

Environmental law research groups in Spanish public universities: Characterization and presence in social networks

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ABSTRACT

It is imperative that research in environmental law be conducted in order to facilitate scientific progress and the protection of the planet. University research groups are the fundamental units for the creation and generation of scientific knowledge. The dissemination of research processes and results is crucial for university research groups, as it facilitates access to information and enhances their reputation, thereby expanding their reach. This study's primary objective is to characterize environmental law research groups from Spanish public universities based on three key variables: size, gender, and lines of research. Additionally, it aims to assess the presence and activity of these groups on social networks "X" and "ResearchGate." The principal findings indicate that the majority of these groups are relatively small, comprising between three and 11 members. There is a moderate degree of gender equality within these groups, and their lines of research are broad and interdisciplinary in nature. Furthermore, it is evident that the visibility of these groups on social networks, particularly on X and ResearchGate, remains limited. Despite efforts to maintain an active digital presence, there is a clear need for continued work in this area to achieve the desired outcomes related to the dissemination of research activity and scientific production. The integration of social media into this process is a crucial element.

Keywords: research groups, university, Spain, environmental law, social networks

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1. INTRODUCTION

Research is the foundation of scientific and social advancement. Public universities should facilitate academic inquiry and analysis through the formation of research groups. These groups are essentially collectives of individuals with analogous backgrounds, led by one or two individuals responsible for coordinating their efforts, who direct their attention toward a particular field of knowledge, examining a range of subjects, and enhancing the quality of human life. Environmental law is a branch of administrative law that addresses the protection of the environment in a general sense. It is vitally important for all human beings and for the proper development of life. Research groups in environmental law contribute to the fulfillment of the sustainable development goals, given the transversality of the subject, which affects a range of areas including urban planning and sustainable mobility, biodiversity, and energy.

It is imperative that research be disseminated beyond the confines of the academic environment. It is essential to

ensure the comprehensive dissemination of the research process, extending beyond the conventional model of knowledge transfer through publications, articles, reports, and other traditional channels. Effective communication facilitates comprehensive understanding of the research context, including the identity of researchers, their areas of expertise, and the implications of their work. Social networks are instrumental in reaching both the intended audience (researchers, students, professors, etc.) and the broader public.

1.1. State of the Art

Despite the absence of studies on particular environmental law research groups in Spain, there are studies on other research groups that have been conducted with a view to characterizing them. Berbesí Chacón and Iregui (2002) characterized the research groups belonging to the Faculty of Engineering at the National University of Colombia. Pérez Angón (2004) offers an analysis of research groups at Mexican state universities, examining the number of researchers and the level of production. Ardanche et al. (2014) examine research groups at the Universidad de la República (Uruguay), emphasizing the advantages of collaboration and cooperation among group members and with external agents. In Spain, Altopiedi et al. (2015) conduct a characterization of the 101 groups situated in the autonomous community of Andalusia, within the Andalusian Plan for Research, Development and Innovation, focusing on their internal characteristics.

The relationship between communication and scientific research has also been the subject of study. Siso Calvo (2019) analyzes the digital dissemination strategies of research in documentation sciences, highlighting the idea

that the dissemination of groups is a key aspect to improve the projection and reputation of institutions. The use of social networks in academic settings has been the subject of extensive investigation, consistently demonstrating that an effective presence yields advantageous outcomes. González Díaz et al. (2015) assess the use of scientific digital social networks by Spanish universities, with a particular focus on ResearchGate and Academia.edu. Fernández Marcial and González Solar (2015) examine the promotion of research and the digital identity of the Universidade da Coruña. Campos Freire and Rúas Araújo (2016) investigate the use of professional social networks in Galician public universities. Pertuz et al. (2018) also study ResearchGate in the context of Colombian universities.

These studies collectively demonstrate that effective communication is a crucial element in maintaining a positive image and reputation for universities and the research groups they support. Furthermore, such communication facilitates the exchange of knowledge and the transfer of results, as a larger proportion of the population (including researchers) can access and reuse the information presented in this research. This underscores the importance of social networks as a communication tool in the context of research.

2. OBJECTIVES

The principal aim of this study is to profile the environmental law research groups of Spanish public universities and to examine their presence and activity on social networks X (formerly known as Twitter) and ResearchGate. This aim is broken down into the following specific objectives:

- To describe the groups in accordance with the variables of size, gender, and lines of research.

- To identify the digital presence of the groups on the selected social networks.
- To ascertain the degree of activity of the groups on the social networks.
- To determine the age of the groups on the social networks.

3. METHODOLOGY

The population is constituted of 57 research groups in environmental law affiliated with 35 Spanish public universities. To identify the relevant population, it was first necessary to locate all Spanish public universities. This was achieved by consulting the CRUE registry (<https://www.crue.org/universidades/>). Following an exhaustive examination of the corporate websites of these universities, the pertinent groups were identified. All environmental law research groups affiliated with the Department of Law, Social and Legal Sciences, or with similar departments at Spanish public universities, have been included in the study. Groups dependent on research centers with their own entity have been excluded. The selected groups have at least one line of research related to the environment in any of its aspects, including urban planning, biodiversity, water law, sustainable development, and others. The analysis is performed on the entire population, without sampling. To characterize the groups, three variables were analyzed: size, gender, and lines of research. For the study of size and gender, both principal members and regular collaborators or external members were included, with the distinction being made between the leader or principal investigator and the rest. A total of 634 members belonging to 57 research groups were located.

The analysis of size and gender variables was conducted on 51 groups and 629 members. To ensure the integrity of the results, six groups were excluded from the analysis due to the unavailability of comprehensive information regarding their composition. This was due to either the absence of complete data or the inclusion of only the principal investigator, without the members' details. To analyze the data pertaining to group size and gender, a spreadsheet was used to enumerate all members of the research groups. This spreadsheet indicated the following information for each member: university, group affiliation, first and last name, gender (coded as 1 = male and 2 = female), and position (coded as 0 = member and 1 = responsible). The statistical software package SPSS was employed to analyze the data, extract descriptive statistics, and calculate frequencies.

A total of 49 groups were included in the study of research lines, as eight groups did not provide this information on their websites. A comprehensive list of all the lines of research identified in the groups' respective sources of information has been compiled. Due to the heterogeneity of terminology employed by the groups, a standardized natural language has been used to facilitate the study. The text has been converted to a .txt format, with each word separated by a hyphen and each concept by a semicolon. The text has been imported into the online applications "Lexicool" and "Nube de palabras" to obtain the ranking of the most frequent concepts and the tag cloud.

To examine the prevalence of the groups on social networks, their profiles were identified on X and ResearchGate. The selection of X is predicated on the fact that it is one of the most pervasive social networks among the general population, which allows for the combination

of text, image, and photograph, thus becoming a means of communication with the average citizen. In contrast, ResearchGate is a social network designed specifically for the academic community, which lends further justification to its selection. These social networks are considered to be two of the most effective for the dissemination of research and communication of these groups. To search for groups, the name of the group was entered directly into the search box of the social network. In the case of ResearchGate, the tabs corresponding to “Research,” “People,” “Questions,” “Job,” and “Institutions” were selected. Finally, a Google search was conducted as a cross-check. Once the groups have been compiled, a table has been constructed for the purpose of studying the presence of the collection in X, with the objective of gathering the following data:

- Name of the group
- @ of the group
- Number of followers
- Number of followed
- Update
- Creation date

The data presented here were collected in October 2023. It is crucial to ascertain the frequency of updates in order to determine the group’s status with regard to its continued validity or potential inactivity. Groups that have not published or republished anything in the last month will be considered as 0 = inactive and 1 = active if there has been at least one publication in the last month. Additionally, the date of creation of the profile is collected to study its age. However, it was not possible to study the activity of the groups on ResearchGate, as no research group with a profile on this network was identified.

4. RESULTS

4.1. Group Characterization

The characterization of the groups is based on three key aspects: size, gender, and lines of research. A total of 51 groups and 629 members were included in the study of size and gender, while 49 groups were included in the analysis of lines of research. With regard to size, the mean number of members is 12.33, with a standard error of the mean of 1.025 and a median of 11. The largest group comprises 31 members, while the smallest group has only three members. In comparison, the groups at the University of the Republic of Uruguay have an average of six members (Ardanche et al., 2014). It is estimated that the groups under investigation have a mean of approximately twice as many individuals, indicating a notable increase in population size. Based on an average of 12 individuals per group, the following classification scheme is proposed:

- Small groups (3–11 members)
- Medium-sized groups (12–24 members)
- Large groups (25 or more members)

The data indicate that 27 small groups (53%) comprise 190 members (30%), 20 medium-sized groups (39%) include 320 members (51%), and four large groups (8%) consist of 119 members (19%). It can be stated that the majority of groups are small, although the majority of members are in medium-sized groups. This result coincides with those of Ardanche et al. (2014) and Altopiedi et al. (2015) who observed that small and medium-sized research groups are in the majority. Some individuals were found to be part of two groups, representing a residual percentage of 0.6%.

With regard to gender, the 629 members in question were found to be distributed as follows: 336 men (53.4%) and 293 women (46.6%). A total of 54 leaders have been identified across the 51 groups included in the study. This figure includes three groups with two leaders each: Transport, Infrastructure and Territory (940,077); Bio-environmental law: Law, Ethics and Science (BIDA, E076-03); and Administrative Law Area (UCLM). The distribution of leaders across gender is as follows: 35 men (64.8%) and 19 women (35.2%). It can be stated that the level of participation in the groups is moderately equal, with a difference of 6.8%. However, the discrepancy in the distribution of positions of responsibility is more pronounced, with a ratio of almost 30% more men than women. Once the physical characteristics of the groups (gender and size) have been analyzed, we proceed to describe the main lines of research.

Table 1 illustrates the 10 most studied topics by the groups, with the number of times they appear. It can be observed that some groups indicate “environmental law” as the most general topic. It should be noted that the majority of groups have multiple lines of research, which may result in this specification being redundant in cases where the group is legal-environmental in origin and insufficient in generalist groups that do not specify which aspects of environmental law they study.

Table 1. Ranking of the 10 most studied topics.

SUBJECT	APPEARANCES
Environmental law	19
Fundamental rights	14
Public bodies	13

SUBJECT	APPEARANCES
Urban planning	12
International law	12
Environmental taxation	12
Community law	11
Sustainable development	11
Water	10
Climate change	9

Source: Own elaboration.

Figure 1 depicts the tag cloud, which illustrates the various lines of research. The size of the words represents the relative popularity of each topic. In this context, the larger the word, the greater the popularity. The presence of minor topics such as artificial intelligence, biotechnology, and the circular economy is noteworthy, underscoring the interdisciplinary nature of environmental law.



Figure 1. Label cloud with the lines of research. Note: The words in Spanish are kept. Source: Own elaboration.

4.2. Presence in Social Networks

4.2.1. X

In X, five research groups with distinct profiles were identified. Table 2 presents the data collected, arranged in alphabetical order by group name. The characteristics of the followers of each profile exhibit slight differences. The profile with the fewest followers (47) is the newest addition, although the profile with the most followers (1,143) is not the oldest. In terms of follower count, the oldest profile is the one with the most followers, and the newest profile is the one with the fewest followers. The average number of followers per profile is 406, while the average number of followed per profile is 280.

The mean ratio of followers to followers is 1.47:1, indicating that there are 1.47 followers for each followed. As indicated by Tonidandel (2023), an appropriate ratio is 3:1, or three followers for each account followed. In this regard, the Transport, Infrastructure and Territory group (Complutense University of Madrid) is the only one with a ratio above the average, indicated at 4.24:1. The reasons why a group has more or less followers are diverse. However, it is recommended that these groups increase the number of followers to raise this ratio through marketing campaigns, calls to action, and greater interaction with users.

The mean age of the profile of these groups is five years. The oldest group in X is ARMELA (Universidade de Santiago de Compostela), which was established 10 years ago. The most recent profile is that of Territori, Ciutadania i Sostenibilitat (Universitat Rovira i Virgili), which was created in June 2023. All groups are updated and post content that is relevant and pertinent, created either by themselves or by other people, institutions, and so on. This

Table 2. Analysis of presence in social networks.

GROUP	USER	FOLLOWERS	FOLLOWED	UPDATED	CREATION DATE
Compra Pública Verde	cpvuah	243	173	Yes	June2019 ,1
Grupo de Investigación de Alto Rendimiento en Transición Energética y Acción por el Clima .Global y Local) GLOCALRES(Glocal_Res	112	375	Yes	May2017 ,1
Rede de Investigación en Igualdade ,Dereitos e Estado Social) ARMELA(RedeArmela	488	429	Yes	June2013 ,1
Territori ,Ciudadania i Sostenibilitat	tcsURV	47	156	Yes	June2023 ,23
Transporte ,Infraestructura y Territorio	tGIS_ucm	1143	269	Yes	February,1 2017

Source: Own elaboration.

encourages interactivity. In addition to these profiles, publications about six other groups have been located. These were written by the university to which they belong, members, or other related institutions.

The publications identified pertain to activities conducted by the group in question or mention a member of the group. While the publications are uniformly positive and devoid of any negative criticism, the groups themselves lack control over these publications. Of the total number of groups (57), only 11 (19.29%) have a presence on X. Of these, five (8.77%) have their own profile, and six (10.52%) are mentioned by third parties. It is noteworthy that each group is from a different university, with groups from 11 universities (31.4% of the total) having a presence in X.

4.2.2. ResearchGate

A comprehensive search of ResearchGate revealed no evidence of the existence of any research groups on this social network. This is undoubtedly a negative fact, as the network is one of the most used by the academic and scientific communities, and it is essential for research groups to have a presence there. Furthermore, the research group lacks a distinct profile, which would confer upon it a unique identity, facilitate its identification and contact, and so on. Additionally, no references to these groups were discovered, whether by members who possess profiles and indicate their affiliation with a particular group or by third parties, including other groups, institutions, and so on.

5. CONCLUSIONS

Environmental law research is present in 35 of 50 public universities of Spain, with a total of 57 research groups

distributed throughout the country. The majority of researchers belong to medium-sized groups of between 12 and 24 members, although the majority of groups are small, with between three and 11 members. The composition of these groups is relatively equitable with regard to gender, although positions of responsibility are held by a slightly higher percentage of men. The research conducted by these groups is broad and general, encompassing areas such as environmental law, fundamental rights, and international law. However, there are also specific approaches to topics such as urban planning, economics, and sustainable development, as well as cutting-edge areas such as artificial intelligence.

It can be concluded that at this time, the presence of the subject in question on social networks is, at best, minimal. In X, only 19.29% of the groups have a presence, and only 8.77% have a specific profile for this purpose. Notwithstanding, the groups that have a profile in X are active and use the social network in an optimal manner. In ResearchGate, no groups were identified, nor was there any mention of them by members who might have an individual profile, which is detrimental to the group's image and hinders communication and dissemination of its academic and research activity. Academic networks are essential for dissemination, and groups should prioritize developing an adequate digital presence.

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