

Scientific Production of a Peruvian Private University in Scopus Database

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Abstract

Objective: to evaluate the scientific production of the Universidad de San Martín de Porres (USMP) between 1995-2020. **Method:** a bibliometric study was carried out, analyzing the articles published in Scopus database that registered the author's affiliation with the USMP, analyzing the variables: number of publications, areas, authors, language, type of publication, journal, collaboration, and citations by article. **Results:** a total of 880 articles were located. There was an upward trend in the annual number of publications. Most of the articles (43.7%) belong to the medicine area, followed by social sciences (11%) and psychology (7.4%), the authors with the highest number of publications were: Domínguez-Lara, Merino-Soto, and Fujita, 61.3% of the articles are produced in English, 58.2% of the articles have at least one citation. **Conclusion:** there is evidence of an increase in scientific production, predominantly in the area of medicine and articles in English.

Keywords: bibliometrics; scientific production; private university; scientific information.

Producción Científica en la Base de Datos Scopus de una Universidad Privada del Perú

Resumen

Objetivo: evaluar la producción científica de la Universidad de San Martín de Porres (USMP) entre el periodo 1995-2020. **Método:** se realizó un estudio bibliométrico analizando los artículos publicados en la base de datos Scopus que registraban como afiliación del autor a la USMP, y las variables: número de publicaciones, áreas, autores, idioma, tipo de publicación, revista, colaboración y citas por trabajo. **Resultados:** se ubicaron un total de 880 artículos. Se evidenció una tendencia al alza en el número anual de publicaciones. La mayor parte de los artículos (43.7%) fueron clasificados como pertenecientes al área de Medicina, seguido de Ciencias Sociales (11%) y Psicología (7.4%), los autores con mayor número de publicaciones fueron: Domínguez-Lara, Merino-Soto y Fujita, 61.3% de los artículos son producidos en inglés, 58.2% de los trabajos tienen por lo menos una cita. **Conclusión:** se evidencia un incremento de la producción científica con predominio del área de medicina y de artículos en inglés.

Palabras clave: bibliometría; investigación científica; universidad privada; información científica.

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Introduction

Scientific production is the essence of universities (Piedra & Martínez, 2007). It is defined as the evidence of the scientific knowledge generated, it makes research visible, it reflects the academic and scientific activity of a researcher expressed in publications that involve an institution or social group, which contributes to the development of knowledge and to the improvement in the quality of life of the inhabitants of a country.

A scientific community disseminates the production of knowledge using various means: papers, theses, books, and lectures (Braga et al., 2003; Tarango et al., 2015) in this sense, as pointed out by Miguel (2011), academic-scientific journals are one of the main means of communication and dissemination of research results, which promote the social institutionalization of science and its public nature for the evaluation of the scientific community.

The production of science in the world is evaluated through the number of scientific publications, its impact on societies in public policies, international collaborative production, co authorship, the impact factor of the journal in which it is published and the number of citations that a paper has in the scientific literature. (Chúa & Orozco, 2016).

Within this context, the National Superintendence of University Higher Education (Superintendencia Nacional de Educación Superior Universitaria [Sunedu], 2020) publishes the ranking of universities as part of its Second biennial report, in which it establishes as an indicator the scientific production of university research, in accordance with international quality standards, based on the journals indexed by Scopus; and places the Universidad Peruana Cayetano Heredia in first place with 100 points and the Universidad de San Martín de Porres in 13th place with 13.39 points. On the other hand, the Higher Technical and Productive Education Policy (Ministry of Education [Minedu], 2020) proposes that Peruvian universities achieve a position among the 1,000 best universities in the world, an aspect linked to Peru's Vision for 2030.

Therefore, it is a challenge for public and

private universities to generate research and publish it in high-impact indexed journals such as those registered in Scopus, therefore, the scientific production of the Universidad San Martín de Porres (USMP), an institution created in 1962 to train professionals, is the reason for the need to study its scientific production. Currently, there are twenty professional programs: administration, international business administration, accounting and finance, human resources management, psychology, medicine, nursing, dentistry, communication sciences, law, economics, education, civil engineering, architecture, computer-systems engineering, aeronautical sciences, industrial engineering, marketing, obstetrics, and tourism and hospitality.

According to the licensing resolution (Resolution of the Board of Directors No. 024-2017-SUNEDU/CD, 2017), it is recognized that it has 118 existing programs leading to an academic degree and 109 second specialty programs, which are carried out in its 11 locations located in the province and department of Lima, 13 programs in its Chiclayo branch and 12 programs in its Arequipa branch. According to the Scimago Ranking (2007-2011), USMP was ranked 12th (Chamana, 2013) and for the 2020 period, it was ranked 5th (De-Moya-Anegón et al., 2020).

A work carried out on the scientific production of USMP (Taype-Rondán & Luque, 2014) refers to a total of 92 papers in Scopus until 2013, showing an upward trend in the annual number of publications, with a predominance of works in the area of medicine (62%), followed by psychology with 16.3%; 57.6% of the papers were published in Spanish, 42.4% in English and 69.6% were collaborative. For these reasons, the present research seeks to update the information after seven years of Taype-Rondán and Luque's report (2014) and to characterize the scientific production of a private entity, in the process of positioning itself as an institution that generates scientific knowledge, which should be evaluated for diagnostic and monitoring purposes. Likewise, to evaluate if the research programs are giving the expected results, especially with the implementation of the University Law 30220 and the licensing of the university higher education service, particularly

in relation to the lines of research to be developed. Therefore, the present research has as objectives: to evaluate the scientific production of the Universidad San Martín de Porres according to the number of papers published between 1995 and 2020, by identifying: a) the trend of publications, b) the areas of greatest production, c) the authors with the greatest number of publications, d) the language of publication, e) the type of publication, f) the journal of greatest publication, g) the collaboration network achieved, and h) the most cited papers.

Method

A bibliometric study of the scientific production of the USMP was conducted by analyzing the papers published up to 2020 in the Scopus database edited by Elsevier. This database was chosen because, in an initial inspection of publications in recent years, it was found a strong tendency of authors to choose journals indexed in this database, in addition to the relevance, scope, and advantages of the information source (De Granda-Orive et al., 2011). Information retrieval used the search by affiliation “Universidad San Martín de Porres” (affiliation identifier: 60071247), filtering for the period 1995-2020. Subsequently, the database was downloaded in CSV format according to the variables: authors, document title, year, title of the source/journal, authors with affiliations, abstract,

type of document, and language.

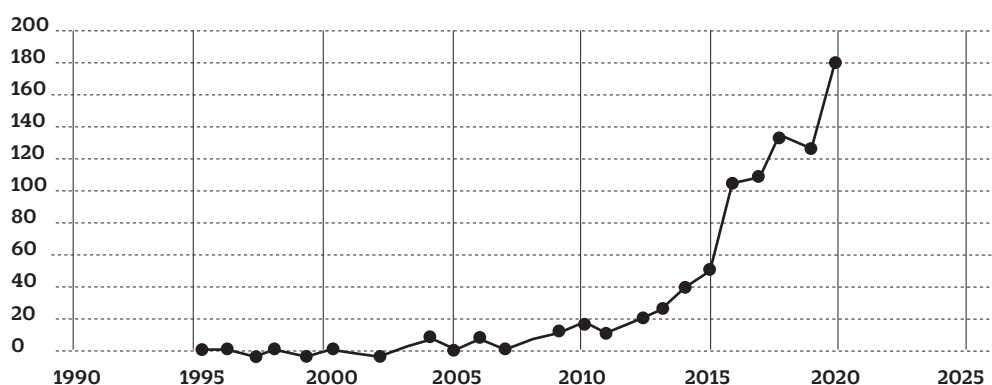
The unit of analysis was the original publication. The statistical analysis was carried out using SPSS 25 and Vos Viewer 1.6.1.6. The authors guarantee the confidentiality of the data and that they will not be used for purposes other than the preparation of this study. Since this was a minimal risk study, in which no interventions were performed and no patient data or biological samples were obtained, the authorization of an Institutional Ethics Committee was not required.

Statistical aspects involved: use of Pearson's correlation coefficient and the t-test for significance of correlations, as well as polynomial and exponential trend analysis, the coefficient of determination, frequency analysis, and a co authorship network analysis.

Results

We identified 880 papers published in scientific journals by the Universidad de San Martín de Porres, which are indexed in the Scopus database, with two initial papers published in 1995 (Romero, 1995; Vojvodic & Marroquín, 1995). According to the year, there is an upward trend in the annual number of publications (Figure 1). The highest number of papers was observed in 2020, followed by 2018, with a slight decrease in 2019. The analysis by year made it possible to evaluate the trends in research and a gradual increase in the

Figure 1
Scientific Production of USMP by Year in the Scopus Database (1995-2020)



publications with a positive correlation between the year of publication and the number of publications ($r = .80$, $p = .01$), which is indicative of the gradual development achieved. The analysis of the second-order polynomial trend showed a coefficient of termination of $R^2 = 92\%$, reflecting a tendency to an increase in the number of papers

(Figure 2). Most of the papers were classified as belonging to the area of medicine (43.7%), followed by social sciences (10.7%), psychology (7.4%), and biochemistry, genetics and molecular biology (6.4%), with the lowest number belonging to the area of energy (0.16%) and decision sciences (0.16%) (Table 1).

Figure 2
Frequency of Publication of Dissertations by Year of Publication

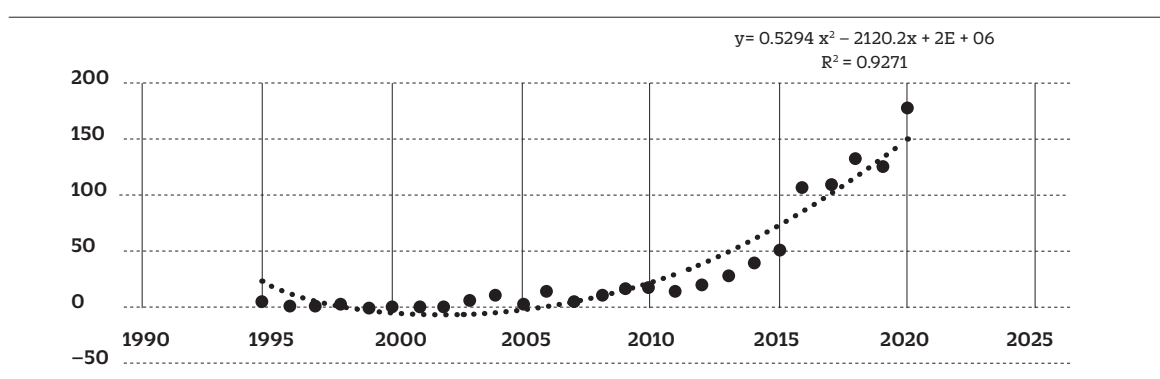


Table 1
Frequency of Papers with USMP Affiliation by Area

Area	f	%
Medicine	381	43.4%
Social Sciences	96	11.0%
Psychology	65	7.4%
Biochemistry, Genetics, and Molecular Biology	55	6.4%
Dentistry	42	4.8%
Computer Science	28	3.2%
Nursing	27	3.1%
Agriculture and Life Sciences	24	2.7%
Immunology and Microbiology	21	2.4%
Pharmacology, Toxicology, and Pharmacy	17	1.9%
Business, Administration, and Accounting	16	1.8%
Engineering	16	1.8%
Neurosciences	11	1.3%
Economics, Econometrics, and Finance	11	1.3%
Multidisciplinary	11	1.2%
Physics and Astronomy	11	1.2%
Arts and Humanities	10	1.1%
Health Sciences	7	0.8%
Chemistry	6	0.7%
Material Sciences	6	0.7%
Environmental Sciences	5	0.6%
Mathematics	5	0.6%
Chemical Engineering	3	0.3%
Earth and Planetary Sciences	3	0.3%
Decision Sciences	2	0.2%
Energy	2	0.2%
Total	880	100.0%

Table 2
Frequency of Papers with USMP Affiliation by Area

Position	Authors	f
1	Merino-Soto, C.	61
2	Domínguez-Lara, S.S.	53
3	Domínguez-Lara, S.A.	50
4	Fujita, R. R.	36
5	Taype-Rondan, A.A.	27
6	Sánchez, S.E.	25
7	Díaz-Vélez, C.	23
8	Gelaye, B.	21
9	Parodi, J.F.	21
10	Rossell-Perry, P.	21
11	Runzer-Colmenares, F.M.	20
12	Morales-Vadillo, R.	18
13	Toro-Huamanchumo, C.J.	18
14	Sandoval, J.R.	17
15	Urrunaga-Pastor, D.	17
16	Alvarez-Risco, A.	15
17	Huarcaya-Victoria, J.	15
18	Benites-Zapata, V.A.	14
19	Fernández-Arata, M.	13
20	Soto, C.M.	13

The four most productive authors are Merino-Soto (61 papers), Domínguez-Lara (53 papers), Domínguez-Lara, S.A. (50 papers), and Fujita (36 papers), and Table 2 shows the first 20 with the highest number of papers.

Co authorship reflects the scientific collaboration and links between researchers

which allows identifying the authors who work in a network and those who work individually. Figure 3 shows the map of the co authorship network, showing the most productive authors and their links. The colors indicate groupings of researchers who are relatively related to each other, identifying five well-defined collaboration groups.

Figure 3
Co authorship Networks of Researchers with USMP Affiliation

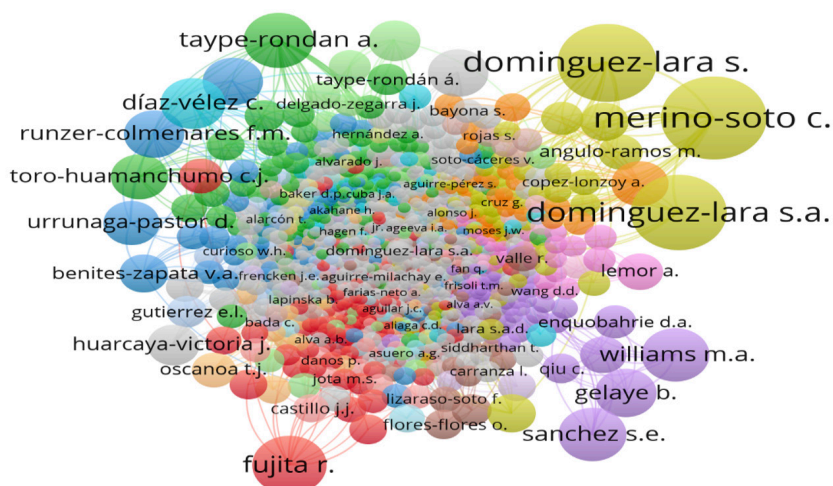
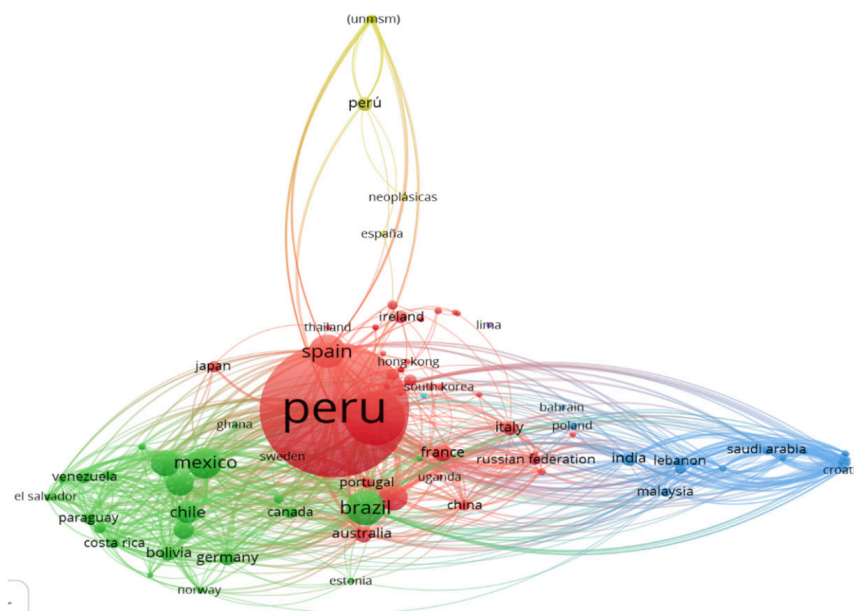


Figure 4
Researcher Links by Country



With respect to the links of the researchers, according to the countries, three clusters of links can be observed, one internal with Peruvian institutions (hospitals and universities), an external group made up of Venezuela, Mexico, Chile, Brazil, Paraguay, and El Salvador, another group of links with China, Spain, France, Russia, Italy, Portugal, as well as another group of links with Saudi Arabia, Croatia, Malaysia, India,

Poland, and Lebanon (Figure 4).

Regarding the language in which the papers are published, 61.3% are in English, 38.3% in Spanish, and 0.5% in Portuguese. In the beginning, there was a slight presence of papers in Spanish, and then English was predominant.

In relation to the papers by type of document, 68.5% were original papers, followed by letters to the editor with 18% and review papers with 6.5% (Table 3).

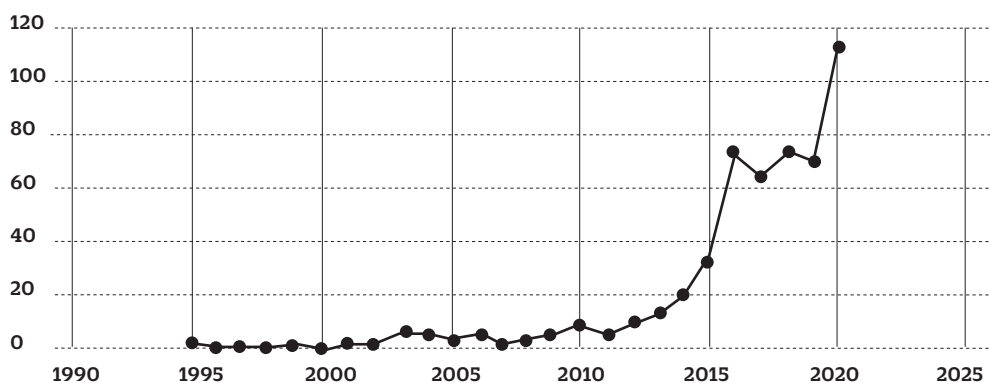
Table 3
Publications in the Scopus Database by Document Type

Type of document	<i>f</i>	%
Paper	596	67.7%
Letter	164	18.6%
Review	57	6.5%
Session document	30	3.4%
Book chapter	11	1.3%
Note	9	1.0%
Editorial	8	0.9%
Erratum	2	0.2%
Book	1	0.1%
Short survey	1	0.1%
Indefinite	1	0.1%
Total	880	100%

Table 4
Journals with the Highest Frequency of Publications of USMP

Type of document	f
Revista Peruana de Medicina Experimental	59
Educación médica	33
Revista Médica de Chile	20
Revista de Gastroenterología	18
Journal of Oral Research	11
Salud Pública de México	11

Figure 5
Scientific Production in Scopus of the Area of Medicine of USMP (1995-2020)



In terms of citations, it is observed that 41.8% of the papers have no citations, instead, the work of Garred et al. (2006) has 307 citations, followed by the NCD Risk Factor Collaboration research (NCD-RisC, 2019) with 148 citations and the publication of Knowles et al. (2011) with 108 citations.

The five journals with the highest predominance of papers with USMP affiliation are: Revista Peruana de Medicina Experimental y Salud Pública from Peru, followed by Educación Médica from Spain, Revista Médica from Chile, Revista de Gastroenterología from Peru, Journal of Oral Research from Chile, and Salud Pública from Mexico (Table 4).

Regarding the area of medicine, 519 papers were identified, showing a progressive growth trend, except for a period of instability (2015-2020), with the most productive years being 2016 and 2020. (Figure 5).

The analysis by year made it possible to evaluate the trends in medical research and a

gradual increase in publications was observed.

The analysis of the second-order polynomial trend showed a determination coefficient of $R^2=89\%$, reflecting a tendency to increase the number of papers (Figure 6).

In the area of medicine, the five most productive authors were Domínguez-Lara, Merino-Soto, Sánchez, Tapie, Rosell, and Gelaye (Table 5).

The analysis of the social sciences area identified 131 papers showing an increasing trend with a slight decrease on the years 2016 and 2019, with the most productive years being 2018 and 2020 (Figure 7).

The analysis by years made it possible to evaluate the trends in social science research, and a gradual increase in publications was observed. The analysis of the second-order polynomial trend showed a determination coefficient of $R^2=84\%$, reflecting a trend towards an increase in the number of papers (Figure 8).

Figure 6
Polynomial Curve of Scientific Production in Medicine

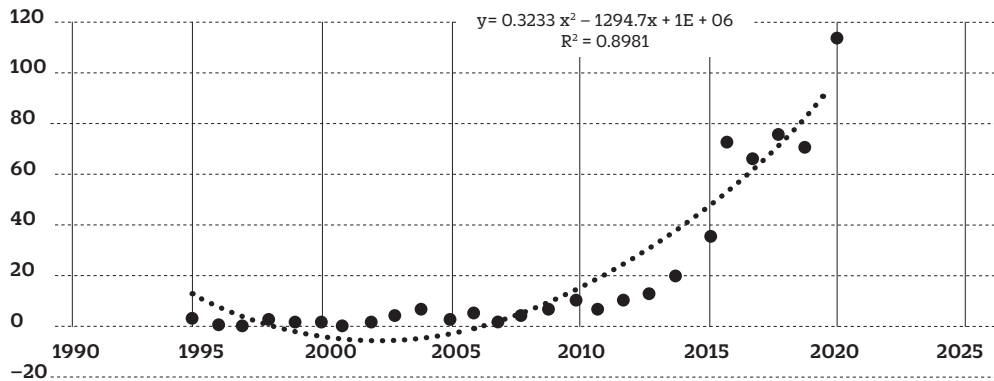


Figure 7
Scientific Production in Scopus of the Area of Social Sciences of USMP (1995-2020)

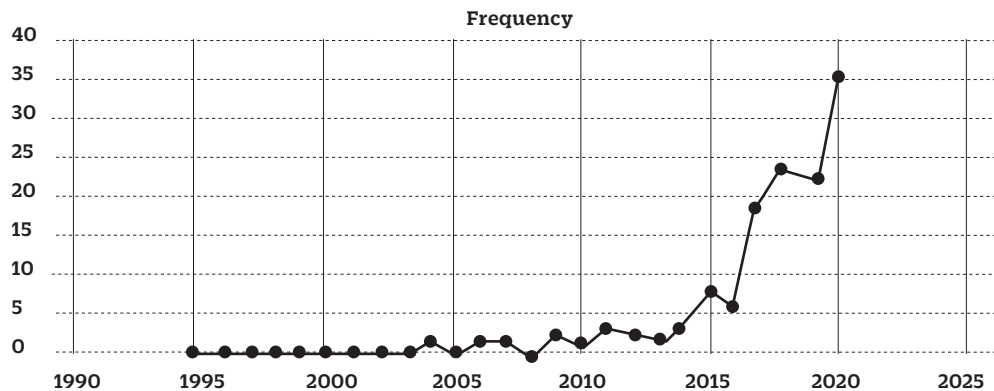


Table 5
Ten Most Productive Authors in the Area of Medicine at USMP

Authors	<i>f</i>
Domínguez-Lara, S.A.	33
Merino-Soto, C.	25
Sánchez, S.E.	22
Taype-Rondan, A.	22
Rossell-Perry, P.	20
Gelaye, B.	19
Parodi, J.F	18
Runzer-Colmenares, F.M.	18
Díaz-Vélez, C.	17
Fujita, R.	17

The five authors with the highest scientific production in the social sciences were: Merino-Soto, C.; Domínguez-Lara, S.; Domínguez-Lara, S.A., and Fernández-Arata, M. (Table 6).

In the area of psychology, 89 documents with a very irregular production achieved significant growth, with 2018, 2019 and 2020 being the most productive years (Figure 9).

Figure 8
Polynomial Curve of Scientific Production in the Social Sciences

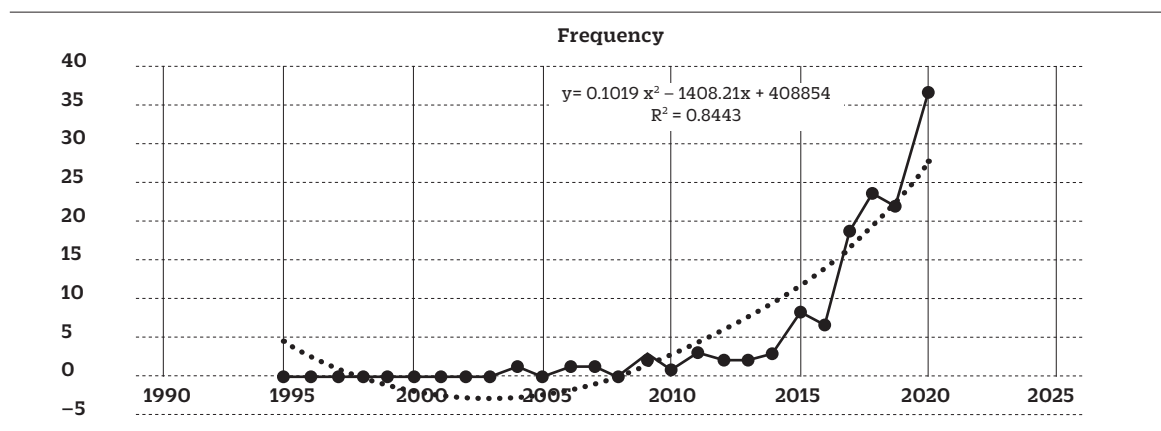


Figure 9
Scientific Production in the Area of Psychology

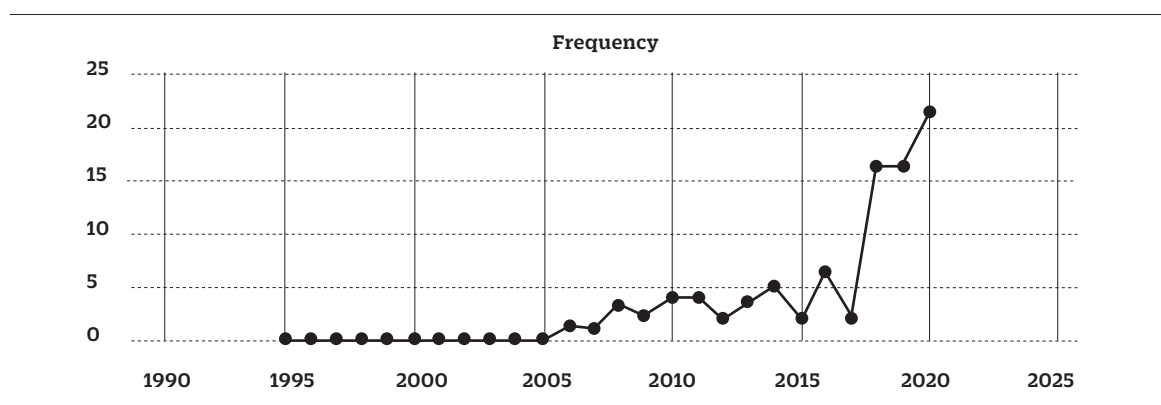


Table 6
Scientific Production by Authors in the Area of Social Sciences

Authors	f
Merino-Soto, C.	18
Domínguez-Lara, S.	16
Domínguez-Lara, S.A.	11
Fernández-Arata, M.	6
Toro-Huamanchuco, C.J.	6
Parodi, J. F.	5
Apaza, C.R.	4
Díaz-Vélez, C.	4
Garay-Argandoña, R.	4
Navarro-Loli, J. S.	4

Figure 10
Polynomial Curve of Scientific Production in Social Sciences

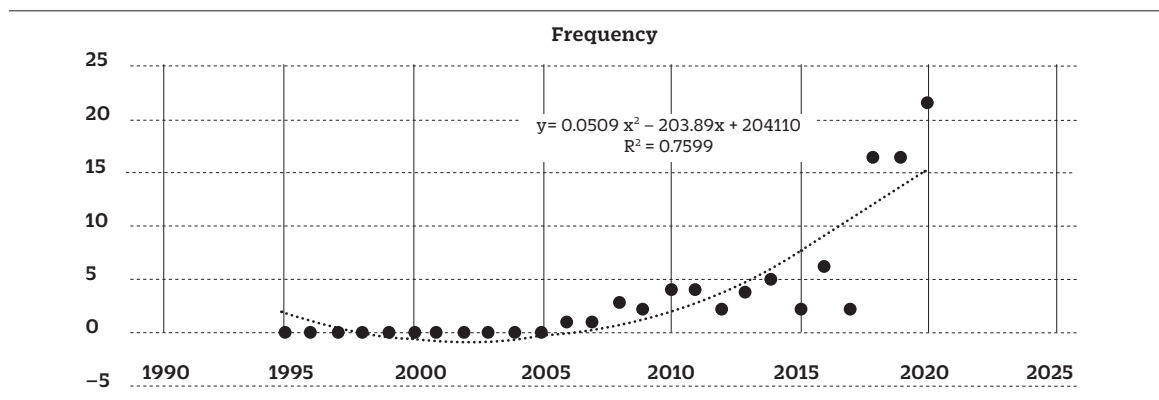


Table 7
Authors with the Highest Production in the Area of Psychology Sciences

Authors	f
Merino-Soto, C.	29
Dominguez-Lara, S.	24
Soto, C.M.	8
Medrano, L. A.	6
Navarro-Loli, J. S.	6
Gelaye, B.	5
Dominguez-Lara, S.A.	4
Fernández, M.	4
Merino Soto, C.	4
Salas-Blas, E.	4

The analysis of the second order polynomial trend showed a coefficient of determination of $R^2=75\%$, reflecting a trend towards an increase in the number of papers (Figure 10).

The five authors with the highest scientific production in psychology were: Merino-Soto; Domínguez-Lara, S.; Domínguez, S. A; and Fernández-Arata (Table 7).

In relation to the area of biochemistry, there are 76 publications with an irregular production and with a significant decrease in the last year, achieving the highest production in 2019 (Figure 11). The analysis by years allowed evaluating the trends of research in biochemistry and a gradual increase of publications was observed. The analysis of the second-order polynomial tendency showed a coefficient of determination of $R^2=81\%$, reflecting a trend towards an increase in the number of papers (Figure 12).

The five authors with the highest scientific production in biochemistry were: Fujita, Sandoval, Acosta, and Santos (Table 8).

Discusión

Bibliometrics allows the analysis of scientific production and is considered as the application of statistical analysis to evaluate the characteristics of the use and creation of documents, their producers and consumers, in such a way that it allows observing the state of science and technology through the global production of scientific literature at a given level of specialization (Solano et al., 2009).

For this reason, this methodology was applied to the scientific production of the Universidad San

Figure 11
Scientific Production in Scopus in the Area of Biochemistry

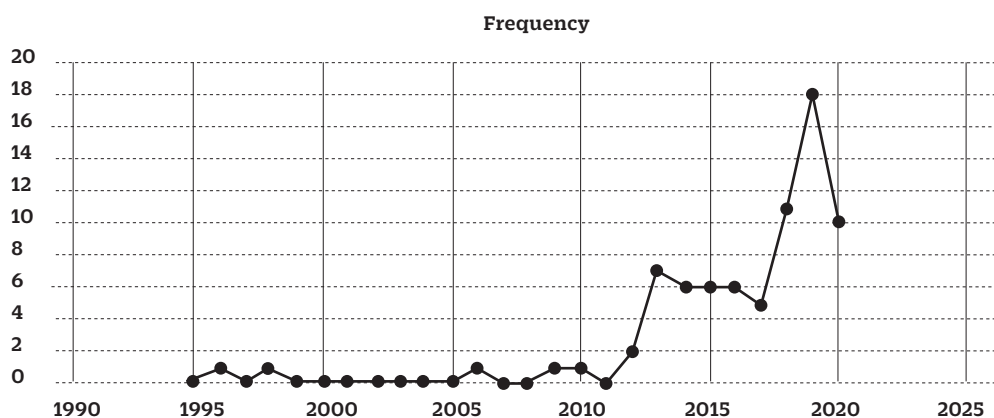


Figure 12
Polynomial Curve of Scientific Production in the Area of Biochemistry.

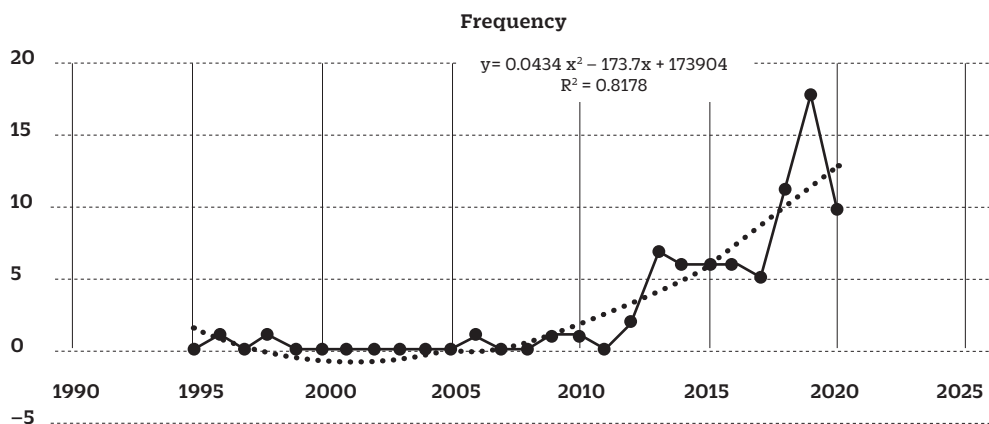


Table 8
Authors with the Highest Scientific Production in the Area of Biochemistry

Authors	f
Fujita, R.	20
Sandoval, J. R.	14
Acosta, O.	9
Santos, F.R.	9
Lacerda, D.R.	8
Sánchez, S.E.	8
Enquobahrie, D. A.	7
Parodi, J.F.	7
Runzer-Colmenares, F.M.	7
Ananth, C.V.	6

Martin de Porres whose works were registered in Scopus. The USMP was the sixth private university created in Peru in 1962 and has increased its scientific production, so it was necessary to evaluate it, due to its growing recognition in its scientific productivity.

The scientific production of the USMP denotes a trend of polynomial growth achieving 880 documents from 1995 to 2020. If we compare the average number of papers between 1995-2013, which was the range of years of the study by Taype-Rondán & Luque (2014) and the average number of papers published between 2014-2020, we observe a difference of 100 papers between the averages ($\bar{x}=8.9$ vs. $\bar{x}=106.5$), which is also reflected in the accumulated figures; in the first period of 19 years there were 134 papers and in the second period of seven years the accumulated figure was 746, an increase that has allowed USMP to occupy the fifth place in the Scopus 2020 Ranking, reflecting the progressive exponential growth.

The area of greatest production was medicine, almost half of the production belongs to this sector of knowledge, with a sustained increase in research. This aspect is also observed when making an analysis of the scientific production of Peru, the area of medicine in 2020 has 1,819 documents in Country Ranking Scimago Journal (<https://www.scimagojr.com/country-search.php?country=PE>), an aspect corroborated by Limaymanta et al. (2020), who points out that the medical sciences are among the top 10 disciplines with the highest production in Peru. Likewise, the other areas of greatest growth at the USMP are social sciences, psychology and biochemistry, sectors that university managers should strengthen, as well as medicine, which has decreased from representing 68% of the papers (Taype-Rondán & Luque, 2014) to 43% of the total production. It should be noted that medical education requires that the medical and health sciences professional be comprehensively trained by developing specific and generic competencies, highlighting within the former the areas or domains of scientific foundations and research and application of the scientific method (Risco de Domínguez, 2007).

The largest submission of papers falls on three authors: Domínguez-Lara (103 papers), Merino-

Soto (74 papers), and Fujita (36 papers). drawing attention to the lack of standardization of the signatures of the first two authors, an aspect that has ORCID as an alternative, as a unique identifier of the researcher (Perilla-Rodríguez & Pérez-Acosta, 2016). One implication of this is that the standardization of the name of the authors in emerging researchers should be explicit and promoted as a possible university policy among researchers at all levels.

Another variable of analysis was the language of publication, with the largest number of papers being in English, followed by Spanish. In this regard, Niño-Puello (2013) points out that English is not the most spoken language in the world, but it is the most important and argues that it has acquired significance in scientific publications since the Industrial Revolution, being considered the lingua franca of the scientific community. Just to indicate that 80% of the specialized journals indexed in Scopus are published in English, and, therefore, its relevance for the promotion of research and the increase of citations is not questioned. In the present case, it is observed that all publications have been collaborative.

Regarding the types of work, it is observed that scientific papers predominate, followed by letters to the editor and review publications, representing 93% of scientific production. The results show that the vehicle for communicating science is the empirical paper, which expresses original ideas and findings (Jiménez, 2015); letters to the editor also stand out, which establish an interactive aspect between researchers, reflecting critical judgment (Fernández, 2014) and novel contributions to the context in which they are published. Many of the letters to the editor published in recent years have consisted of two types of content: critical observations on the analyses conducted, and with consequent reanalysis reported in the same letter, and interesting analytical procedures. As a side note, formal responses to the letters generated by the authors were rare.

Collaborative networks make it possible to study research groups, but above all there is the scientific collaboration allowing to deepen lines of research and measure the collective production of knowledge. The results indicated five groups, one

led by Domínguez-Lara with Merino-Soto, who represent authorship in psychology and papers in medical science journals, with links between them, where both would achieve the greatest hegemony in the USMP; another group led by Fujita of biochemistry, Taype-Rondan; and a more scattered group led by Williams and Sánchez. The visualization of collaborative networks reflects the strong tendency of lines in the natural sciences. International relations between authors are also observed, an aspect that is reflected in other studies (Huamani & Mayta-Tristán, 2010) where it is indicated that the most productive Peruvian institutions collaborate more intensely with foreign institutions than with national ones.

This research does not cover all the scientific production of USMP researchers, it is likely that other works can be located in the Web of Science and Scielo, as well as other databases, but this contribution provides sufficient information for future research to evaluate other bibliometric indicators and assess the impact of the implementation of the basic conditions of quality implemented by the Sunedu.

Growth in scientific production has been observed at USMP and it is expected to continue to be sustained, involving other areas of the university and strengthening the communities that are being consolidated (medicine, social sciences, and psychology), developing a policy of incentives. As expressed by Astorne and Lepage (2011), qualifications are currently focused on education and research. This is in line with the National Higher Education Policy established by Minedu (2020), which aims for higher education to play a key role in the development and competitiveness of the country and to ensure that, by 2030, ten Peruvian universities can be ranked among the 1,000 best in the world.

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