Microcredits: a bibliometric review

Germán Arriaga Baidal
Email: garriaga@upse.edu.ec
ORCID code: 0000-0002-0118-3609
Affiliation: Peninsula St. Helena State University

Gladys Velez Garcia
Email: gvelez@upse.edu.ec
ORCID code: 0000-0002-0206-0037
Affiliation: Peninsula St. Helena State University

Abstract

This article focuses on identifying the increase of scientific publications on microcredit in the world of microfinance. The chronological limitation was established between the years 1996 to 2015 of the documents published in the Scopus database, using the key terms: *"microcredit OR micro-finance OR micro-credit OR micro-credit OR micro-lend OR micro-lend OR micro-lend"* the information was processed and analyzed in Excel (2015). Lotka's bibliometric indicator was applied to establish the relevance of more productive authors and the map of collaboration density among authors was visualized from the network diagram in VOSviewer 1.6. The work established that scientific production in microcredit has grown rapidly since 1996. The year of highest productivity was 2013, with 340 published papers. The literary contribution was generated in 981 indexed journals that published papers on microcredit. The elite zone consisted of the 21 most influential authors in the field of microcredit. The author with the highest scientific output was Mersland Roy. Finally, the study provides the community with a perspective of visualization and the impact of scientific publications on microcredit.

Keywords: *Bibliometric indicator, Microfinance, Scopus, Vosviewer*

DOI Number: 10.14704/nq.2022.20.13.NQ88134 **Neuro Quantology 2022; 20(13):1053-1062**

Resumen

Este artículo se centra en identificar el incremento de las publicaciones científicas sobre microcréditos en el mundo de las microfinanzas. La limitación cronológica se estableció entre los años 1996 al 2015 de los documentos publicados en la base de datos de Scopus, utilizando los términos clave: *"microcredit OR micro-finance OR micro-credit OR micro-credit* OR micro-lend* OR lend*"*, la información se procesó y analizó en Excel (2015). Se aplicó el indicador bibliométrico de Lotka para establecer la relevancia de autores más productivos y el mapa de densidad de colaboración entre autores que se visualizó a partir del diagrama de red en VOSviewer 1.6. El trabajo estableció que la producción científica en el campo de los microcréditos creció aceleradamente desde 1996. El año de mayor productividad fue el 2013 con 340 documentos publicados. La contribución literaria se generó en 981 revistas indexadas que publicaron documentos sobre microcréditos. La zona élite se conformó de los 21 autores más influyentes en el campo de los microcréditos. El autor con mayor producción científica fue Mersland Roy. Finalmente, el estudio aporta a la comunidad con una perspectiva de visualización e impacto de las publicaciones científicas acerca de los microcréditos.

Palabras clave: *Indicador bibliométrico, Microfinanza, Scopus, Vosviewer.*

1. INTRODUCTION

The scientific production of microfinance is extensive and has been widely discussed, generating controversies and controversies in the scientific community. In addition, microcredits capture the attention of researchers due to their social contribution and the rise of

microcredit programs worldwide. (Rey-Martí et al., 2016).

Currently, many microcredit programs fundamentally seek to help those who lack access to credit (Ganle et al., 2015) and positively influence social participation, household decision making and well-being in living conditions (Li et al., 2011). As a result, microcredit has become a modality of capital available for "social economy businesses, as well as for specific groups at risk of social and financial exclusion" and reduces economic inequalities (Giagnocavo et al., 2012) and reduces economic inequalities (Akotey & Adjasi, 2016).

In this regard, Hulme (2000) mentions that traditional financial institutions do not meet the unsatisfied demand of people from low-income social sectors due to the lack of guarantees; a fact that has led microcredit to become a popular, successful and controversial method of economic growth in developing countries or emerging economies. However, this system created by Yunus has been extensively debated recently, and numerous scientific contributions have attracted the scientific community's attention (Bayulgen, 2008).

In turn, researchers who initiate the process of scientific production need the appropriate tools to optimize resources. The documents analyzed through bibliometric analysis must significantly impact the community.

The literature contains extensive bibliometric studies in different branches of knowledge. For example, social sciences (Bornmann, 2017; Bornmann et al., 2010 a Glänzel, 2012); computer sciences (Bornmann & Haunschild, 2018 and Desrochers et al., 2015) and medicine (Sweileh, 2018 and Zyoud, 2018), business, management and accounting (Iritani & Morioka, 2015), engineering (Anwar et al., 2018) and, arts and humanities (Campos, 2018) among the most productive areas.

Bibliometric studies concerning scientific production in social sciences are applied to different practical objects such as scientific productivity in universities (Maz-Machado et al., 2010 and Torres-Salinas et al., 2009), scientific databases (Ellegaard & Wallin, 2015; Filippo et al., 2008); economics (Bonilla, C.A., Merigó, J.M., Torres-Abad, 2015); categorization of social science journals (Sanz-Casado et al., 2010); literary contributions in Latin America and Central Asia; literary contributions in Latin America and Central Asia; gender studies (Bentley, 2015); and gender studies (Söderlund, T. Madison, 2015), among others.

In this way, the research focuses on identifying how scientific publications about microcredit have increased; it is important to build a database that contributes to the literature on the topic of study and facilitates the detection of findings that holistically configure findings in the construction of knowledge in a field of study. In addition, Zupic, 2015In addition, he mentions that bibliometric methods represent an excellent opportunity for researchers to start publishing scientific articles; "because they provide useful tools to quantitatively analyze the development of the academic literature in a particular field" (Mao et al., 2015; Cepeda et al., 2022).

In this sense, the article aims to identify the increase in scientific publications on microcredit in microfinance to determine the evolution of literary production and the distribution of the cumulative number of published papers. These scientific journals contribute to the most relevant authors, the elite zone and the collaboration network using the VOSviewer visualization software. The study comprises the compendium of literary works published in micro-credits from the Scopus database between 1996 and 2015.

2. MATERIALS AND METHODS

The study was exploratory and was based on the compilation of bibliographic data on microcredit publications using the scientific database Scopus. It was used as a source of information that collects the literary contributions developed by the scientific community. The first papers on microcredit appeared in 1977 and amount to 2,891 papers published up to 2015. However, the chronological limitation was established from 1996 (the year its growth began) up to and including 2015, totaling 2,856 documents. The study was limited to the branches of knowledge of interest: "social science," "economics, econometrics and finance," and "business, administration and accounting." The search strategy is presented in the following section.

2.1. Variables, indicators and data processing

The first bibliographic search was performed using the terms: *"microcredit OR micro-finance OR*

micro-credit OR micro-credit OR micro-lend OR micro-lend OR lend" and the field "title, abstract or keyword" was used. In this way, it was ensured that the chosen keywords covered the terms related to the subject matter, for example (Fahimnia et al., 2015). From 1977 to 2015, the sample (mesodata) amounted to 2,891 documents.

The metadata was obtained in the three areas of study, with the highest literary production in: "social science," "economics, econometrics and finance," and "business, administration and accounting." Data refinement allowed the extraction of documents in the chosen branches of knowledge. Finally, the search data were downloaded in RIS format to elaborate the network diagram from the VOSviewer visualization software.

This study also considered some other indicators to provide a better representation of the scientific production analyzed. For example, the Lotka productivity index measures the productivity of the most influential authors (Lotka, 1926) and the contribution per author indicator to identify the authors with the highest productivity. (Merigó et al., 2015; Cardenas et al., 2022).

3. RESULTS AND DISCUSSION

This section presents the main bibliometric results found in the scientific production of microcredits between 1996 and 2015. A total of 2,856 papers were published, which includes 2,185 articles, 333 book chapters, 143 reviews, 85 conferences, 64 books, 22 articles in the press, 35 editorials, 13 notes, five letters to the editor, three short surveys, one correction, and two conference reviews.

3.1. Evolution of publications

The first publications on microcredits are shown from 1977 onwards; three scientific articles were published that year. The annual volume reached eight scientific studies during the eighties (1980-1989). During the nineties (1990-1995), the scientific production reached an annual volume of 24 literary contributions. Since 1996, its scientific growth has grown exponentially, with an annual volume of 14 publications in that year and a record 340 papers in 2013.

Figure 1 shows the trend of the number of published papers and their growth from 1996 to 2015. The growth of scientific production in microcredit is due to globalization, the use of technology, interest in researching the topic and the increase of researchers in the scientific community (Merigó et al., 2015).

Figure 1

Number of published articles (1977-2015)

Note. The graph represents the evolution of publications from 1977 to 2015 taken from the Scopus database.

Figure 2 reveals the relationship between the cumulative frequency of the number of articles published since 1996. The exponential function $M1 = (33{,}396e^{0{,}2439y})$ with a coefficient of determination ($R^2 = 0{,}9286$) and the polynomial function $M2 = 8{,}8377y^2 - 49{,}252y + 130{,}58$ with a coefficient of determination ($R^2 = 0{,}9972$) were fitted with the annually published trends of microcredit articles for the periods 1996-2000 and 2001-2015.

Mathematical functions $M1$ y $M2$ represent the number of articles accumulated during the 1996-2000 and 2001-2015 time periods, respectively. The exponential and quadratic equations to which the trend of publications was fitted indicated an accelerated growth from 1996 onward in publications concerning microcredit which, according to (Zhi et al., 2015) is very useful for predicting future publications.

Figure 2

Distribution of the cumulative number of articles and year of publication (1996-2015).

Note. The graph represents the relationship between the cumulative frequency of the number of articles published from 1996 to 2015 and is fitted to exponential and polynomial mathematical functions of degree 2.

3.2. Analysis of scientific journals

Regarding the most productive scientific journals, literary contributions were published in 981 journals, 97% of which have less than ten publications. Table 1 shows the five most

productive journals, which have been listed according to the number of articles published.

These journals are responsible for publishing 397 scientific articles corresponding to 40% of the total scientific production on microcredit in the study period. This result is similar to that obtained (Zheng et al., 2015) in their bibliometric analysis of "industrial wastewater: current trends and prospect."

Table 1

Top 5 contributions, according to the journal with the highest scientific production

Magazine	Number of publications	(SJR)	Average number of appointments 2015
Enterprise Development and Microfinance	111	0.114	0.089
World Development	103	2100	2667
Journal of International Development	76	0.505	0.848
Saving and Development	63	0.104	0.000

Table 1

Continua

Magazine	Number of publications	(SJR)	Average number of appointments 2015
Economic and Political Weekly	44	0.364	0.375

Note: SJR Scimago Journal Rank is a metric factor that establishes the quality of scientific publications based on the citation count obtained by each publication.

In addition, "World Development" is the journal with the highest average number of citations received per published paper (3.19). It is an international journal that publishes various branches of knowledge. It has been indexed in Scopus since 1973. According to the metrics, it occupies quartile one and although it appears in "Table 1" in the number two position, it is the scientific journal with the greatest influence in the scientific production of microcredit.

3.3. Influential authors

Another important aspect is the relevance of the author. Bornmann (2014) explains that there is a small number of article with a large number of citations, as well as a large number of articles with relatively low or no citation levels (Sandström & van Besselaar, 2016).

The same reasoning applies to author productivity, with an inversely proportional relationship between the number of authors and the number of publications. Vinkler (2012) concluded that "the number of authors making $\boldsymbol{n}$ contributions is close to $\mathbf{1/n^2}$ of those making one; and the proportion of all contributors, who make a single contribution is 60%. (Glänzel, 2012).

Alfred Lotka's law can be applied either as an inverse square law or in its generalized form for the author's productivity data (Lotka, 1926). It is defined in its generalized form as:

$$A(n) = k.n^{-\alpha}; n = 1,2,3, \ldots$$
$$k > 0$$
$$\alpha > 1$$

Table 2 shows the inverse distribution between authors and publications produced, where one can observe that, out of a total of 3,811 authors, 0.47% wrote ten or more scientific papers, while 96.48% of authors wrote three or fewer publications ($\boldsymbol{A}$) 0.47% wrote ten or more scientific papers, while 96.48% of authors wrote three or fewer publications. The authors with an intermediate production were 116 authors (3.04%). This result was adjusted with Lotka's Law, which predicts that in a discipline, a few authors produce a large number of articles (Uriona-Maldonado et al., 2012).

Table 2

Average author/article distribution

Number of authors ($\boldsymbol{A}$)	Total number of authors ($\boldsymbol{n}$)	Number of items
3.677	0.9648	≤ 3
82	0.0215	4-5
25	0.0066	6-7
9	0.0024	8-9
18	0.0047	10 ≥
3.811	1.0000	

Thus, "Table 3" shows the frequency distribution of scientific production where Lotka's index allowed the identification of three classes of authors according to their productivity: major producers, large producers and small producers. (IP) index allowed the identification of three classes of authors according to their productivity: large producers, intermediate producers (IP [0 < IP > 1]), and (GP [$IP \geq 1$]) intermediate producers (IP [0 < IP > 1]) and transitory producers (PT [IP = 0]) (Lotka, 1926).

Table 3

Frequency distribution of scientific production

Number of authors ($\boldsymbol{A}$)	Number of items ($\boldsymbol{n}$)	Total number of authors (%$\boldsymbol{n}$)	IP ($\boldsymbol{log10n}$)
43	4	0.2847	0.6021
39	5	0.2583	0.6990
17	3	0.1126	0.4771
14	6	0.0927	0.7782
11	7	0.0728	0.8451
6	8	0.0397	0.9031
5	12	0.0331	1.0792
4	16	0.0265	1.2041
3	9	0.0199	0.9542
3	10	0.0199	1.0000
1	11	0.0066	1.0414

1	13	0.0066	1.1139
1	18	0.0066	1.2553
1	20	0.0066	1.3010
1	22	0.0066	1.3424
1	32	0.0066	1.5051

Note: The table shows the productivity index of the authors who published four or more scientific papers. Lotka (1926) (PI) of authors who published four or more scientific papers.

Only those authors who produced at least four articles were considered in this context. In this case, there are 151 authors. The results show that out of 151 authors, 11.92% (18 authors) were considered highly productive ($GP\,[IP \geq 1]$) 88.08% (133 authors) are categorized as intermediate producers, with PI ranging from $(0{,}6021 - 0{,}9542)$. The remaining authors are presented as transitory authors, who have between 1 and 3 publications in the microcredit field. The elite zone is presented in Figure 3, which is made up of 21 highly productive authors in the world of microcredit, such as Marsland, R., Morduch, J., Hudson, M., Lensink, R., Karlan, D., Mosley, P., Zeller, M., Tawney, C., Khandler, S.R., Hulme, D., among others.

Figure 3

Alfred Lotka productivity index (elite zone)

Note: The graph presents the elite zone of highly productive authors, represented in an inverse distribution between authors and publications produced in the field of microcredit.

Finally, "Table 4" presents the detail of the authors with the highest scientific production in microcredit in the study period. Mersland Roy is the most influential author. He is a Norwegian researcher with affiliation at Agder University of Kristiansand School of Business and Law with an h-index of 11 and a total of 32 scientific contributions up to 2015. The most cited article published by (Mersland & Øystein Strøm, 2009) is: "Performance and Governance in Financial Institutions," published in 2009 in the Journal of Banking & Finance with 944 citations.

Table 4

Contribution by authors

Authors	Country	Affiliation	Publications	Quotations	Impact factor
R. Mersland	Norway	Adger University	32	514	13.83
J. Morduch	USA	NYU	22	2.202	48.93
M. Hudon	Belgium	ULB	20		5.61
D. Karlan	USA	NBER	18	469	4.34
I Guerin	India	IFRE	16	183	5.23
S. Johnson	United Kingdom	Bath U. CDS	16	1.752	64.89
R. Lensink	Netherlands	WCDI	16	1.733	17.33
P. Mosley	United Kingdom	Sheffield University	16	1.752	14.97
V. Hartarska	USA	Auburn University	13	408	15.69
D. Hulme	United Kingdom	Manchester University	12	2.962	27.17

3.4. Influential authors

For the visualization of the VOSViewer 1.6 thematic cluster, ten was used as the minimum value for the linking strength between terms, allowing the visualization of the most prominent authors on microcredit and revealing the overall structure of the map by focusing attention on the most important areas. Figure 4 shows the map of collaboration density among authors, in which authors with a minimum of 5 publications were chosen to obtain a map with 91 items, presenting Mersland, Morduch, Lensink, Guerin and Mosley as the most influential authors in the subject. In addition, authors such as Hulme and Hudon are also found in the orange zone, reflecting their influence in the scientific literature, which, according to the map, their density, in addition to indicating the most influential authors in the field, also shows their influence in the scientific literature (Qiu et al., 2014). In addition to indicating the percentage of existing relationships, their density also indicates the potential relationships that the influence of these authors could produce.

Figure 4

The map of collaboration density between authors

Note: The graph designed in VOSViewer represents the map of collaboration density among the most productive authors.

The study contributes to the community with a perspective of visualization and the impact of scientific publications on the increase of scientific publications on microcredits that is useful for the management of literary contributions for researchers in general.

The analysis of the study's results through bibliometric laws in the microcredits allows concluding that the first scientific paper in the Scopus database was published in 1977 and that, from 1996 to 2015, scientific productions show accelerated growth. The most influential author in the field of microcredit is Mersland Roy.

Lotka's law made it possible to visualize the elite zone of the most productive researchers in a discipline, microcredit. There are 21 most productive authors. The network collaboration density map shows the most prominent authors who foster scientific production in microcredits.

Researchers can view published papers on microcredits that contribute to the management of the scientific production process.

Akotey, J. O., & Adjasi, C. K. D. (2016). Does Microcredit Increase Household Welfare in the Absence of Microinsurance? *World Development*, *77*(2012), 380–394. https://doi.org/10.1016/j.worlddev.2015.09.005

Anwar, S., Abdullah, F. M., Alkahtani, M. S., Ahmad, S., & Alatefi, M. (2018). Bibliometric analysis of abrasive water jet machining research. *Journal of King Saud University - Engineering Sciences*. https://doi.org/10.1016/j.jksues.2018.02.002

Bayulgen, O. (2008). *Muhammad Yunus , Grameen Bank and the Nobel Peace Prize : What Political Science Can Muhammad Yunus , Grameen Bank and the Nobel Peace Prize : What Political Science Can Contribute to and Learn From the Study of Microcredit*. *10*(3), 525–547. https://doi.org/10, 525–547

Bentley, P. J. (2015). No TitleCross-country differences in publishing productivity of academics in research universities. *Scientometrics*, *102*(17), 865–883. https://doi.org/10.1007/s11192-014-1430-4

Bonilla, C.A., Merigó, J.M., Torres-Abad, C. (2015). Economics in Latin America: a bibliometric analysis. *Scientometrics*, *105*(2), 1239–1252. https://doi.org/10.1007/s11192-015-1747-7

Bornmann, L. (2014). How are excellent (highly cited) papers defined in bibliometrics? A quantitative analysis of the literature. *Research Evaluation*. https://doi.org/10.1093/reseval/rvu002

Bornmann, L. (2017). Measuring impact in research evaluations: a thorough discussion of methods for, effects of and problems with impact measurements. *Higher*

Education, *73*(5), 775–787. https://doi.org/10.1007/s10734-016-9995-x

Bornmann, L., & Haunschild, R. (2018). Plots for visualizing paper impact and journal impact of single researchers in a single graph. *Scientometrics*, *115*(1), 385–394. https://doi.org/10.1007/s11192-018-2658-1

Bornmann, L., Leydesdorff, L., & van den Besselaar, P. (2010). A meta-evaluation of scientific research proposals: Different ways of comparing rejected to awarded applications. *Journal of Informetrics*. https://doi.org/10.1016/j.joi.2009.10.004

Campos, F. C. de. (2018). *Analise bibliométrica 1990-2014 : inteligência competitiva Analysis bibliometric 1990-2014 : competitive intelligence*. *23*(1), 71–88. https://doi.org/10.1590/1981-5344/2375

Desrochers, N., Bowman, T. D., Haustein, S., Mongeon, P., Quan-haase, A., Costas, R., Larivière, V., Pecoskie, J., & Tsou, A. (2015). *Tweets , Reader Counts and the Multifaceted Reward System of Science*. 1–4.

Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, *105*(3), 1809–1831. https://doi.org/10.1007/s11192-015-1645-z

Fahimnia, B., Sarkis, J., & Davarzani, H. (2015). Green supply chain management: A review and bibliometric analysis. In *International Journal of Production Economics* (Vol. 162, Issue October). https://doi.org/10.1016/j.ijpe.2015.01.003

Filippo, D. de, Morillo, F., & Fernández, M. T. (2008). Indicadores de colaboración científica del CSIC con Latinoamérica en bases de datos internacionales. *Revista Española de Documentación Científica*, *31*(1), 66–84. http://redc.revistas.csic.es/index.php/redc/article/viewFile/413/425

Ganle, J. K., Afriyie, K., & Segbefia, A. Y. (2015). Microcredit: Empowerment and disempowerment of rural women in Ghana. *World Development*, *66*, 335–345. https://doi.org/10.1016/j.worlddev.2014.08.027

Giagnocavo, C., Gerez, S., & Sforzi, J. (2012). Cooperative Bank Strategies for Social-Economic Problem Solving: Supporting Social Enterprise and Local Development. *Annals of Public and Cooperative Economics*, *83*(3), 281–315. https://doi.org/10.1111/j.1467-8292.2012.00464.x

Glänzel, W. (2012). Bibliometric methods for detecting and analysing emerging research topics. *El Profesional de La Informacion*, *21*(2), 194–201. https://doi.org/10.3145/epi.2012.mar.11

Hulme, D. (2000). Impact assessment methodologies for microfinance: Theory, experience and better practice. *World Development*, *28*(1), 79–98. https://doi.org/10.1016/S0305-750X(99)00119-9

Iritani, D. R., & Morioka, S. N. (2015). *Análise sobre os conceitos e práticas de Gestão por Processos...* 164–180.

Li, X., Gan, C., & Hu, B. (2011). The welfare impact of microcredit on rural households in China. *Journal of Socio-Economics*, *40*(4), 404–411. https://doi.org/10.1016/j.socec.2011.04.012

Lotka, A. (1926). The frequency distribution of scientific productivity. *Journal of the Washington Academy of Science*, *16*, 12. https://www.jstor.org/stable/pdf/24529203.pdf

Mao, G., Zou, H., Chen, G., Du, H., & Zuo, J. (2015). Past, current and future of biomass energy research: A bibliometric analysis. *Renewable and Sustainable Energy Reviews*. https://doi.org/10.1016/j.rser.2015.07.141

Maz-Machado, A., Torralbo-Rodríguez, M., Vallejo-Ruiz, M., & Bracho-López, R. (2010). Análisis bibliométrico de la producción científica de la Universidad de Málaga en el Social Sciences Citation Index (1998-2007). *Revista Española de Documentación Científica*, *33*(4), 582–599. https://doi.org/10.3989/redc.2010.4.757

Merigó, J. M., Mas-Tur, A., Roig-Tierno, N., & Ribeiro-Soriano, D. (2015). A bibliometric overview of the Journal of Business Research between 1973 and 2014. *Journal of Business Research*. https://doi.org/10.1016/j.jbusres.2015.04.006

Mersland, R., & Øystein Strøm, R. (2009). Performance and governance in microfinance institutions. *Journal of Banking & Finance*, *33*(4), 662–669. https://doi.org/10.1016/j.jbankfin.2008.11.009

Qiu, J.-P., Dong, K., & Yu, H.-Q. (2014). Comparative study on structure and correlation among author co-occurrence networks in bibliometrics. *Scientometrics*, *101*(2), 1345–1360. https://doi.org/10.1007/s11192-014-1315-6

Rey-Martí, A., Ribeiro-Soriano, D., & Palacios-Marqués, D. (2016). A bibliometric analysis of social entrepreneurship. *Journal of Business Research*. https://doi.org/10.1016/j.jbusres.2015.10.033

Sandström, U., & van Besselaar, P. den. (2016). Quantity and/or quality? The importance of publishing many papers. *PLoS ONE*, *11*(11), 1–16. https://doi.org/10.1371/journal.pone.0166149

Sanz-Casado, E., Torres-Salinas, D., Jiménez-Contreras, E., Delgado-López-Cózar, E., Giménez-Toledo, E., & Bordons, M. (2010). *Clasificación integrada de revistas científicas (CIRC)*: propuesta de categorización de las revistas en ciencias sociales y humanas. *El Profesional de La Informacion*, *19*(6), 675–684. https://doi.org/10.3145/epi.2010.nov.15

Söderlund, T. Madison, G. (2015). Characteristics of gender studies publications: a bibliometric analysis based on a Swedish population database. *Scientometrics*, *105*(3), 1347–1387. https://doi.org/10.1007/s11192-015-1702-7

Sweileh, W. M. (2018). *Global output of research on the health of international migrant workers from 2000 to 2017*. 1–12.

Torres-Salinas, D., Delgado López-Cózar, E., & Jiménez-Contreras, E. (2009). An analysis of the output of the University of Navarra in terms of publications made in Social Science and Humanities journals, employing the Web of Science and a number of Spanish ranking systems. *Revista Española de Documentación Científica*, *32*(1), 22–39. https://doi.org/10.3989/redc.2009.1.673

Cepeda, M. D. L. L., López, L. K. S., & Cárdenas, G. A. Z. (2022). Variantes de COVID-19 predominates en Ecuador y sus síntomas asociados. Universidad y Sociedad, 14(S3), 93-104. https://rus.ucf.edu.cu/index.php/rus/article/view/2939

Cárdenas, G. A. Z., López, L. K. S., & González, I. A. (2022). Pacientes de COVID-19 en cuidados intensivos y sus lesiones cutáneas. Universidad y Sociedad, 14(S3), 105-117. https://rus.ucf.edu.cu/index.php/rus/article/view/2940

Uriona-Maldonado, M., dos Santos, R. N. M., & Varvakis, G. (2012). State of the art on the Systems of Innovation research: A bibliometrics study up to 2009. *Scientometrics*. https://doi.org/10.1007/s11192-012-0653-5

Vinkler, P. (2012). The Garfield impact factor, one of the fundamental indicators in scientometrics. *Scientometrics*. https://doi.org/10.1007/s11192-012-0688-7

Zheng, T., Wang, J., Wang, Q., Nie, C., Smale, N., Shi, Z., & Wang, X. (2015). A bibliometric analysis of industrial wastewater research: current trends and future prospects. *Scientometrics*. https://doi.org/10.1007/s11192-015-1736-x

Zhi, W., Yuan, L., Ji, G., Liu, Y., Cai, Z., & Chen, X. (2015). A bibliometric review on carbon cycling research during 1993–2013. *Environmental Earth Sciences*. https://doi.org/10.1007/s12665-015-4629-7

Zupic, I. (2015). *Bibliometric Methods in Management and Organization*. *18*(3), 429–

472.
https://doi.org/10.1177/1094428114562629

Zyoud, S. H. (2018). Estimates of global research productivity in using nicotine replacement therapy for tobacco cessation: A bibliometric study. *Globalization and Health*, *14*(1), 1–11. https://doi.org/10.1186/s12992-018-0335-z