Open Science and the Sustainable Development Goals: A Bibliometric Study in Mexico

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This paper analyses the relationship between Open Science (OS) practices and the Sustainable Development Goals (SDGs), on the assumption that OS practices may contribute to their achievement. A bibliometric study examines research publications in OS and traditional science at a public university in Mexico, focusing on gender, academic discipline, and publication volume. Publications from 2021, based on 745 affiliated researchers, were analysed using Scopus and Web of Science (WoS) indexes. Findings suggest researchers use OS and traditional publishing practices almost equally, with OS practices gaining importance. Researchers in Science, Technology, Engineering and Mathematics (STEM) as well as medical sciences show the highest Open Access (OA) publishing rates, while the percentage of male researchers publishing in open access exceeds that of female researchers. Regarding the SDGs, the highest number of OA publications were linked to SDG 3 (Good Health and Well-Being) and SDG 9 (Industry, Innovation and Infrastructure), a pattern consistently observed in both WoS and Scopus. In conclusion, this study provides a first descriptive insight into the adoption of OS practices in a Mexican public university and highlights their potential role in promoting equity in scientific production and contributing to the dissemination of research linked to the SDGs.

Keywords: open science, sustainable development goals, academic disciplines, gender, bibliometric study

1 Introduction

Open Science (OS) has emerged as a paradigm that is transforming scientific research, promoting open access (OA) to the knowledge generated by the scientific community. This movement aligns with the growing need to democratise information and foster international collaboration, providing equitable access to research results and scientific data (Steinhardt et al., 2023). In this context, OS not only seeks to break down barriers to access to knowledge, but also presents itself as a great opportunity to advance the Sustainable Development Goals (SDGs), a set of global goals established by the United Nations (UN) in order to address the planet's most pressing challenges, such as climate change, poverty, gender equity, and quality education (United Nations [UN], 2015). The interrelationship between the OS and the SDGs is crucial, as it allows the rapid dissemination of knowledge that can accelerate the achievement of these global targets

and fosters collaboration between different actors (Camkin et al., 2022). In the same vein, the shift towards open access policies enhances transparency and accelerates the formulation of evidence-based policies, which is vital for addressing global challenges (Zagrodzka et al., 2024). Universities, as generators of knowledge, play a central role in this process. Not only do they contribute to scientific advancement through the production of academic publications, but they also directly influence the creation of policies and the implementation of sustainable solutions. However, the adoption of Open Science Practices (OSP) varies considerably between institutions and countries. In Latin America, and specifically in Mexico, OS has long been a common practice, partly due to the limited resources available for publications in many universities. In recent years, however, it has gained greater relevance as a paradigm, driven by public policies that promote it (National Council of Humanities, Science and Technology [CONACyT], 2017) and for the commitment of universities to transparency and equity in access to scientific information. Despite these advances, there is still a lack of studies that examine the OSP within public universities, which constitute a significant component of the country's higher education system, and its potential contribution to the achievement of the SDGs.

The present study seeks to fill this gap through a bibliometric analysis of the scientific publications of a public university in Mexico[1]. Bibliometric analysis is a powerful tool that allows quantifying scientific production and offers a detailed view of trends and patterns in research (Tomás-Górriz & Tomás-Casterá, 2018). Through this methodology, the analyses seek to identify whether there are significant differences in the number of publications depending on the academic discipline, the gender of the authors, and the relationship of the publications with the SDGs. In addition, the level of adoption of OSPs in the university is explored, evaluating how many of the university's publications are in OA. One of the most innovative aspects of this study is its focus on the relationship between scientific publications and the SDGs. Academic research can play a crucial role in achieving these goals by offering evidence-based solutions to global challenges. Therefore, it is essential to know to what extent university research is oriented towards these ends and how it contributes to progress in areas such as gender equality, poverty reduction, or environmental sustainability. Likewise, the exploration of gender equity in scientific production is of special interest, given that the equal participation of women and men in research is an essential pillar to achieve the Sustainable Development Goals (SDGs).

In summary, this study seeks not only to provide an overview of the current state of scientific production in a public university in Mexico, but also to contribute to the dialogue on how higher education institutions can promote OSP that foster the dis-

[1] The overall results of the analysis are available in this link: https://www.bibliotecas.uaslp.mx//opac-tmpl/bootstrap/archivos/informe/Ana%CC%81lisis%20de%20la%20produccio%CC%81n%20cienti%CC%81fica%202022.pdf.

semination of research linked to the SDG, while advancing greater equity in scientific production.

2 Literature Review

The SDGs are goals established by the member states of the United Nations (UN) that represent the most relevant priorities of the world and the international community to address problems that affect all countries at different levels and that no country can solve individually. The SDGs aim to reduce extreme poverty, inequality, injustice, climate change, etc. (UN, 2015). To meet them, academia and research are of central importance for developing solutions and innovations. With regard to goal 4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all), academia plays a crucial role through its teaching and research activities, which directly support this objective. Within this context, OS can further contribute, as one of the purposes of this paradigm shift is to democratise scientific production and decentralise science, promoting access to scientific knowledge free of charge and on equal terms (Anglada & Abadal, 2018).

Similarly, Goal 17 (Partnerships to achieve the Goals) highlights that knowledge sharing between countries and organizations can contribute to the achievement of the SDGs according to target G of the SDG (The Global Goals, 2025b). In this sense, OS represents a paradigm shift in scientific practices that benefits collaboration and the achievement of goal 17 since among its main objectives is the promotion of transparency in academic practices, encompassing initiatives such as public databases and open peer review (Bautista Valdivia et al., 2023). Consequently, there is a pressing need for science to evolve following the principles of OS in order to improve openness, integrity, and reproducibility, thus avoiding unethical practices and generating greater collaboration among researchers because this paradigm shift has the potential to reduce inequality gaps and promote collaboration (Steinhardt et al., 2023). Additionally, due to inequality in terms of access to scientific and technological knowledge and resources, it is increasingly difficult to achieve what is proposed in the SDGs (Camkin et al., 2022). For this reason, the UNESCO (2021) recommends the adoption of OS, as it points out that this movement allows multilingual scientific knowledge to be open, accessible and reusable for all, with the purpose of sharing information that benefits science and society, increasing scientific collaborations and opening the process of knowledge creation, as well as its evaluation and communication to all social actors. Discussing OS involves addressing a shift in the traditional scientific model. This shift means carrying out research work based on collaboration, OA and transparency. OS is not limited to unrestricted scientific papers but also includes openness regarding databases, peer review processes, code, laboratory annotations, and all results generated through scientific work (Anglada & Abadal, 2018). The OS movement represents

a significant shift towards making scientific values such as rigor, transparency, and replicability accessible to everyone (Trinh et al., 2025). This approach addresses challenges in modern research, where the lack of accessible data and detailed methodologies often hinders reproducibility, ultimately contributing to the production of better, more reliable science (Anglada & Abadal, 2018). These policy reforms may respond to the need to make effective use of the resources provided by public funding, as Mexico invests less than 1 % of its Gross Domestic Product (GDP) in science (Data México, n. d.), whereas most developed countries allocate 2 % or more of their GDP to science and technology (National Center for Science and Engineering Statistics [NCSES], 2025; Statistisches Bundesamt [Destatis], 2025)

According to Fressoli and Arza (2018), this shift towards OA can lead to a more efficient use of the economic resources invested in science, as sharing data can accelerate scientific production and improve its quality, it can also result in a wider dissemination of research findings and, at the same time, enable scientific production to better respond to current social needs. That is why Camkin et al. (2022) propose that the increased use of OS can accelerate the achievement of the SDGs, because the paradigm shift could generate greater collaboration and transparency.

OS provides many benefits in a variety of ways, which is why it has been adopted in many countries around the world. For example, in the United Kingdom, measures have been created to promote OS, such as the OA policy of the Research Councils UK (RCUK)[2]. This policy dictates that researchers who have funded their publications with government funding must publish articles in one of two ways: the gold route, in which the author pays a fee to make their article OA, and the green route, in which articles are published in OA databases (Levin et al., 2016).

Likewise, in Mexico, initiatives such as the general guidelines for OS proposed by CONACyT (2017) have been adopted. These guidelines govern the future actions of this council in terms of OS, in order to promote the accessibility of scientific research financed with public resources and maximise the dissemination of scientific and technological knowledge and innovation. In addition, in Mexico the regulations on OA to publications were also promoted, its purpose is to modify the Science and Technology Law with the aim of integrating OS policies and promoting the use of OA (Bautista Valdivia et al., 2023).

In this sense, universities play a crucial role as stakeholders in fostering this cultural transformation within research and teaching (UNESCO, 2021) by ensuring equitable access to knowledge and education through the teaching of sustainable development,

[2]For further information regarding these policies, please refer to the following link: https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-OpenAccessPolicy.pdf.

gender equality or human rights SDG 4 (Quality Education) (The Global Goals, 2025a). Undoubtedly, higher education contributes to this, among other things through the outcomes of the research carried out by its members, which is mainly visible through scientific publications. However, in recent years, confidence in scientific discoveries that could contribute to the design and application of pedagogical tools and techniques has been lost, due to the recent reproducibility crisis and unethical practices (Gehlbach & Robinson, 2021). For this reason, OS is a valuable resource for improving scientific practices in favour of regaining the trust of teachers and students in science, integrating more transparent practices such as the pre-registration of hypotheses and methodology before data analysis (Wentzel, 2021). Openness also allows scientific knowledge, which sometimes seems encrypted in complex academic language, to be transmitted more easily and in a language that the educational community and civil society can understand in a simple way, because OS makes knowledge more accessible to science communicators (Wentzel, 2021).

For this reason, it is important to analyse the characteristics of the scientific publications of the members of university communities in order to develop policies and programmes for the improvement of scientific practices. In this sense, bibliometric studies are an important tool for knowing and evaluating the performance of scientific activity, as well as its impact on the community, allowing objective tools to be provided in decision-making on the allocation of funds for research and even in the professional promotion of researchers (Tomás-Górriz & Tomás-Casterá, 2018). Bibliometric studies make it possible to know and evaluate scientific progress in a detailed and objective way, providing valuable information on the productivity, quality and impact of research in different areas of knowledge.

Furthermore, it is important to understand the expectations of scholarly publishing in a wide range of disciplines as it is vital for their self-understanding and for decision-making such as the allocation of research funds, the authorisation and supervision of the development of interdisciplinary programmes, and the development of strategic plans based on the knowledge of their strengths, needs, opportunities, and vulnerabilities of university units (Olejniczak et al., 2022). Likewise, the disciplinary differences of scientific journals have an impact on OA policies, an example of this is the high percentage of OA publications in disciplines such as biomedical sciences due to the requirements established by funders and high public interest (Demeter et al., 2021). Other disciplines that most frequently publish in OA are medical sciences, life sciences, natural sciences, and engineering (Zhu, 2017). Through the analysis of indicators in bibliometric studies such as the number of publications, citations and collaboration networks, it is possible to identify the most dynamic fields of research or those that require greater support or attention to enhance progress in order to achieve important goals in science (Matcharashvili et al., 2014).

In turn, science is essential to support the proposals to solve the problems raised in the SDGs (Martín Rivero et al., 2022). In this sense, any research project that seeks to contribute to sustainability can aim at social inclusion, with gender being one of the aspects of this (Khalikova et al., 2021). Diversity allows scientific organisations to gain innovation that leads to smarter and more creative teams that open the door to new discoveries (Nielsen et al., 2017). Therefore, it is relevant to diversify and increase opportunities in the scientific world and publications for women through the use of OSP (Kruschick & Schoch, 2023). To achieve gender equity, universities must promote gender diversity including in the academic community and be attentive to gender equity in the design of research and solutions (Khalikova et al., 2021).

Undoubtedly, bibliometric studies related to OS play an important role in measuring compliance with objectives 4 and 17, since through them it is possible to analyse scientific advances or contributions to these objectives. For example, a study with data from the National Research Council in Italy analysed the variables of gender, discipline, and publication in OS, finding that there is still a gender disparity among researchers who publish in OS, especially in STEM disciplines, and this gap decreased in the medical and agricultural sciences (Ruggieri et al., 2021). Similarly, the analysis of Spanish scientific production in OA carried out by De Filippo and Lascurain-Sánchez (2023) observed national and international publication programmes, revealing that universities had a greater presence in national studies, while international programmes had more diverse participating institutions, which would be a goal of SDG 17. The study points out that the data derived from bibliometric analysis are essential for the formulation of policies or strategies aimed at promoting collaborative efforts in the field of open international publications among Spanish universities (De Filippo & Lascurain-Sánchez, 2023).

In the case of Mexico, Patiño et al. (2024) conducted a bibliometric analysis of the SciELO [Scientific Electronic Library Online] database to determine which of the journals indexed to SciELO Mexico seek to comply with policies for OS practices, such as open data, early publication of manuscripts, and transparency in peer review (Patiño et al., 2024). In this study, the data generated by 161 journals from the current collection of SciELO Mexico during the second half of the semester of 2023 were analysed. The results showed that 96 of the 161 journals analysed have no development of policies for OS, 64 show an incipient development of such policies, while only 1 presents a moderate development. Therefore, it is important to strengthen the work of publishers in order to achieve a transition to OS (Patiño et al., 2024). Another example of the importance of bibliometric studies is a study carried out in Mexico in order to know the role and development of women's participation in Mexican scientific production registered in Web of Science (WoS) from 1900 to 2000 in the area of exact sciences and engineering. This study serves as a chronicle of the role of women and

what changes were fundamental to improve their participation and integration into academia (Luna Morales et al., 2018).

For all of the above, understanding the current state of scientific production in universities is crucial, as it allows institutions to formulate effective resource management policies and plans. In the context of this work, these ideas serve as a point of reference for a university in the configuration of decisions related to gender policies and in the development of programmes and initiatives that promote open scientific production in all disciplines where the adoption of OS practices is important.

Therefore, this paper aims to analyse the correlation between OS practices and the achievement of the SDGs. To this end, a bibliometric study is conducted to identify research publications available in OS and closed science at the Autonomous University of San Luis Potosí (UASLP) in Mexico. Thus, the study will analyse the correlation between the gender of researchers, discipline, and the number of research publications in OS.

3 Methodology

To answer the previous inquiries, data from the analysis of publications from the year 2021 were utilised. The data were collected from a list of 745 researchers affiliated with a public university in Mexico, compiled by the university's Library System, which included not only full-time professors but also PhD students and lecturers (UASLP, 2023). The retrieval of the publications was carried out between December 2021 and June 2022 using the Scopus of El Sevier and WoS of Clarivate databases. In addition, the profiles of researchers in networks and academic portals (ORCID, Research Gate, Academia.edu, Loop Frontiers, Google Scholar, etc.) were examined to obtain complementary information. Only publications with international standardised numbers or persistent identifiers were included in the selection process. In total, 990 publications were identified and reviewed.

Two samples were used to carry out the analysis of the scientific production. The first sample (Group A) consists of 873 publications from 2021 that meet the quality criteria to be indexed to Scopus and Scival. The second sample (Group B) is made up of both group A and 130 publications collected from academic networks and portals with the purpose of including publications that are not in international indexes but are valuable for the assessment of the scientific production of the university.

In this sense, group A was used for the analysis of scientific production in terms of the academic discipline or area of knowledge, publications made in OA and publications by SDGs. Regarding group B, it was used to analyse the participation in the scientific production of the university in terms of the gender of the researchers. This distinction

was necessary because the two groups were built from different sources of information, which provide data in a non-uniform way and therefore cannot be analysed in the same manner. Group A comprises the articles indexed in Scopus and Scival, which directly generate indicators such as scientific production by academic discipline, type of document, affiliation, country, funding received, OA status, and links to the SDGs. Group B, by contrast, includes the university's entire body of publications from 2021, combining those indexed in Scopus with additional outputs retrieved from other resources such as ORCID, Google Scholar and ResearchGate. In this way, the integration of Group B relied on additional resources that do not necessarily classify all the categories covered by Scopus, but they make it possible to provide a more detailed overview of scientific production with respect to the variable of gender.

Likewise, from group B, 608 journal titles were identified and analysed in Clarivate's Journal Citation Reports (JCR) to obtain the Impact Factor (IF) and Quartile (Q) indicators. In the case of journals not included in the index, they were searched in Scopus and Scimago Journal Bank to record their CiteScore, similar to JCR's IF, and Quartile.

To this end, a database was created in order to eliminate duplication of records, identify collaborative publications by academic entity and classify them by document types. For the analysis, the database did not include books or book chapters. Publications were classified by discipline according to Scopus, as this index is where most publications are located. Subsequently, the journals were searched in JCR to obtain the IF and Quartile. While journals that are not in JCR were searched in Scopus and Scimago Journal Rank to record their CiteScore and Quartile. After having integrated the indicators into a matrix, the data were filtered to order them by discipline, then by Quartile and finally by IF to obtain measures of central tendency of each category to show the publication trend and the most outstanding cases.

In the case of the analysis of publications in OA by discipline and SDGs, as well as the gender of researchers, it involved a thorough examination using both Scopus and WoS databases. To identify the disciplines, searches were conducted focusing on different affiliations of the university. This data was subsequently filtered by year and the OA status to create thematic reports, utilising the Scopus classification of disciplines. It's important to note that the publications are not mutually exclusive, meaning that a single publication can be categorised into multiple thematic areas. Regarding the analysis of OA publications based on the gender of researchers, researchers affiliated with the university as full-time professors were categorized to determine the gender associated with each publication, labelled as female (F) or male (M). Additionally, a third category (X) was designated for OA publications that involved collaboration between full-time professors of both genders. This analysis was conducted in both Scopus and WoS.

Finally, for the analysis by SDGs of the OA publications, reports were made for each of the 17 SDGs in Scopus and WoS. The SDGs were assigned to the publications using filters in the search results, both in WoS and in Scopus. In the case of WoS, this process is based on a category-by-category mapping scheme, where the SDGs are linked to clusters of micro-topics through a Leiden-type community algorithm (InCites Benchmarking & Analytics, 2025; Traag et al., 2019). Finally, an Excel database was created to eliminate duplicates and categorise the SDGs associated with each publication. It should be noted that a publication may address two or more SDGs.

4 Results

4.1 Academic Discipline

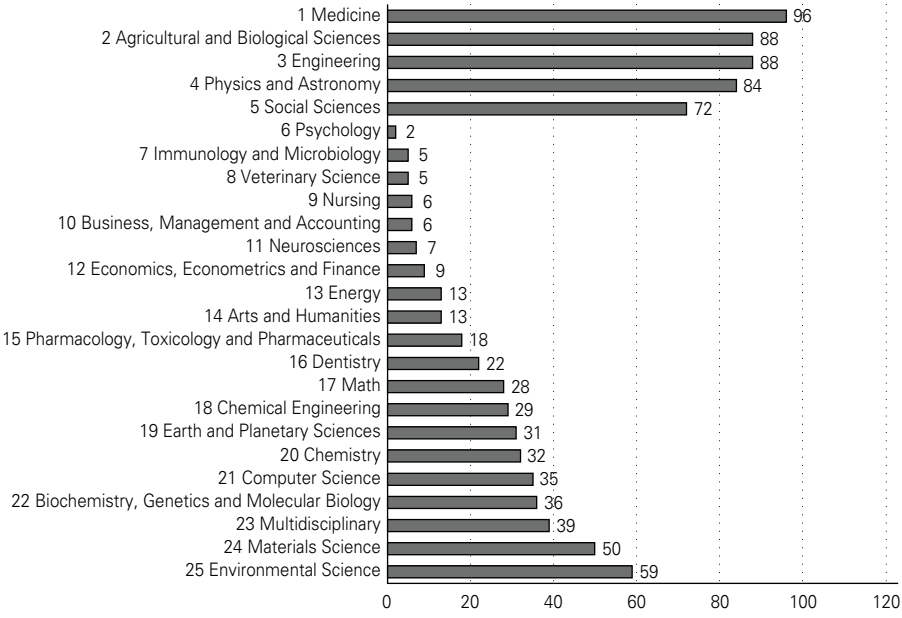
To analyse the number of publications by area of knowledge, the sample of 873 publications indexed in Scopus was used. Health topics were the most researched by the scientific community of the university, since Medicine was the discipline with the highest number of publications (96) representing 10.9 % of the university's publications (see Figure 1). These results can be understood in light of the fact that the university has a strong emphasis and tradition in the field of Medicine, which is why it is the discipline with the greatest relevance in the institution. The next disciplines with the highest number of publications in 2021 are Agriculture and Biological Sciences (10 %), Engineering (10 %), Physics and Astronomy (9.6 %), Social Sciences (8.24 %) and Environmental Sciences (6.7 %). The university has a greater number of researchers in the areas of Exact Sciences and Health Sciences, with the School of Engineering, the School of Medicine and the School of Sciences being the academic entities with the largest population of researchers. For this reason, it is observed that at the university, greater emphasis and funding is given to research classified in the Health Sciences and sciences belonging to STEM (Demeter et al., 2021; Zhu, 2017).

Regarding the analysis of the IF and the Quartile of the 608 journals, it was found that 71 % of the journals in which the members of the university published are in JCR. 42 % of these journals have a high IF and belong to Q1 and Q2. Likewise, in both JCR and Scopus, Medicine is the area of knowledge with the highest indicators, followed by Physics and Astronomy, Engineering and Chemistry. These are the areas with the highest number of publications, in addition to the fact that most of the journals in which it is published belong to Q1 and Q2, so research has greater visibility. In the case of Medicine, 21 of these journals have an IF higher than the average for the subject area, which is 5.096.

To know the trend of the impact of the publications, the median IF for each area of knowledge was obtained. Most of the journals chosen to publish concentrate on IF from 2 to 3. Similarly, it was found that there are several thematic areas that do not

have enough values to reach a trend indicator. For example, in the case of Medicine, most publications are concentrated in journals with IF 3 to 4. In this analysis, Medicine is below Energy and Biochemistry, since together the publications are closer to an IF of 3.9; this occurs because the publication in The Lancet provides an average well above the rest of the publications because it has a very high IF.

Figure 1: Number of Publications by Discipline

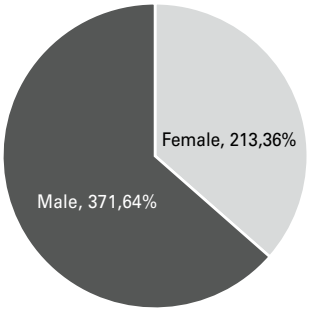


4.2 Gender

Regarding the gender of the researchers, a total of 584 researchers were found where 371 are male and 213 are female (see Figure 2). The distribution of researchers according to their gender in academic entities and their publications were analysed. Scientific production by gender is relative to the majority of men or women in each dependency. It was observed that in most of the largest dependencies of the university there is still a gender gap since in the School of Engineering there are 51 male and 12 female researchers. In the School of Sciences there are 41 male and 16 female researchers, in the Institute of Physics 31 male and 4 female researchers. Likewise, schools were found where the presence of female researchers is very minimal or non-existent, as is the case of the School of Social Sciences and Humanities (15 male researchers and 2 female) and the School of Economics (9 male researchers and 0 female). In three schools, female researchers outnumber male researchers, namely Chemical Sciences (24 vs. 33), Accounting and Administration (6 vs. 12), and Nursing and Nutrition (3 vs.

13). It is relevant to note that 72 % of female researchers at the School of Chemical Sciences had publications in 2021, which is particularly significant given the strong female participation in a STEM discipline.

Figure 2: Percentage of Male and Female Researchers

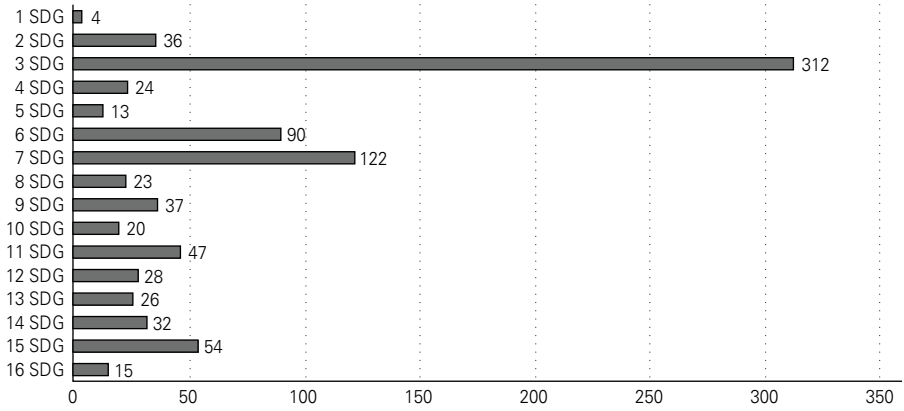


4.3 Sustainable Development Goals

312 publications referring to SDG 3 "Good Health and Well-being" were found (see Figure 3). This is related to the strong emphasis on Health Sciences and Medicine at the university, in addition to being disciplines of high public interest (Demeter et al., 2021). The SDG with the second highest number of publications was SDG 7 "Affordable and clean energy" with 122 publications, followed by SDG 6 "Clean water and sanitation" with 90 publications[3]. In addition to the fact that these disciplines are the ones in which OA is most frequently published (Zhu, 2017). Finally, only 24 publications related to SDG 4 (Quality Education) were found, while SDG 17 (Partnerships for the Goals) was not considered for analysis due to the complexity of identifying publications that contribute to the goal.

[3]The university gives relevance to the sciences belonging to STEM and environmental sciences for water care since the university is located in a desert climate.

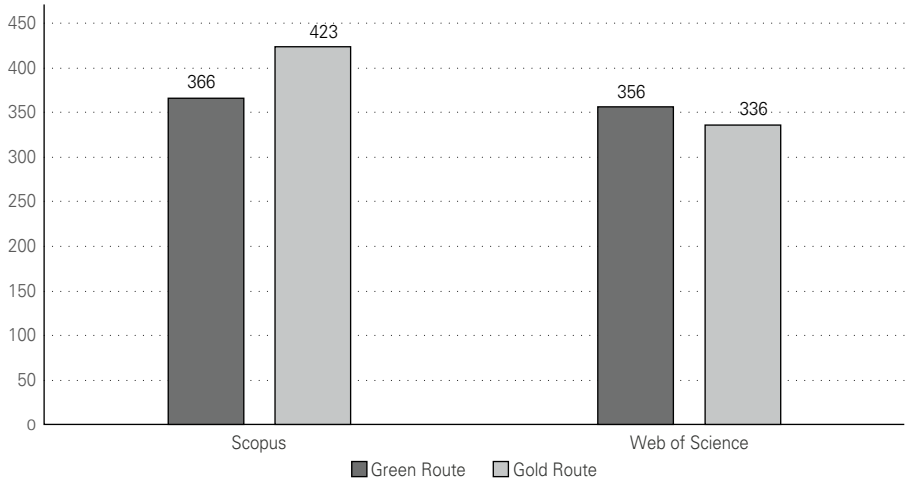
Figure 3: Number of Publications by SDG



4.4 Open Science

Regarding the OA publications, a total of 692 articles were found in WoS, of which 356 (51.4 %) were published using the green route and 336 (48.5 %) were published in the gold route. In Scopus, 789 articles were identified, of which 366 (46.38 %) were published in the green route and 423 (53.6 %) in the golden route. In addition, there is a high number of research projects that receive public funding, so they are published in OA to comply with the legal guidelines of OS provided by CONAHCYT, which is the main funding agency for university research. Likewise, it is important to note that in Mexico, OA publishing is frequent due to the low number of financial resources (Bautista Valdivia et al., 2023).

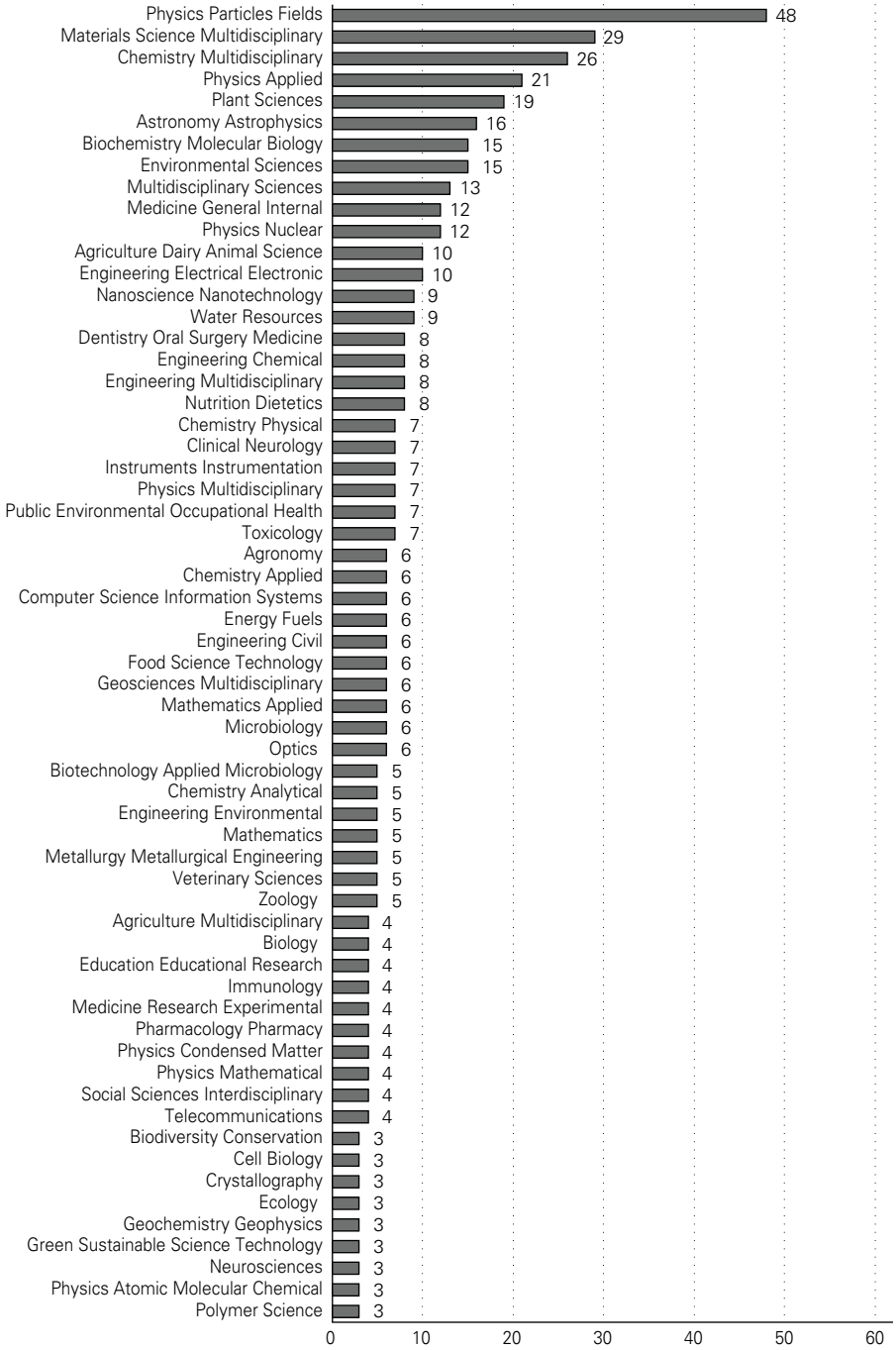
Figure 4: Open Access Publications or Subscription Access Publications



4.5 Open Science & Academic Discipline

After identifying the OA publications in WoS (356) and Scopus (366), thematic analysis was conducted based on the Scopus discipline classification. For WoS (refer to Figure 5), 48 (13.483 %) of the OA publications were categorised under Physics Particles Fields, 29 (8.146 %) under Materials Science Multidisciplinary, 26 (7.303 %) under Chemistry Multidisciplinary, and 21 (5.899 %) under Physics Applied. In the case of Medicine, it was observed that although this discipline has the highest number of publications overall, among OA publications, it accounted for 3.371 % (12 publications), ranking after the STEM fields.

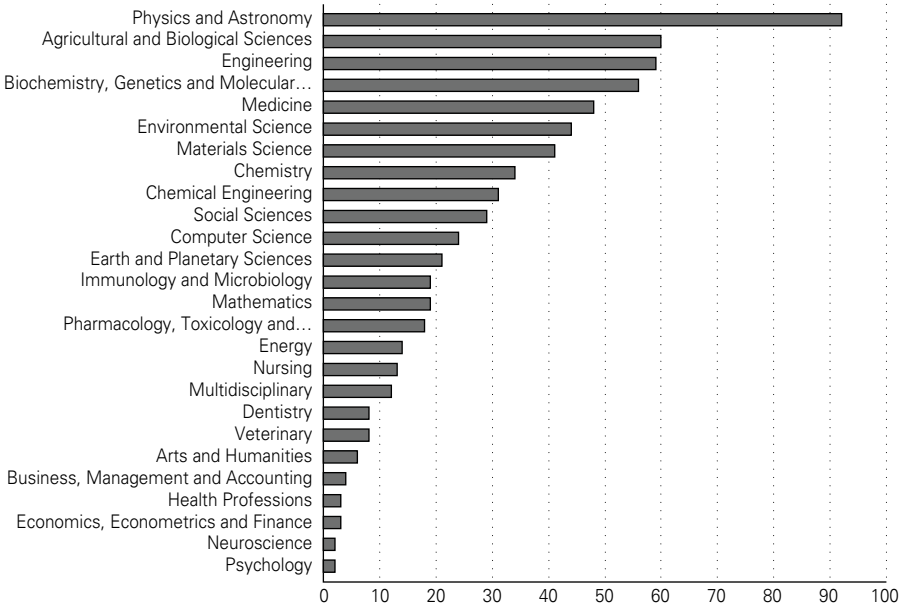
Figure 5: Open Access Publications per Academic Discipline in WoS



Likewise, in Scopus (refer to Figure 6), the analysis revealed that the disciplines with the highest number of OA publications are as follows: Physics and Astronomy with 92 publications (25.137 %), Agricultural and Biological Sciences with 60 publications (16.393 %), Engineering with 59 publications (16.120 %), Medicine with 56 publications (15.301 %), and Biochemistry, Genetics and Molecular Biology with 48 publications (13.115 %). It is important to mention that the disciplines excluded from Figure 5 are those that reported having only one open access publication, such as Law, History, and Nursing, among others.

In both analyses, it is evident that the disciplines with the highest number of OA publications are STEM fields, largely due to the significant public funding allocated for their development (Demeter et al., 2021; Zhu, 2017). While Medicine ranks lower than the broader STEM categories in terms of the number of OA publications, it remains one of the disciplines with a substantial publication output. This trend may be attributed to the strong tradition and emphasis that institutions place on the medical field, in addition to the fact that they were published at the time of the COVID-19 pandemic.

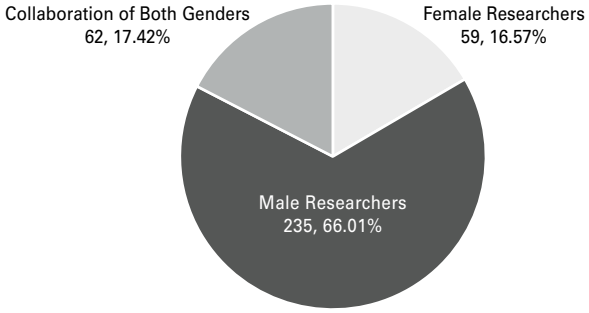
Figure 6: Open Access Publications per Academic Discipline in Scopus



4.6 Open Science & Gender

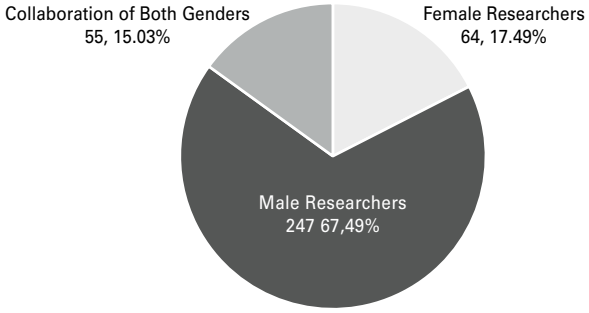
OSP can be facilitators for a greater presence of female researchers (Kruschick & Schoch, 2023), but this has not been yet a determining factor at the analysed university. Out of the 356 OA publications found in WoS, female researchers represent only 16.57 % of the participation in OA publications, while male participation stands at 66.01 % (see figure 7). Similarly, in Scopus, among the 366 publications, only 17.49 % are attributed to female researchers, in contrast to 67.49 % by male researchers (see figure 8). Moreover, it is important to highlight that there is also the presence of collaboration between female and male researchers, representing 17.42 % in WoS and 15.03 % in Scopus.

Figure 7: Female and Male Researchers who Publish in Open Access in WoS.



In this context, STEM fields tend to have a higher number of articles published in OA, primarily because research in these areas is often publicly funded (Demeter et al., 2021; Zhu, 2017). Although most researchers in STEM at the university are men, and this sector has seen the highest number of OA publications, this could explain the disparity in the number of female researchers publishing in OA compared to their male counterparts.

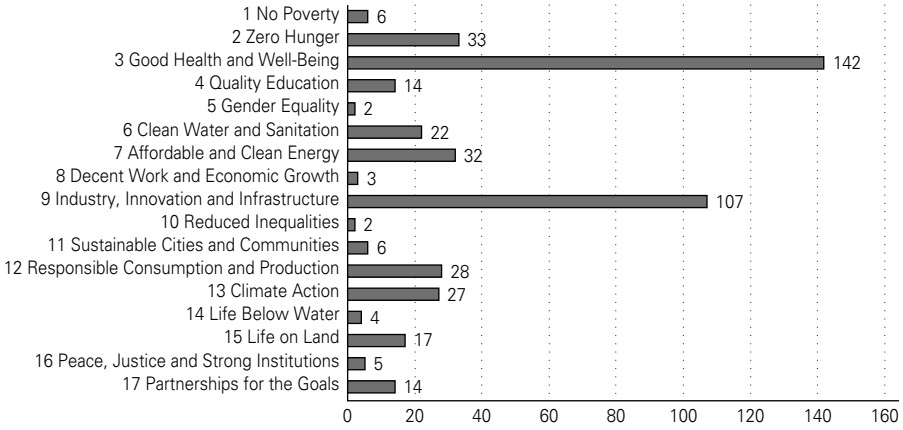
Figure 8: Female and Male Researchers who Publish in Open Access in Scopus.



4.7 Open Science & Sustainable Development Goals

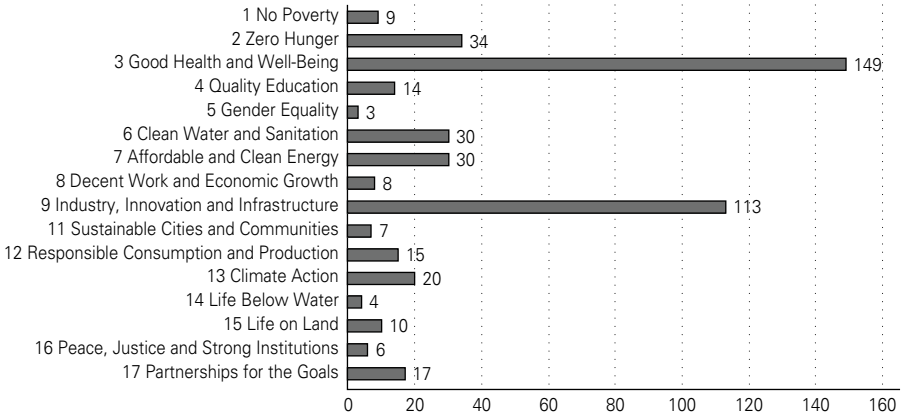
According to the WoS database, the SDGs that recorded the highest number of OA publications were SDG 3 (Good Health and Well-Being), with 142 publications, and SDG 9 (Industry, innovation and infrastructure), with 107 publications. These results are consistent with the data obtained in Scopus, where SDG 3 also leads in the number of OS publications, with a total of 149, followed by SDG 9, with 113 articles (Figures 9 and 10).

Figure 9: Number of Open Access Papers per SDG in WoS



This aligns with the principle that OS should serve societal needs (Camkin et al., 2022). The publication period of these articles coincided with the COVID-19 pandemic, which may explain the high number of studies related to SDG 3. Similarly, the significant contribution to SDG 9 could be linked to the socioeconomic characteristics of the city where the university is located, known for its strong industrial presence.

Figure 10: Number of Open Access Papers per SDG in Scopus



Furthermore, the Sustainable Development Goals with the lowest number of OA publications were SDG 5 (Gender Equality), with two publications in WoS and three in Scopus as well as SDG 10 (Reduced Inequalities), with two publications in WoS and none in Scopus (see Figure 9 and 10). Added to these are SDG 16 (Peace, Justice and Strong Institutions), SDG 1 (End Poverty) and SDG 8 (Decent Work and Economic Growth), which recorded fewer than seven publications in both Scopus and WoS. This low representation could be since these goals are not directly linked to STEM disciplines, which could influence a lower investment in their scientific development.

The findings of this study suggest that the university exhibits a clear tendency to utilise OA publishing at a level comparable to traditional publishing models. This trend may foster the democratic distribution of knowledge, particularly in regions characterised by limited investment in science, where the ability to access the most recent publications freely or at low cost can significantly enhance researchers' scientific output.

Regarding the SDGs, while the transition to OS does not directly ensure their achievement, it can serve as a catalyst for increasing scientific production. A higher volume of research outputs may, in turn, generate articles that contribute to advancing the SDGs. Moreover, and consistent with Camkin et al. (2022), our findings suggest that OS could promote collaboration among diverse stakeholders, thereby strengthening the potential of academic research to address global challenges.

5 Conclusions

Analysing a paradigm shift how scientific output is distributed to the global scientific community is undoubtedly a relevant topic. OS and all its components imply a cultural change in the way of doing research that has gradually taken root in different universities around the world. Hence, analyses that allow us to review the extent to which this paradigm shift relates to other phenomena, such as the advancement of the SDGs and gender parity in academic publications, become necessary. In this sense, a bibliometric analysis of a public university's scientific publications reveals several key findings. First, it is observed that the disciplines with the highest volume of publications are the health sciences and exact sciences, which reflect the institution's tradition in these fields and its contribution to scientific knowledge in areas of high demand. This may also be a consequence of the research carried out in the context of the pandemic and published in 2021.

Besides, a notable gender gap persists, with men publishing more than women, especially in disciplines such as engineering and exact sciences, except in the chemical sciences, where female participation in publications is higher. This is also consistent in the analysis of publications in OS, where a greater participation of female researchers has not yet been noted. While in some areas such as Chemical Sciences, Nursing and Nutrition women already outnumber men, in others the disparity remains significant. This suggests the need for institutional policies that foster more balanced participation across disciplines, addressing gender gaps in fields traditionally dominated by men and ensuring equitable representation overall.

Regarding the Sustainable Development Goals, the SDG to which the university's research contributes the most is health-related, which is consistent with the high production in health sciences this specific university. Finally, the analysis on access to publications indicates that researchers use both OS practices and traditional publishing practices almost equally, this shows that OS practices are extensively used. It is important to notice, that in Mexico, although universities are familiar with traditional publishing practices, only a few have the financial means to adopt the gold route. As a result, there is a growing perspective that advocates for a non-profit publication model that emphasises academic integrity and improves access to scientific knowledge, so Mexican researchers resort more frequently to the green route and are therefore more accustomed to publishing according to what OS proposes. This result shows a significant openness towards OS, although there is still room to promote greater free access to knowledge, facilitating scientific advancement and global collaboration.

This research attempted to be a first descriptive approach to the analysis of the paradigm shift that OS represents in a public university in Mexico regarding gender, discipline and SDGs. In this regard, future research could undertake more comprehensive bibliometric studies, incorporating a detailed examination of both the personal characteristics of researchers and the institutional attributes of the various schools and disciplines within the university. A limitation of this study is that only a few researchers explicitly mention or relate their work to any of the SDGs. In Mexico, the SDGs have only recently begun to be included in research agendas, and their consideration remains limited; rather, it is often the thematic content of research that may be connected to these goals. Reflecting on this, studies of this kind can contribute to informing development of educational policies that encourage universities and research centres to engage more directly with the SDGs. To advance this agenda, longitudinal, inter-institutional and even international studies are recommended, as they would provide a broader and more contextualised understanding of these dynamics.

Of interest would also be a comparison of the results of this study with higher education institutions in other countries, as well as the use of qualitative studies that allow us to delve into the motivations, barriers and incentives of researchers to use Open Science Practices.

Undoubtedly, examining the phenomena underpinning the practice and adoption of Open Science constitutes an ongoing challenge that necessitates sustained scholarly attention, as this emerging paradigm may serve as a valuable instrument for addressing and potentially mitigating both current and future global challenges.

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