

UNIVERSITIES OF THE ANDEAN SUBREGION IN THE SCIMAGO AND QS RANKING

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Abstract

Andean universities have been acquiring technological tools, accelerating the generation of knowledge, some have managed to strengthen the quality of education through knowledge management, giving a reflection on the presence of the HEIs of the subregion and region in the SCIMAGO indices and QS, a differentiated perspective is seen in the indices and their correlation between the best universities in the Andean subregion where a correlation by Spearman's Rho which shows a similar behavior and position in Latin America in the rankings disaggregating the Andean subregion which establishes a correlation between the indexes of Top 10 universities.

Keywords: Educational management, Knowledge management, University rankings

INTRODUCTION

Universities belonging to Andean nations with the object of promote the knowledge in different areas face new challenges being the main axis in the society for the knowledge transmission, that's where this knowledge management study is conceived through a combination of people, technological use, processes application and institutional politics that facilitate the transmission of new knowledge. Knowledge management is a discipline whose purpose is improve individual and organizations performance; as well as to maintain and take advantage of the present and future values of knowledge assets. (Orellana Méndez, 2021).

SCIMAGO International Bibliometric Ranking (SIR) is a classification of academic institutions related to research, classified by a composite indicator that combine three different groups of indicators based on research performance, innovation results and social impact measured by visibility on the web. (Kuong Morales y Kuong Morales, 2022).

Professors who lead research projects are the people who generate more knowledge in universities because many times apply their curricular objectives in research and when they include their students they can also be generators of knowledge because they help their teachers create and share knowledge. Andean Community, despite its institutional difficulties, community, has been making important coordinated efforts among member countries in order to stablish guidelines that combine measures to promote higher education. (Herrero Olarte y Jaime Baena, 2022). Main characteristic of andean universities seeks quality education, many times leaning on research and internalization, complexity of global change in the knowledge management highlights the need for collaborative commitment between different fields of science (Audretsch et al., 2020), SCImago Institutions Ranking classification analyze all the universities taking into account all research factors, social



impact and innovation, where research factor uses as a source the works indexed based on Scopus Elsevier data, the classification is made every year with results obtained during a period of five years that ends two years before the edition. (Buitrago Reyes, 2022). Andean universities have different indicators to measure the importance of their journals evaluating the importance of a specific area, for example, citation number made in their articles.

Other important point in a journal is the periodicity, which is defined by Scielo as a factor that shows the flow of scientific production suspended to the specific area covered by a journal as well as unveils the speed with a communication is published. (Pérez-Anaya, 2017). Knowledge management is a capacity that impulses educative innovation in universities, therefore, it requires tools that allow its evaluation. (Vázquez González et al., 2021). According to indicators of excellence in higher education, there are three models, first is related to universities reputation in terms of rankings, achieves, research, administrative and financial resources. (Flor Freire, 2017). Technological incorporation made by higher education institutions as a tool to generate knowledge has generated the formation of interdisciplinary work teams that act as mediators and facilitators of knowledge, an important factor for technological development and competitiveness of a country is their ability to absorb knowledge (identification, adequacy and application to reality) and the generation of self-knowledge reflecting in their scientific and technological production. (Agüero Aguilar, 2017).

Positioning of universities in the rankings varies not only in the quality of the education they offer but also in the quality of their publications and the guidance they give to their research projects. It is not coincide that the universities that are located in the top 200 of the most influential rankings are mostly world-class with good orientation in research and development of cutting-edge science and technology. (Villaseñor Becerra et al., 2015). From universities rankings elaboration, information on scientific activity is obtained, allowing to guide decision-making about possible strategies of improvement, strengthening or distribution of financial resources regarding the evaluated criteria (Buela-Casal, 2017).

Measurement of research production of universities has been gaining great importance, what has generated the growth of international rankings. The university rankings have as one of their main factors the number of published articles in scientific journals of Web of Science and Scopus (Rodríguez Pallares et al., 2020). Scientific journal are part of general university gear, without books and journals, a university is not such; libraries and editorial projects are the basis of their intellectual, scientific and technological development. (Oviedo Pérez y Vinaja, 2022). Traditional institutions of cultural heritage (ergo, libraries, files and museums) are information silos, with data and long stored records in their own catalogs and database. (Zhang, 2022). Information that universities have is of great interest for academic communities for the interest that its management may have.

The most significantly number of global classification systems are predominantly focused on context of measure the research performance as an crucial indicator of quality and competitiveness of universities, followed by reputation category, teacher quality and web performance indicators, in some cases. (Ganga-Contreras et al., 2020)

Although for many researchers the rankings can be questionable, others give it importance to having an indicator that allows each higher education institution to have a benchmark against which to compare their research and educative performance. Universities rankings are a universities organization according to some criteria that should provide usefulness. This use consists of knowing the existing order of the universities.

Most literature about knowledge management talks about universities in general, mainly there is information on knowledge management in large quantities about North America universities, followed by european and asian universities. (Luque-Martínez, 2023).

Historically, knowledge was assumed to be in hands of organizations, who explicitly developed and distributed through manuals, memoranda and other documents. However, there is a growing recognition that the knowledge possessed by employees can provide organizations with a greater competitive advantage. (Ferreira et al, 2022)

Knowledge management systems in the higher education institutions improve planning strategies towards this objective (Khatún et al., 2021). Knowledge management (km) is a broad concept that

proposes a kind of practical strategy and application to identify, create, organize, represent, store, share, communicate, search, analyze and improve their knowledge and experiences. (He, 2011). Taking into account the fast growing rate, empirical knowledge accumulation of university employees is crucial to colleges and universities growing and development, knowledge management is the management system more appropriate in the knowledge economic era. (Rui Liu et al., 2022)

METHODOLOGY

Martínez Ortega, Rosa María, & Tuya Pendás, Leonel C., & Pérez Abreu, Alberto, & Cánovas, Ana María, & Martínez Ortega, Mercedes (2009) consider it as a measure of linear association that use ranges, order numbers, of each subjects groups and compares that ranges in the following equation: Equation 1. Linear association of ranges.

$$r_s = 1 - \frac{6 \sum d_i^2}{n^3 - n}$$

Source: Martínez Ortega, Rosa María, & Tuya Pendás, Leonel C., & Pérez Abreu, Alberto, & Cánovas, Ana María, & Martínez Ortega, Mercedes (2009)

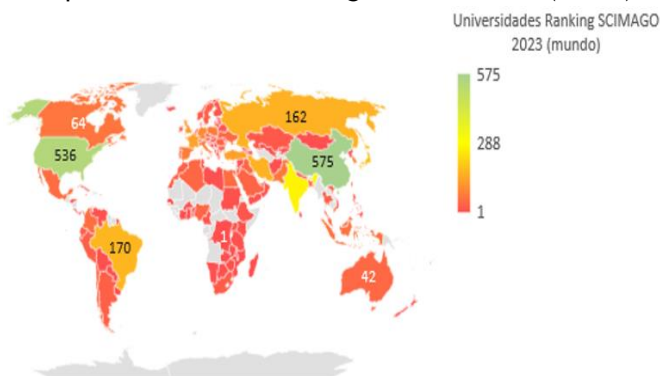
Hernández Sampieri states (2014) that in the Spearman correlation both coefficients varies from -1.0 (perfect negative correlation) to +1.0 (perfect positive correlation), considering the 0 as a correlation absence between hierarchical variables. Taking the hypothesis from the author Hernández Sampieri, (2014) states that the hypothesis arise from a problem statement that is based on a theoretical framework that recognizes previously research elements of similar nature, this is why the following elements must be considered to proposes the hypothesis described by Hernández Sampieri (2014). 1) Current situation; 2) Understandable variables; 3) Logic and plausible relation between variables; 4) Variables are measurable in real referent terms. From the construction of the methodology, implicitly underlying the possible hypothesis that would occur in this scenario and which for the purposes of this documents are: H1: There is a similar behavior in a positive correlation between the best ten universities of the Andean subregion according to SCIMAGO 2023 indicator and the position in the Quacquarelli Symonds Ranking QS 2023 index; Ho: Does not exist a similar behavior in a positive correlation between best ten universities of Andean subregion according to SCIMAGO 2023 and their position in the Quacquarelli Symonds Ranking QS 2023 index.

RESULTS AND DISCUSIÓN

By 2023 the SCIMAGO ranking of universities included a total of 4.533 Higher Education Institutions around the world (see map 1), at this point, United States and China stand out with more than five hundred HEIs present in the ranking, followed by India with 268 universities. Map shows a high concentration of present universities in the ranking, mainly in North America, Europe and Asia, relegating regions such as Africa and Latin America to a secondary role, however, it would not be enough to consider the number of HEIs present in the SCIMAGO 2023 ranking to determine by itself the knowledge management that they carry out, however, it's a good start as a thermometer to link good practices to daily exercise in which other indicators can be incorporated such as the QS that involves dimensions that SCIMAGO does not consider or does not give as much weight, by this way it begins precisely with this last ranking as a reference base for the development of the document.



Map 1. Universities Ranking SCIMAGO 2023 (world)



Source: own elaboration from SCIMAGO 2023

Regarding the Latin American region, there are 418 HEIs in the ranking, in this part, Brazil is the undisputed leader with 170 universities that represent 41% of the total, followed by Mexico, Colombia, Chile and Argentina, who together add another 41%, leaving the remaining 18% to the remaining eighteen countries that appear in the measurement.

Map 2. Universities Ranking SCIMAGO 2023 (Latin America)



Source: own elaboration from SCIMAGO 2023

At this point, it is convenient to disaggregate the nations that are part of the Andean Parliament: Bolivia, Chile, Ecuador, Perú and Colombia, in this way, the number of universities from the Andean countries present in the SCIMAGO 2023 ranking is presented in the table

Table 1. Andean Universities Ranking SCIMAGO 2023

| País | Universidades Andinas Ranking SCIMAGO 2023 |
|----------|--|
| Chile | 42 |
| Colombia | 51 |
| Perú | 27 |
| Ecuador | 21 |
| Bolivia | 1 |

Fuente: Elaboración propia a partir de SCIMAGO 2023

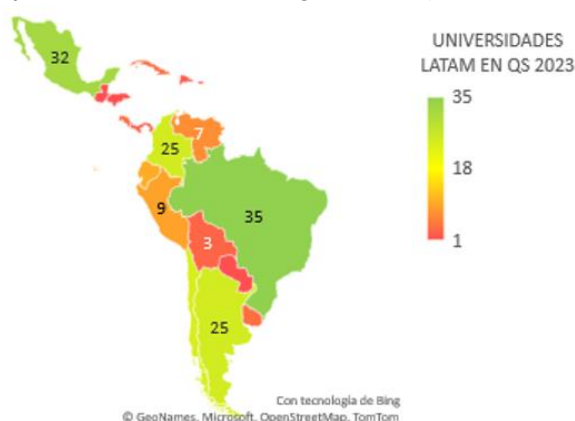


Table 2. Universities Ranking QS 2023 (Latin America)

| PAÍS | UNIVERSIDADES LATAM EN QS 2023 |
|----------------------|-----------------------------------|
| Argentina | 25 |
| México | 32 |
| Brasil | 35 |
| Chile | 24 |
| Colombia | 25 |
| Perú | 9 |
| Uruguay | 4 |
| Cuba | 4 |
| Costa Rica | 4 |
| Venezuela | 7 |
| Ecuador | 10 |
| República Dominican. | 2 |
| Paraguay | 1 |
| Panamá | 2 |
| Puerto Rico | 1 |
| Guatemala | 1 |
| Bolivia | 3 |
| Honduras | 1 |
| TOTAL | 190 |

Source: own elaboration from QS 2023

Map 3. Universities Ranking QS 2023 (Latin America)



Source: own elaboration from QS 2023

Regarding the Andean region, a total of 71 is reported, which represents 37% of the universities in the region led by Colombia with 25 HEIs, followed by Chile with 24. See table 3.

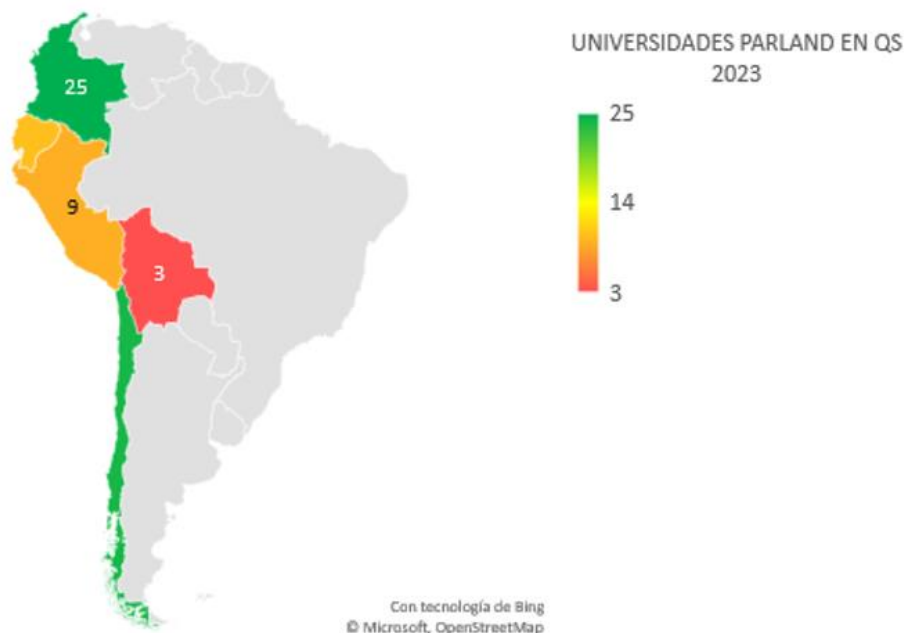
Table 3 Universities Ranking QS 2023 (andean countries).

| COUNTRY | UNIVERSITIES IN QS 2023 |
|--------------|-------------------------|
| Chile | 24 |
| Colombia | 25 |
| Perú | 9 |
| Ecuador | 10 |
| Bolivia | 3 |
| TOTAL | 71 |

Source: own elaboration from QS 2023



Map 4. Universities Ranking QS 2023 (andean countries)



Source: own elaboration from QS 2023

From the previous consideration, the recurrence of leadership at the global, regional and subregional level is evident, this is why, prior to moving towards the correlation of the two indices, it was considered by the research team to take the initial ranking (SCIMAGO) and correlate the rankings of the first 10 universities (2023) to appear on this list in the Andean subregion according to their position in LATAM and of course, in the Andes area during the five-year period between 2019 and 2023 with the following data and results:

Table 4. Top 10 Universities of Andean subregion in ranking SCIMAGO 2019-2023

| # | Institución | 2019 | 2020 | 2021 | 2022 | 2023 |
|----|---|------|------|------|------|------|
| 1 | Pontificia Universidad Católica de Chile | 9 | 9 | 7 | 7 | 7 |
| 2 | Universidad de Chile | 8 | 8 | 8 | 9 | 9 |
| 3 | Universidad Nacional de Colombia | 14 | 14 | 10 | 10 | 10 |
| 4 | Universidad de Antioquia | 33 | 31 | 18 | 16 | 15 |
| 5 | Universidad de Concepción | 36 | 26 | 22 | 18 | 17 |
| 6 | Pontificia Universidad Javeriana | 44 | 38 | 20 | 17 | 26 |
| 7 | Universidad de los Andes, Colombia | 45 | 45 | 26 | 27 | 29 |
| 8 | Pontificia Universidad Católica de Valparaíso | 67 | 67 | 57 | 40 | 35 |
| 9 | Universidad de Talca | 60 | 58 | 50 | 50 | 42 |
| 10 | Universidad Austral de Chile | 55 | 57 | 38 | 36 | 48 |

Source: own elaboration from SCIMAGO 2019-2023

It immediately proceed to correlate using the Spearman finding method.

Table 5. Correlation Top 10 Universities of Andean subregion in ranking SCIMAGO 2019-2023

| | | AÑO 2023 | AÑO 2022 | AÑO 2021 | AÑO 2020 | AÑO 2019 |
|----------|----------------------------|----------|----------|----------|----------|----------|
| AÑO 2023 | Coeficiente de correlación | 1,000 | ,988** | ,927* | ,939** | ,939** |
| | Sig. (bilateral) | . | ,000 | ,000 | ,000 | ,000 |
| | N | 10 | 10 | 10 | 10 | 10 |
| AÑO | Coeficiente de correlación | ,988** | 1,000 | ,939* | ,915** | ,927** |

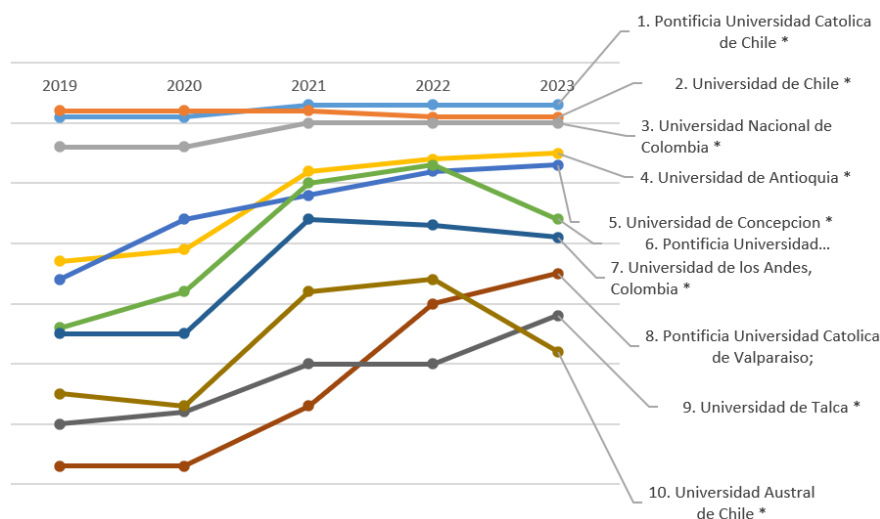
| | | | | | | | |
|-----------------|----------|----------------------------|--------|--------|-------|--------|--------|
| Rho de Spearman | 2022 | | | | * | | |
| | | Sig. (bilateral) | ,000 | . | ,000 | ,000 | ,000 |
| | | N | 10 | 10 | 10 | 10 | 10 |
| | AÑO 2021 | Coeficiente de correlación | ,927** | ,939** | 1,000 | ,952** | ,988** |
| | | Sig. (bilateral) | ,000 | ,000 | . | ,000 | ,000 |
| | | N | 10 | 10 | 10 | 10 | 10 |
| | AÑO 2020 | Coeficiente de correlación | ,939** | ,915** | ,952* | 1,000 | ,976** |
| | | Sig. (bilateral) | ,000 | ,000 | ,000 | . | ,000 |
| | | N | 10 | 10 | 10 | 10 | 10 |
| | AÑO 2019 | Coeficiente de correlación | ,939** | ,927** | ,988* | ,976** | 1,000 |
| | | Sig. (bilateral) | ,000 | ,000 | ,000 | ,000 | . |
| | | N | 10 | 10 | 10 | 10 | 10 |

** . La correlación es significativa en el nivel 0,01 (bilateral).

Source: own elaboration from SCIMAGO 2019-2023 - IBM SPSS

Therefore, the record (place) of these HEIs in the ranking is graphed on a timeline:

Figure 1. Behavior Top 10 universities of Andean subregion in ranking SCIMAGO



Source: own elaboration from SCIMAGO 2019-2023

These types of institutions tend to remain in the highest places in the Andean subregion and the Latin American region over time based on considerations specific to the constitution of the index such as citations, research, innovation and social impact that, among others, Reasons that will be the subject of another publication, potentially stem from the budgetary capacity of these organizations. In order to continue the initially proposed exercise and not before having reflected on the presence of HEIs from the subregion and region in the SCIMAGO and QS indices, it is time to approach the discussion from a differentiated perspective in which the two indices They are correlated in order to validate if there is a positive or negative relationship or if, on the contrary, there is no relationship between the ten best universities in the Andean subregion from SCIMAGO and their location in the QS ranking; In this way, the exercise is initially presented from Latin America, to give way to the same praxis only in the five countries of the Andean subregion:



Table 6. Top 10 Universities andean subregion ranking SCIMAGO vs QS

| <i>Institución</i> | <i>SCIMAGO 2023</i> | <i>QS 2023</i> |
|--|---------------------|----------------|
| <i>Pontificia Universidad Católica de Chile *</i> | 1 | 1 |
| <i>Universidad de Chile *</i> | 2 | 2 |
| <i>Universidad Nacional de Colombia *</i> | 3 | 4 |
| <i>Universidad de Antioquia *</i> | 4 | 10 |
| <i>Universidad de Concepción *</i> | 5 | 8 |
| <i>Pontificia Universidad Javeriana *</i> | 6 | 6 |
| <i>Universidad de los Andes, Colombia *</i> | 7 | 3 |
| <i>Pontificia Universidad Católica de Valparaíso</i> | 8 | 16 |
| <i>Universidad de Talca *</i> | 9 | 31 |
| <i>Universidad Austral de Chile *</i> | 10 | 28 |

Source: own elaboration from SCIMAGO y QS 2023

Correlation by Spearman's Rho shows that there is a similar behavior to when these 10 universities were considered in their position in Latin America for the two rankings, in this way and by disaggregating the Andean subregion it must be established that there is undoubtedly the strong positive correlation between the two variables (indices)

Table 7. Correlation Top 10 Universities andean subregion ranking SCIMAGO vs QS (*andean subregion ubication*)

| | | <i>RANK SCIMAGO2023</i> | <i>RANK QS 2023</i> |
|------------------------|--------------------------|-------------------------|---------------------|
| <i>Rho de Spearman</i> | <i>RANK SCIMAGO 2023</i> | 1,000 | ,818** |
| | | Sig. (bilateral) | ,004 |
| | | N | 10 |
| | <i>RANK QS 2023</i> | ,818** | 1,000 |
| | | Sig. (bilateral) | ,004 |
| | | N | 10 |

** . La correlación es significativa en el nivel 0,01 (bilateral).

Source: own elaboration from SCIMAGO y QS 2023 - IBM SPSS

CONCLUSIONS

Knowledge Management can be a tool for Andean universities which face the new challenges presented by the university environment and work on the integration of the analysis, collection, structuring, compilation and socialization of knowledge, making it an integral element in the achievement of their goals. In this decade the SCIMAGO ranking of Universities included Higher Education Institutions, the United States and China, highlighting the HEIs present in the ranking followed by India. A high concentration of universities present in the ranking is shown in North America, Europe and Asia, relegating regions such as Africa and Latin America to a secondary role; however, it would not be enough to consider the number of HEIs present in the SCIMAGO 2023 ranking to determine by itself. Knowledge Management itself, link its good practices to the daily exercise in which other indicators can be incorporated such as the QS that involves dimensions that SCIMAGO does not consider or does not give as much weight, in this way it begins precisely with the latest ranking as a reference base for the development of the document.

The Latin American region, places IES in the ranking, Brazil is the leader with universities, followed by Mexico, Colombia, Chile and Argentina. At this point, it is convenient to disaggregate the nations that are part of the Andean Parliament: Bolivia, Chile, Ecuador, Peru and Colombia, in this way, the table presents the number of universities from the Andean countries present in the SCIMAGO ranking with respect to the Andean region, of the universities in the region led by Colombia with HEIs. The recurrence of leadership at the global, regional and subregional level, prior to progress towards the

correlation of the two indices, by the research team the initial ranking (SCIMAGO) and correlate the rankings of the first universities to appear on the list of the Andean subregion according to their position in LATAM and the Andes area during the five-year period included. It is correlated using the Spearman method by finding. The Correlations of the Universities of the Andean subregion in the SCIMAGO ranking are significant at the bilateral level, where the timeline of the registration of these HEIs in the ranking provides elements of value to the discussion.

Institutions tend to remain in the highest places in the Andean subregion and the Latin American region over time based on considerations specific to the constitution of the index such as citations, research, innovation and social impact, on the presence of IES of the subregion and region in the SCIMAGO and QS indices, the discussion from a differentiated perspective in which the two indices are correlated in order and to validate the existence among the ten best universities in the Andean subregion from the SCIMAGO and its location in the QS ranking.

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