

Article

Copyright in the Scientific Community. The Limitations and Exceptions in the European Union and Spanish Legal Frameworks

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Abstract: The increase of visibility and transfer of scholar knowledge through digital environments have been followed by the author's rights abuses such as plagiarism and fraud. For this reason, copyright is increasingly a topic of major importance since it provides authors with a set of rights to enable them to utilize their work and to be recognized as the creators. The new research methods linked to technological advances (such as data mining) and the emergence of systems such as Open Access (OA) are currently under debate. These issues have generated legislative changes at the level of the European Union (EU) and its Member States. For this reason, it is relevant that the researchers know how to protect their work and the proper use of another's work. Consequently, this research aims to identify the limitations of copyright in the EU and as a specific case in Spain, within the framework of scientific research. For this, the changes in the European and Spanish copyright regulations are analyzed. The results confirm new exceptions and limitations for researchers related to technological evolution, such as data mining. Additionally, the article incorporates several guidelines and implications for the scientific community.

Keywords: copyright; intellectual property; licensing; publication ethics; scholarly publishing; scientific research; European law; open access

1. Introduction

The Information and Communication Technologies (ICT) revolution has meant a transformation for the legal institutions. These changes have brought different capacities and possibilities that require legal regulation, to avoid violations of human rights and freedoms [1]. This statement is accentuated in the field of copyright since the Digital Networked Technologies (DNT) have allowed a greater dissemination and access to the author's works from all over the world. It has consequently brought legal problems such as copyright privacy among others. In this regard, all the creations from the intellect are intellectual assets that can be protected. Copyright protects the form of the expression not the content in itself. This legal control is not only relevant for creative literary production and culture [2,3] but also in the scientific field since researches need to publicize their projects and discoveries through publications by different means [4].

Copyright relevance extends worldwide, and the Universal Declaration of Human Rights includes it as a right in its Article 27: "everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits. Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author" [5]. It is also important to cite the Berne Convention for the Protection of Literary and Artistic Works de 1886, as the oldest and most important international multilateral treaty. It provides creators with the means to control how their work is used, by whom and on what terms. The Berne Convention guarantees that the signatory states

assurance minimum rights to holders of foreign rights [6]. In the European Union (EU) case, the Charter of Fundamental Rights of the EU includes copyright.

Nevertheless, copyright regulations are not the same all over the world, although the international treaties and successive EU directives have been tried to harmonize them [7]. However, the WIPO Copyright Treaty recognizes the importance of the “need to maintain a balance between the rights of authors and the larger public interest, particularly education, research and access to information” [8]. In this regard, copyright legislation has always included exceptions and limitations, which have played a key role in the so-called intellectual property paradox. The paradox of intellectual property lies in a system that supports or aspires to promote knowledge but restricting it [9]. This explains the tension between public and private interests intrinsic in intellectual property regulation. In this regard, exceptions and limitations allow for copyright works to be used without licence from the copyright owner since that use serves public interests and guarantees the safeguarding of the core values of the EU protected by fundamental rights [10]. Exceptions and limitations allow to guarantee the safeguarding of the values of the EU protected and important public interest [11]

The application of exceptions and limitations is done related to the principles of free use of works incorporated in part 2 of Article 9 of the Berne Convention. This provision contains three basic requirements known as “three-step test” that the free use of works should comply. According to the interpretation of Hugenholtz and Okediji limitations and exceptions that are not overly broad, do not rob right holders of a real or potential source of income that is substantive and do not do disproportional harm to the right holders, will pass the test [12].

However, Egloff et al. [13] address that European copyright legislation is aware of the fact that copyright may present a barrier to scientific work, since exceptions and limitations are only applicable when they are transformed into national law by different member states of the EU. This means that they apply only to that member state, besides exceptions and limitations are usually implemented under a voluntary scheme, with very few exceptions established as mandatory. Consequently, there are different legal frameworks and the scientists need to be aware of them.

In line with previous studies, the capacity of global copyright law interferes with basic scientific research methods [14–16]. Also, the rapid evolution of the publication possibilities has generated a situation in which the field of EU copyright has become obsolete in several circumstances. In this regard, public interest and the author private interests (such as economic benefits) often collide, which causes legal problems. To achieve a balance, recognition and compensation for the work must be mixed with values such as access to culture and knowledge [17,18]. Academic and scientific researchers are motivated by intellectual recognition for their research efforts, academic positions and prestigious awards, which has also motivated re-thinking the fundamentals of copyright policies [19].

Previous works have addressed that over the years there has been an overreach and expansion of copyright outside its traditional borders [20,21]. This situation caused that these rights were in the hands of producers or publishers and not of the creators. For this reason, initiatives that promote Open Access (OA) have appeared. This system refers to making scientific works available to users, to access them and to use them freely under certain conditions [22,23]. This strategy was promoted by the Budapest Open Access Initiative [24], which recognized that the literature that should be freely accessible online is that which scholars give to the world without expectation of payment. Primarily, this category encompasses their peer-reviewed journal articles, but it also includes any unreviewed preprints that they might wish to put online for comment or to alert colleagues to important research findings. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited. However, in this publication system, several barriers have appeared at a disciplinary, economic, institutional or cultural level [25–30].

Regarding copyright, different studies affirm that since 2003 the legal frameworks of this rights have not been a barrier to the proliferation of OA journals. For journals offering OA only for the electronic version, authors were usually bound by the agreements they had made with the publisher

and readers could at least access the text on equal terms with the paper version. Besides, thanks to the use of Creative Commons licenses the use of this system has been made easier [31]. The existence of subject repositories and institutional repositories has also relaxed copyright agreements [32,33]. Nevertheless, many publishers have defined policies which they have allowed posting copies in institutional repositories but not in subject repositories [34]. OA initiatives are increasingly supported and some authors affirm OA is particularly important in sciences because of the importance of sharing data and information from which scientific insights are developed. Besides, scientific publications should be made openly available and restrictions should be based on specific justifications [13]. Nonetheless, other authors declare that how it is developed may aggravate the unequal distribution of knowledge due to the appearance of financing via "article processing charges" [35].

All these challenges and rapid technological developments have led legislative modifications in the EU, the last one in 2019 with the Directive (EU) 2019/790 on intellectual property and related rights in the Digital Single Market (DSM). This directive contains a number of provisions intended to modernize the copyright law, among them there is the provision related to mandatory text and data mining (TDM) exception that would benefit research organizations. However, this progressive idea has received various criticisms [36,37], as will be analysed in the next section. These changes in EU law have affected the Member States, but some of them have already been introduced this exception such as United Kingdom (UK) and France. A couple months before, Spain approved a reform of its copyright law, so it is a good opportunity to verify if the measures that have been proposed have been implemented.

This article aims to review the limitations and exceptions for the scientific community in the EU, specifically TDM exceptions, and the case study of Spain. The analysis is structured as follows. First, this article discusses the problems surrounding TDM exceptions according to prior works. Second, the problems of the exceptions and limitations in Spain are exposed and discussed. The final part reflects through a discussion the situation with these exceptions in the EU and Spain including possible solutions and several guidelines for the scientific community. Through this can we tell if the exceptions were sufficient and if they could cause problems to the scientific community.

2. Methodology

The methodology applied encompasses qualitative research of a doctrinal nature. This research contains a doctrinal or "black-letter law" methodology [38,39]. This means that the research is based on analysing the copyright legal rules about the exceptions and limitations and their interpretation of existing literature. This approach enables the researcher to critically analyse the implications of these regulations. Specifically, this research contemplates the Directive (EU) 2019/790 on intellectual property and related rights in the Digital Single Market at European level, and the Spanish copyright legislation.

The research is in part doctrinal in its methodology as it entails a critical, qualitative analysis of legal materials, and also uses the literature review to support the opinions [40]. Doctrinal research has been defined as an analytical study of existing laws, related cases and authoritative materials as a whole on some specific matter [41]. This approach involves identifying specific legal rules, in this case those that deal with copyright exceptions and limitations for the scientific community. When the individual legal rules are identified, general legal principles which underlie the copyright emerge, which enables to identify ambiguities, criticisms and solutions according to international and national scientific literature.

The purpose of the literature review in this paper is to provide an examination of existing studies to critically evaluate the subject and identify the points in common and those from which the author differs. The research undertaken by other scholars has been used to the detection of the main legal conflicts.

The main sources of data for this research will be the legal instruments itself and the existing literature about the subject. The purpose of examining these sources on the new limitations and exceptions is to identify if these are sufficient or may cause problems in the scientific sector or others,

and the same for the Spanish case. This approach helps to clarify the situation and identify the possible solutions. The information will be gathered from a variety of sources including conference papers, textbooks, papers from different journals and publications from several public organisms.

The key problems in copyright exceptions and limitations for the scientific community at the European level are shown in Section 3 through the regulation of the new exception in data mining and previous studies the existing problems are presented. The Spanish case is analysed in Section 4, which verifies the lack of adaptation of copyright regulation. In Section 5 through discussion, some of the challenges and ideas for regulatory improvement regarding new exceptions and limitations, at European and Spanish level, are exposed. Finally, the main conclusions have been summarized in Section 6, which express general ideas of the present study.

3. Directive (EU) 2019/790 on Intellectual Property and Related Rights in the Digital Single Market

Technological innovation driven by the combination of Big Data, Cloud Computing among others, is one the most powerful drivers of change [42] and it has brought about the revision of the European Directive 2001/29/EC (InfoSoc Directive). It granted to the author the reproduction and communication rights, although the directive consolidated restrictions to these rights in the general interest, through exceptions and limitations. InfoSoc Directive gave Member States the option of establishing these limitations into their national laws, besides these exceptions needed updating at regular intervals [43]. This situation resulted in insufficient regulatory harmonization and legal uncertainty, both for rights holders and for users about certain practices of the works when they are in the digital environment. Specifically, in the field of research, since scientists who collaborate internationally needed to be aware that different legal frameworks should apply. In this regard, previous works illustrated that national provisions in EU on copyright regarding exceptions and limitations for research purposes differed in substance [13,44]. A project commissioned by European Union Intellectual Property Office (EUIPO) made in June 2017 demonstrated that copyright law throughout the EU did not give unanimous answers and Members States have often not implemented the EU provisions in a uniform way [45].

As a consequence, on May 17, 2019, Directives (EU) 2019/789 and 2019/790 were published to update the legislation on copyright and complement the current regulations. Both directives have a transposition deadline that concludes on June 7, 2021, this implies that the different EU Member States must adapt their national laws before that date. Directive (EU) 2019/789 recognizes the importance of cross-border uses of digital content protected by copyright and seeks the approximation of national laws to harmonize European regulation.

However, there are currently 28 national rights protection systems coexisting, which poses difficulties regarding cross-border use [46]. As well, DSM is intended to ensure a well-functioning marketplace for copyright. The European Council described the DSM key goals as protecting press publications; reducing the value gap between the profits made by Internet platforms and by content creators; encouraging collaboration between them and creating copyright exceptions for TDM [47].

Nevertheless, the DSM had a critical stage within the EU due to Articles 15 and 17. The first one, for prohibiting the sharing of any kind of journalistic creation protected by copyright through internet platforms without the permission of the author. As well, the second article imposes on the web pages the supervision of the contents uploaded to them by the users to guarantee copyright. So, these platforms must apply systems that allow them to detect copyright infringements. This Article 17 may affect the different online platforms to which researchers refer to publish their work, as they will have to verify that the authors who post their publications there are authorized to do so, either because the article is OA because they have not ceded publication rights, etc. However, Article 17 excludes from this obligation all non-profit platforms, and specifically, educational and scientific repositories. These two articles aim to allow authors to manage their creations in the way they consider appropriate.

3.1. New Exceptions and Limitations of Copyright in Scientific Research due to the Advancement of New Technologies. Data Mining

The European data economy is a reality as legislative changes in different sectors (data protection, copyright, telecommunications, etc) have shown. The ability to process, collect, search or any operation with data is a treasure that Big Data have for the European economy [48]. In these circumstances, TDM appears as an essential automated analytical technique aiming to analyse text and data in digital form in order to generate information such as patterns, trends a correlation. Potentially, text and data mining can be applied in any type of research on any type of content.

According to a study made for the European Commission [49], TDM have different steps: (1) Individual content is extracted from outside sources or created; (2) the content is transformed to fit operational needs, when it is necessary; (3) this content is loaded into a data set, repository or collection; (4) data miners gain access to the data and the mining tools are applied; (5) and finally, the new knowledge is created as a result of the analysis.

In this context the 2016 European Commission's Impact Assessment accompanying the proposal for the DSM studied the TDM. According to this document the TDM was common tool in the business sector and something new in the non-business sector. However different elements obstructed the development of TDM in EU, such as infrastructural challenges or legal ambiguity in copyright laws [50].

This situation has led to DSM had established the obligation for the Member States to impose an exception that would not require prior authorization for text and data mining activities in the field of research. Since having access to large amounts of information is essential for various sectors of the scientific community. The beneficiary entities are the research organizations, which include universities, libraries, investigation institutes or any other entity, whose primary goal is to conduct scientific research or carry out educational activities involving also the conduct of scientific research. The Article 3 in the directive contains:

- Member States shall provide for an exception for reproductions and extractions made by research organizations and cultural heritage institutions in order to carry out, for the purposes of scientific research, text and data mining of works or other subject matter to which they have lawful access;
- Copies of works or other subject matter made in compliance with the previous paragraph shall be stored with an appropriate level of security and may be retained for the purposes of scientific research, including for the verification of research results;
- Rightholders shall be allowed to apply measures to ensure the security and integrity of the networks and databases where the works or other subject matter are hosted. Such measures shall not go beyond what is necessary to achieve that objective;
- Member states shall encourage rightholders, research organizations and cultural heritage institutions to define commonly agreed best practices concerning the application of the obligation and of the measures referred to in the two previous paragraphs.
- An additional TDM exception was introduced in Article 4:
- Member States shall provide for an exception or limitation for reproductions and extractions of lawfully accessible works and other subject matter for the purposes of text and data mining;
- Reproductions and extractions made pursuant to previous paragraph may be retained for as long as is necessary for the purposes of text and data mining;
- The exception or limitation provided for in the first paragraph shall apply on condition that the use of works and other subject matter referred to in that paragraph has not been expressly reserved by the rightholders in an appropriate manner, such as machine-readable means in the case of content made publicly available online;
- As well, finally, this article shall not affect the application of Article 3.

However, this new exception has brought criticism and controversy. In the opinion of Rosati [51], limiting the availability of a mandatory TDM exception to research organizations alone does not make sense. This is so because data mining tools are novel in the EU scientific sector, and also the

nature of TDM is not about disturbing existing content, which means that all the TDM process are incidental phases whose final result is not the re-use of protected parts of a work. This indicates that European legislation should not limit the beneficiaries of the exception. For Margoni and Kretschmer [52], TDM techniques access the information kept in the works but do not use copyright works as works. The informational value in works is not protected by copyright laws. However, in practice, the development of the copyright law has allowed that these techniques could constitute a copyright infringement. This is due to the temporary copy made during the TDM process. For this reason, in the current state of EU copyright law a TDM exception is necessary, although not the one of DSM. The main argument of Kretschmer and Margoni [36] against it is the double limitation related to research organizations and the purpose of scientific research. This benefit is not available for commercial enterprises or for research organizations performing with other purposes.

This EU approach implies that the exception for research organizations and cultural heritage institutions does not allow rightholders to reserve the right to make reproductions, but the exception on Article 4 does [53]. The DSM has resolved that the undertaking of TDM activities outside of a licencing agreement or exceptions could expose one to potential liability for copyright infringement, regardless of whether the process of copying is intermediated and finalized at extracting data and information, elements outside copyright law.

TDM affects Artificial Intelligent (AI), since copyright exceptions indirectly conditioning the framework for the development and application of analytical methods (machine learning). Therefore, the access to a large volume of data is essential to improve the neural network of the AI. In this sense, Rosati [53] studied the case of AI, and she concluded that copyright law has the potential to remain an obstacle in this sense, and specifically on the unlicensed development of AI creativity.

According to Ducato and Strowel [54] the fundamental problem of Article 3 is the narrow scope of its application due to the required simultaneous fulfilment of conditions related to the entity performing the activities, the purposes and the necessity of legal access to the protected content. Besides, the applicability of this exception may be problematic regarding the limitation of the time of reproduction, extraction and retention and the rightholder permission to exclude the application of this exception [55].

In this context, it should be added the uncertain application of pre-existing exceptions and limitation to TDM techniques, which have been implemented in different ways by each Member State. This situation generated an inconsistent legal framework for the researchers [56,57].

For the universities and the research community in general, the exception seems to be a great benefit. In this way, any license used to disseminate that content in the databases must support text and data mining activities, since they cannot be removed by contract. Nonetheless, the mining of texts and data may have as their object facts or data that are not protected by copyright, in which case an authorization will not be necessary.

This exception of text and data mining affects the right of reproduction of works and services in general and the right of extraction of the database producer [58]. This directive has included a new limitation given the importance of data mining activities to improve economic development and innovation in the EU. However, this exception has not been sufficient in the business sector [59] opting for a greater benefit for the research area.

Regarding the objectives of TDM, that is, non-profit research or research for purposes of public interest and the beneficiaries of exceptions remain very limited. This is because in many cases the research is partially financed with private funds. In these cases, distinguishing between research for commercial and non-commercial purposes would be very difficult in practice. Furthermore, this exception may undermine the Commission's initial purpose, that is, to support research innovation for both profit and non-profit purposes, and in this context, the new exceptions could affect the development of AI in EU [60], as indicated above.

4. Spanish Copyright Legislation and the Effects of the New European Directive

The regulatory system used by the EU implies the transposition of Directive (EU) 2019/790 in each of the Member States national law. They have a period of two years from the publication to carry

it out. Thus, unlike what happens with other legal acts of the EU, the directive compels its recipients to the final result that must be obtained but leaves the national authorities the choice of the form and means to obtain that result. This means several modifications in the regulations of European states, including Spain. The EU has been immersed in its preparation for an increasingly digital and connected world for years, and the recently published directives are a sample of the enormous work done by the European legislator. This responsibility now moves to the Member States to adapt their internal regulations in a maximum term of 2 years.

In the Spanish case, the highest level of protection is the Spanish Constitution that recognizes and protects literary, artistic, scientific and technical creation in its title 1, chapter II, section 1, Article 20 b. Thus, the Spanish Civil Code ensures the protection of intellectual and industrial property rights within Spanish territory without prejudice to international treaties.

Currently, copyright in Spain is regulated by Royal Legislative Decree 1/1996, of April 12, a consolidated Text of the Intellectual Property Law (TRLPI), amended several times over the years. The last one being introduced on March 1, 2019, since the legal and technical mechanisms for the protection of intellectual property were obsolete and ineffective, however it does not include the Directive (EU) 2019/790 [61].

With this last regulatory change, the economic rights or the exploitation rights continue to be maintained throughout the author's life and seventy years after his death. When the author dies the rights that are not extinguished are these: The right of disclosure, which may be exercised during the term of seventy years after death; the right to demand respect for the paternity of the work and the right to the integrity of it, and they have no time limit. This regulation allows several options for the protection of the work:

- Through the copyright symbol, the owner of the rights of exploitation, or in its case the editor may put the symbol © in its name and indicate the place and year of its disclosure. The use of these symbols is voluntary and must be recorded in a manner that clearly shows the reserved exploitation rights;
- In the case of free or copyleft licenses, the exclusive rights owners authorize that their work can be used freely without the restrictions of copyright. Creative Commons licenses are the most common and provide the authors of works to specify the uses that they allow of their work. They facilitate national laws adapted licensing models. Also, in the case of software, it is used the GNU General Public License, which is a free software license. This license has the requirement that the modified versions of the published program make the adjusted source code available to users under the same license. On the other hand, *Coloriuris* is a mixed system of self-management and transfer of copyright online that combines web and legal tools so that the rights holders can register the works, share, and manage them;
- There is also the option of the works registry. In Spain, there is the Intellectual Property Registry, which is a registry of public ownership that depends on the Spanish Ministry of Culture, and in which the authors can register their works voluntarily. However, there is the Safe Creative, a digital registry of intellectual property that allows the authors to register their works from the internet and is a solid proof of authorship valid in all countries adhered to the Berne Convention and international intellectual property treaties.

4.1. Exceptions and Limitations in Research Community Benefit

The TRLPI includes in its Chapter II (Articles 31 to 40) limitations and exceptions on exclusive rights of the author or rightholder. Most of these exceptions were result of a “*de minimis*” implementation of the InfoSoc Directive [62]. In this regard, a copyrighted work could be use without rightholder’s authorization, due to constitutional principles prevail over the owner’s protected work. However, Article 40bis declares a limit to the limitations: The articles of this chapter may not be interpreted in a way that would cause an unjustified prejudice to the author’s legitimate interests or be contrary to the normal exploitation of the works”. According to the three-step test included in the Berne Convention.

In the fields of research, innovation and education, the Spanish legislation includes several exceptions and limitations. For these areas a private copy can be made on any medium (both electronic and traditional) without prejudice the expected equal compensation, as long as the following requirements have complied:

- The works must be published, and a natural person must make the copy;
- The copy is only for private use, and this reproduction must be made from a legal source;
- The copy cannot be a subject to collective or lucrative use;
- Electronic databases, computer programs, reproductions of legal downloads of works on the Internet and reproductions made in acts of unauthorized face-to-face public communication are excluded from the private copy;
- If the work is protected by technological measures, the holders of the rights must provide adequate means to make the private copy, without prejudice that they adopt technological criteria concerning the number of reproductions for private work.

In the case of the reproduction, loan, and consultation of works by museums, libraries or archives of public ownership or integrated into institutions of cultural or scientific character, the copy will be allowed in the following cases:

- When reproduction is carried out for research or conservation purposes;
- If these are works that are in the funds of the previous institutions (museums, libraries, etc.);
- When it is not applied to databases and computer programs;
- If the copy covers any type of reproduction of a work, whether it is reproduced in paper or analogue format;
- It must be done without a lucrative purpose, and the works have been previously published;
- As well, if the work is protected by technological measures, the rights holders must provide the necessary means to carry out the reproduction.

Besides, libraries may reproduce, for research purposes, the works of others without permission of the rights owner of the reproduction, so the reproduction made by libraries for purposes other than research and teaching may be illegal if you do not have the authorization of the rights holder. Also, the communication of works or the provision of specific persons does not require prior authorization from the rights holder when it is done for research purposes and whenever it is done through a closed and internal network through specialized terminals in museums, libraries, and in general, in cultural, scientific or educational entities. Authorizations do not be required when the works are not subject to conditions of acquisition or license, and always respecting the author's right to receive equitable remuneration.

One of the best-known exceptions in the field of research is the right to quote for educational or research purposes. This right regulated in the Law of Intellectual Property implies that fragments of other works may be included if the researcher complies with the following requirements:

- The work must be published;
- If the inclusion of the work is for its analysis or quote;
- It is necessary to indicate the source and the author;
- The use of this other work requires research or teaching purposes.

Finally, copies of works such as textbooks, manuals or similar publications can also be distributed exclusively to the collaborating research staff of each specific project. For the previous case, the authorization of the author or editor will not be necessary. Nevertheless, for this specific case, musical scores, single-use works, compilations or groupings of fragments of works or isolated works of a figurative plastic or photographic nature are excluded. Furthermore, Spanish legislator collected the limit of the illustration of education in 2006. However, in 2014 the law changed and it established a double limit: With and without remuneration. With the new European directive, the exception becomes mandatory and cannot be eliminated by contract. It only refers to the digital use of works and benefits, to teach illustration, without commercial purposes, that is, to clarify issues in

the field. Reproduction and public communication (not distribution). This limit also applies to the rights of publishers on recognized press articles.

Precisely one of the changes that Directive (EU) 2019/790 brings to Spanish regulations is found in the exceptions since this new text expressly requires to incorporate the new limitations in all Member States. In this way, a more definite legal framework is established for the scientific community regarding the use of innovative research tools. They can carry out the mining activity of texts and data without requiring the necessary authorizations, as long as it is developed for exclusive scientific research purposes.

The Spanish legislator lost the opportunity to update its exceptions to the new technological realities in this last modification. Some authors point out other Member States legislation should have been considered [63]. In particular, the UK was the first Member State to adopt a text and data analysis exception for non-commercial research in 2014, however the exception did not cover reproduction of databases. In the case of German, for example, its national law has extended the notion of normal use of a database to include TDM according to its specific TDM copyright exception.

The current Spanish exceptions also present ambiguities and doubts in the writing. For example, Article 37 provides that the copyright holders may not oppose to the works reproductions when they made without profit and exclusively for research or conservation purposes. The term of research purposes is not defined so it is complicated to determine if only university libraries have research purposes or also those belonging to research centres, for example. Besides, the teaching purposes have not been included, which could cause some problems for certain institutions that perform a mixed function [64]. According to de Sá e Mello [64] including teaching centres among the beneficiaries of the exception and reproduction for teaching purposes would solve the existing problems.

In this sense, Spanish copyright exceptions remain outdated and, in some cases, more restrictive. The application of these limitations could be difficult for researchers who do not know the legal scope of the work uses protected by copyright. Besides these are obsolete in relation to the latest research trends linked to the possibilities offered by ICT such as TDM. These exceptions were valid when the works were in physical format, but with the new supports and resources the Spanish law is insufficient and the new modifications inadequate.

5. Discussion

The emergence of ICT in publishing and communication activities of works and research protected by copyright is a reality [1,2]. The use of electronic communication networks has been essential for the advancement and dissemination of scientific knowledge. However, these changes have forced revisions in the regulations.

One of the main changes affecting the scientific community is related to the limitations and exceptions for the use of elements protected by copyright. The EU has followed a trend of balance between public and private interests for this activity [10,11] and a purpose of harmonization. However, there is an uneven regulation among Member States due to the fact that the InfoSoc Directive established optional exceptions [45]. EU needed a flexible and mandatory exception for the use of TDM, in line with other jurisdictions such as United States. Therefore, it should not be limited to research for non-commercial purposes to stay at the forefront of developing new technology such as AI [53].

The analysis results of the Directive (EU) 2019/790 indicate the obligation of Member States to establish a mandatory exception for TDM, which implies a positive advance for the Spanish scientific community that did not have exceptions for this activity. This modification represents numerous opportunities for research entities, since, in principle, internet material without a subscription, such as YouTube or Facebook, would be an exception. However, as the preliminary analysis shows, these exceptions are applicable only to a very narrow number of cases. The exception in Article 4 is not imperative, which means that it will only be applied if the use of the works has not been expressly reserved by the owner. Besides, both the exception of Article 3 and 4 could be restricted through the application of technological protection measures. This situation may mean that the use of materials

(*a priori* subject to copyright) through TDM by many companies to create algorithms in different technological sectors may still be considered a copyright infringement in some Member States [59].

The TDM exception only to scientific research might also reduce the efficacy of the reform and cause complications in practice [56]. For example, if a public university has lawful access to a database for educational purpose license, it is not clear if this entity would need to pay an additional licensing fee for scientific research purpose. Probably, the answer is not but it is a possible legal uncertainty that research institutions should consider. For this reason, eliminating restrictions to specific purpose uses of lawfully accessed databases might avoid undesirable results [57].

Besides, obtaining TDM licenses for commercial uses may not be in the reach of small business and start-ups. Many companies of this type may have to outsource their mining needs to be competitive in technological sectors, which can lead them to settle in more flexible jurisdictions. Furthermore, some foreign companies could decide not to continue investing in the EU due to the complexity and legal costs. Therefore, extending the scope of the TDM exception will increase the positive impact of the legislative action on research and innovation, according to previous authors [53,54,56].

Undoubtedly, the mandatory nature of these exceptions is a positive step for the EU policies, since the optional nature has led to a diversity of solutions applicable in each Member State, also facilitate the potential of European research. However, according to previous works [51,36,53] these limitations are very restrictive, they do not cover the full spectrum of TDM techniques, and each Member State has implemented them differently.

In this context, EU copyright should have included an open exception more flexible with the technological development and similar to those contained in other jurisdictions, and also covers other future developments. The United States (US) approach could be considered, since its copyright regime has been more favorable to TDM practices. Also, the US has the fair use doctrine, which does not require to identify a specific exception against an infringement, instead the consideration of a specific number of factors in order to determine a fair use of the copyright work is required [15,16, 57,59,61]. The fair use requires to consider whether the use made of a work 'adds value to the original, among other things' [53].

Concerning the latest modifications included in the Spanish regulations, established the provisions of the previous European directives, but the DSM was not incorporated. Consequently, Spanish copyright exceptions and limitations remain outdated, and a narrow system of limitations does not permit the use of technological advantages such as TDM. These legislative changes had been focused in other copyright elements such as licensing mechanism. The mechanism adopted by the new regulations aims to promote access to protected content and establish a balance between the interests of the different parties. The application of the Spanish limitations could be difficult for researchers who do not know the legal scope of the work uses protected by copyright, and for those who want to use TDM techniques or similar.

Finally, and according to some authors the use of OA initiatives could be a solution for the access works of the scientific community, since the EU has opted for a program to promote the circulation of knowledge and innovation that constitutes a fundamental tool for promoting research [23,24,31]. This promotion of the EU is done through the continuous financing in favor of research. Nonetheless, other authors declare that how it is developed may aggravate the unequal distribution of knowledge due to the appearance of financing via "article processing charges" [35].

Both the EU and Spain have established a regulatory framework with a system of exceptions which tries to promote the access of the scientific community to works protected by copyright. In the EU case, legal uncertainties concerning TDM techniques have been blocking the development of TDM. The DSM has pursued to improve the situation and establish TDM exceptions in favor of research institutes and improve the development of knowledge. Although, the mandatory nature of the exception is a good element, it is not flexible enough. Besides, the possible legal uncertainties that could cause these exceptions may interfere with basic scientific research methods, as previous authors indicated with earlier European regulation.

Spain, on the contrary, have not introduced any limitations regarding TDM, and has not modified the old ones. This situation causes ambiguity in the scientific community regarding the use of new technologies in relation to works protected under copyright.

5.1. Guidelines for the Scientific Community

Copyright regulations can sometimes be complex, a situation that could cause the authors of scientific works to be unaware of their rights or the limitations that affect them. For this reason, and after the previous legislative analysis, a series of guidelines are included for members of the scientific community that must be taken into account in their publications:

- From the moment of the creation of the work, its author has a series of rights. Copyright is subdivided into moral rights and economic rights. While the first of them recognize the authors as such and are non-transferable, the latter are those related to publishing and distributing work among others, and they are transferable;
- Regarding the relationship between publisher and author, normally publishers demand a contract for the transfer of exploitation rights, this implies that the author may transfer the same exclusively or not. If it is an exclusive transfer, it will be necessary permission from the publisher to allow the author to publish it in repositories or social media, otherwise, there is an infringement of transfer of rights. If it is an exclusive transfer, it will be necessary permission from the publisher to allow the author to publish it in repositories or social media, otherwise, it will be an infringement of transfer of rights;
- It is recommended that the copyright agreements with the publisher be analysed in advance to see if they establish conditions that may be harmful to the author and, in this case, negotiate through an "addendum" the conditions that are solicited;
- Through OA, publishers directly allow public communication of their works through repositories (institutions or by subject), web pages or social research networks. Therefore, whenever possible, it is better to choose the OA system and avoid possible legal problems with the editors if the authors want to share their research;
- Also, there are other options when it comes to publishing: how to publish in subscription journals that allow self-archiving in open repositories. In this sense, the authors can visit the SHERPA/ROMEO (foreign journals) or DULCINEA (with Spanish journals) databases. The authors can also choose hybrid magazines where there are articles accessible by subscription or others in OA, or the use of licenses such as Creative Commons;
- Depending on the conditions established by the editors, the authors may include different versions of their works in repositories: the preprint, the one not revised, or the postprint, which has already been revised;
- To preserve copyright, it is essential to know the agreements established with publishers, which are usually included on the publisher website;
- Regarding limitations and exceptions, the legislation offers different cases in which third-party works can be used for research purposes or also in the teaching field. The exception of data mining can be freely used by the scientific community, as it is imperative, no authorization will be required. In the case of exceptions that were already in force, they arise to facilitate the research work and its dissemination, so its use should not be extended to other purposes since a copyright infringement would be taking place.

6. Conclusions

The rise of the internet has broken the balance of interests on which the traditional regulation of copyright was based. Nowadays, any Internet user can be both creator and content consumer. Even more, any user has at his disposal the means to generate copies of identical quality to the original work quickly, anonymously and, above all, at a very low cost. These legislative changes at European level are inserted in a much more ambitious project such as the Digital Single Market, the great commitment of the Juncker Commission, which should be understood as the removal of barriers that

can obstruct negotiations and flow in the digital field and electronic commerce. Specifically, because of this circumstance, it was necessary to carry out a harmonization at the community level regarding copyright. Nevertheless, the European copyright framework has conditioned the scope of national policies, since the optional nature of the exceptions and limitations of the previous regulations is eliminated in favor of a mandatory nature.

The universities, public institutions and in general, the entities and researchers that compose the scientific community are factories in the knowledge economy, and copyright incorporates a mechanism for them to disseminate their knowledge and use them in the economic sector. The legal system of copyright seeks to provide legal certainty, promote scientific research and technological development, as well as encourage researchers to consider the possible advantages of exploiting their discoveries or contributions. As well, precisely because this community constitutes the fundamental pillar of innovation and creativity, copyright regulations have chosen to establish exceptions and that researchers can use certain protected works contributing to the dissemination of knowledge.

About areas such as research, innovation, education and conservation of cultural heritage, the Directive 2019/790 innovates with the application of TDM exception, however the current formulation has resulted unsatisfactory. The limitation of the exception to research institutes for research purposes could harm the business sector dedicated to research in the technological field such as AI. For this reason, a flexible EU exception is needed to prevent a situation in which EU is at a disadvantage with foreign countries in terms of technological evolution.

Consistent with previous Community regulations, the directive delves into the fact that the member states must have a rigorous and effective collective management system, in terms of good governance, transparency and information, to ensure regular and diligent distribution and payment to individual rights holders. Similarly, the management entities must follow the principle of equal treatment and provide rights holders with the exclusion of works.

Finally, Spain lost a good opportunity to reform the system of limitations and exceptions according to the EU modifications. In these sense, Spanish courts have made, over the years, a flexible interpretation of the narrow preexisting system, in order to solve the new technological problems in this area. It may be a solution for the Spanish policymakers to consider other regulations (e.g UK or German) to create a flexible and updated system, in a short period of time.

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