of the tasks that are necessary to complete to carry out research and publish a paper.

If we take a look at the process from the editor and publisher point of view, AI applications could have on their part a positive effect in terms of the trustworthiness of research and papers. According to DeVoss (2017), AI can enhance fundamental parts of the editorial process, such as choosing the best reviewers, avoiding plagiarism, bad statistics and reporting, and data fabrication.

Finally, a positive note can be added concerning access to research. Nowadays, academics worldwide can at least write a good paper using online resources that are not as expensive as they used to be. For instance, we found one of these companies that advertises it can provide cheaper online services for young researchers in developing countries, such as scientific training and access to literature and scientific datasets. And maybe in the following years, all these services will be further enhanced by AI software.

On the other side, a couple of negative aspects come from the combined effect of the so-called IMRAD structure and the digital research services we are discussing.

At the beginning of 1900, 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, has brought more standardized papers following the so-called IMRAD structure (Introduction, Materials and Methods, Results And Discussion) (Wu, 2011).

Therefore, software applications and digital search services have further accentuated this trend, making cognitive work highly fragmented and impersonal. With very few exceptions allowed, a rigid structure of the papers, together with the increasing use of digital services, create the conditions for the final outputs to risk being quite similar to each other.

Even if it is often claimed – and researchers are prone to believe it – scholars are essential to state hypotheses, explain results, develop theoretical models, and present novelties enhancing the scientific debate. In the future, we could end up with modular and very standardized papers which differ from each other just in few parts.

Suppose these new services can, in some way, dramatically improve the productivity of the author, easing the approach to the different research steps of Figure 1. In that case, the other side of the coin could be represented by a considerable increase in published papers. Unfortunately, these papers could look very similar to each other with insignificant advances and no ground-breaking impacts at all. A phenomenon that could be identified and named “mass science” surely needs to be investigated.

Engber (2017) named this phenomenon “sameness,” and he claimed how this is strictly connected with the use of AI that could make all papers similar in their structure, with no errors, with no “prose,” though surely more efficient and effective in terms of “publishability.”

A second issue has to do with the loss of the author's control and dilution of his/her contribution and establishing an "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 its proper – or at least traditional – sense. What is left to the authorship when a paper collects research pieces he has not personally done but bought by various providers?

Furthermore, as authors in one way or another compete for publication in the best journals and tenures in universities, authors who still do most of their research on their own (by choice or by necessity) be considered the same way as researchers using digital research services? This is undoubtedly a controversial issue since completely identical conditions are never possible in any field. Nonetheless, at least a mention of it is worth doing, especially concerning the scientific domain wherein everyone should take advantage of the same conditions.

An even more delicate issue is related to the outsourcing to specialized academic writers or AI applications to get a complete draft of the paper, possibly including the more valuable and original parts of the article. We did not find yet services advertising they can write an entire paper for you. However, since we could use these specialized academic writers for all the IMRAD structures, we could obtain a draft or even a paper ready to be submitted. The same is expected to occur in a not-so-distant future using some particular AI applications. McCook (2017) and Tatalovic (2018) wrote about the AI academic writer service able to write complete draft papers, even if it is not clear from the website of the provider and these authors the level of achieved completeness.

So, can we consider a piece of research produced by AI as plagiarism or just something not original? What if, one day, these human or artificial academic writers would claim the authorship or the co-authorship of the paper? No doubt that, in the light of such new technological possibilities, originality issues – and subsequently ethical ones – will have to be profoundly and seriously reconsidered by the entire scientific community.

## **7. Managerial and social implications**

In the present paper, the managerial implications are not aimed at business executives but possibly at fellow scholars who professionally deal with academic research in business management.

From this point of view, this research has made explicit and hopefully created greater awareness around using a range of services, which are easily and quickly adopted, but on which attention is not always sufficiently focused.

A peculiarity of digital services in general – and therefore also of those related to research – is, in fact, precisely that of providing ready-to-use solutions and greatly facilitating the tasks to be performed. In this way, it becomes pretty spontaneous for people to focus on learning how to use the best and to get the most out of them, rendering a conscious and informed decision about the advisability of using them and their possible consequences a "sunk" one.

Therefore, following our analysis, researchers should be more aware of the use of digital research services, both "traditional" and based on artificial intelligence.

Equally important are the social implications since academic research ultimately produces effects on the whole society. From this point of view, a couple of remarks could be made.

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 entire scientific activity less effective and meaningful.

The second issue concerns using public funds to acquire these services for carrying out research and publishing papers. The question of ownership of research carried out by

researchers who are public employees is already debated. In addition, if publicly employed researchers use additional resources to publish their work, the matter becomes even more complicated.

## **8. Limitations and avenues for further research**

This paper has, no doubt, several limitations. First, we could not rely on a well-established base of scientific knowledge on the topic. Thus, our research is of an essentially exploratory kind. This does not mean, per se, that it is without any usefulness or uninteresting, but that, of course, it needs further work.

Then, due to this situation, we have not yet been able to undertake research fully applying a quantitative or qualitative methodology. Our effort consisted of direct observation of the digital research services phenomenon, possibly missing some pieces of evidence and running the risk of being incomplete.

So, some avenues for future research are the following ones. Although these services are intuitively widely used and widespread, there are no surveys available to measure their degree of diffusion a little more precisely. Research on this aspect 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 give of them. Use does not necessarily imply satisfaction or even inner intellectual approval; furthermore, 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. Correlatively, 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. Furthermore, it would be essential to understand the effects that can be observed in scientific production assisted by digital research service 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 artificial intelligence – it would be interesting to analyze the implications of an ethical nature that emerge. How do the algorithms underlie the services' work? Who defines the criteria by which these services must function? Who is the author of the paper in the end? Is regulation appropriate or even conceivable in the use of these services in general and in particular those related to artificial intelligence?

In the end – as it often happens with technology that offers brilliant and costless solutions to many problems – it is at least necessary to have a better knowledge of the phenomenon to harness its power somehow rather than reap just a short-term advantage with no respect of consequences.

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