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Multivariate evaluation of the presence of Ecuadorian universities in global rankings

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Abstract

The study examines the dynamics of Ecuadorian universities in global rankings, focusing on ARWU and THE. Using a multivariate approach, it analyzes the evolution of these institutions over the last five years to identify those in global rankings. Dynamic Biplot analysis shows the trajectory of Ecuadorian universities, illustrating their positions concerning different indicators. The results reveal that only a small percentage of Ecuadorian universities, including Universidad San Francisco de Quito, achieve international ranking. The study underscores the need for effective strategies to enhance Ecuadorian universities' international visibility and competitiveness, calling for a re-evaluation of internationalization policies and academic practices to improve their global presence and recognition.

Keywords: ARWU, Ecuadorian universities, Global positioning of universities, International visibility strategies, Higher education, multivariate evaluation, THE, Dynamic biplot, University internationalization, University rankings, Educational policies.

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1. Introduction

The ranking system operates as a variable directly related to the position of Latin American universities compared to the rest of the world, with the region being less favored than other systems [1]. The trajectory of Ecuadorian universities in these rankings presents a new challenge, and they should adopt certain policies and evaluations to improve their international position and reputation [2].

The international dimension of higher education has become a prominent trend worldwide, attracting the attention of various sectors and aligning with social, cultural, economic, and political interests [3]. Efforts to strengthen the cross-border characteristics of higher education have intensified, leading to the growth of internationalization in terms of student mobility, academic cooperation, and curriculum development [4]. The internationalization of higher education involves the integration of international values, research, and services, contributing to political and economic integration, the reduction of military confrontation, and the development of global telecommunication systems [5]. The international and global dimension of

higher education continues to expand, with different lines of research and studies focusing on comparative higher education, international development, postcolonial studies, global higher education studies, and international educational mobility [6]. English as a medium of instruction (EMI) is considered a policy of internationalization in higher education, with studies exploring attitudes towards its use in different contexts [7].

The Academic Ranking of World Universities (ARWU), also known as the Shanghai Ranking, is one of the most influential international rankings of research universities. It annually produces a list of the top 1,000 universities according to criteria such as alumni, awards, research output, and faculty quality. However, there are criticisms regarding the methodology and indicators used in the ranking. Some argue that the rankings do not take into account scientific papers published in national languages, which disadvantages universities with strong humanities and social science faculties [8]. In addition, the ranking relies heavily on complex and variable rules and data, which makes its results unpredictable and not fully revealed [9, 10]. Rating changes may be due to exogenous or methodological factors rather than intrinsic institutional performance [11]. It is important that stakeholders, including the media, governments, and institutions, are aware of the merits and risks associated with using the Shanghai ranking to assess relative institutional performance.

Times Higher Education is a platform that evaluates the performance of universities and their rankings [8]. The platform has introduced Impact Rankings, which evaluate universities' contributions to sustainable development [12]. The rankings allow universities to voluntarily participate and highlight their efforts to address social, political, ecological, and economic issues [13]. However, there are some limitations in the methodology, such as optional participation and unbalanced weighting factors. The changing landscape of higher education, including the entry of private providers, has created challenges in defining metrics and performance standards. Overall, Times Higher Education plays an important role in evaluating universities, promoting innovation in publishing systems, and facilitating discussions on higher education reform.

Both ARWU and THE are models of university evaluation, but they have some key differences. One important difference is the criteria each model analyzes and the objectives it proposes [14]. The ARWU ranking includes indicators such as "Alumni" and "Awards," which are based on the number of alumni and staff who won Nobel prizes and Fields medals [8].

The rankings allow universities to voluntarily participate and highlight their efforts to address social, political, ecological, and economic issues [15]. However, there are some limitations in the methodology, such as optional participation and unbalanced weighting factors. The changing landscape of higher education, including the entry of private providers, has created challenges in defining performance metrics and standards. Overall, Times Higher Education plays an important role in evaluating universities, promoting innovation in publishing systems, and facilitating discussions on higher education reform.

Achieving a prominent place in the rankings has aroused significant interest, which has not gone unnoticed by Ecuadorian universities. Promoting internationalization through these rankings could result in greater visibility and, consequently, contribute to improving the global perception of Ecuador's university system, preventing it from being perceived as a mere imitation of other systems [16].

In the Ecuadorian context, the absence of research addressing this area is notable, especially regarding the use of dynamic multivariate techniques. Therefore, this proposal would represent a pioneering initiative in the field, offering valuable insights in the face of the growing desire of Ecuadorian universities to increase their presence and recognition in such rankings. This contribution would not only fill an important gap in existing literature but would also mark a significant milestone in academic analysis within the country.

The internationalization of higher education is shaped by various factors, including student mobility and academic collaboration. However, it is increasingly influenced by research productivity and impact metrics that are pivotal for global university rankings, such as the Academic Ranking of World Universities (ARWU) and Times Higher Education (THE). These metrics significantly contribute to enhancing the global reputation of universities [8]. Yet, recent studies have underscored the complexity of the relationship between productivity and academic prestige.

In a large-scale analysis, Sunahara, et al. [17] revealed that while some researchers excel in productivity or in publishing in prestigious journals, it is uncommon for individuals to consistently achieve both simultaneously. This insight has profound implications for how institutions are evaluated in global rankings, which tend to favor high-impact journal publications. However, this focus on journal prestige does not always align with high productivity levels, creating potential discrepancies in how universities' research impact is perceived.

Moreover, Sunahara, et al. [17] highlighted that the relationship between productivity and academic prestige is not uniform across disciplines or career stages. Early-career researchers often achieve greater prestige in high-impact journals, while later in their careers, their productivity increases, often at the expense of the average prestige of their publications. This dynamic suggests that evaluations based solely on either productivity or journal impact may not fully capture the complexities of academic performance. It underscores the need for a more nuanced approach when assessing university rankings.

For Ecuadorian universities, these findings are particularly relevant. To improve global positioning, they must develop research policies that simultaneously enhance productivity and publication in prestigious journals. Currently, there is a lack of thorough analysis on how these dynamics influence their standing in international rankings. Understanding and addressing this gap could significantly boost their global visibility and reputation.

Furthermore, Sunahara, et al. [18] emphasized the importance of discipline-specific strategies, as the productivity-prestige relationship varies greatly across fields. Ecuadorian institutions, therefore, must not only focus on increasing publication volume but also on the quality of publications as measured by journal impact. This balance is essential for strengthening their presence in global rankings.

Lastly, the study also found that both productivity and journal prestige generally increase as researchers advance in their careers. This suggests that supporting the long-term development of researchers, particularly through sustained research funding and opportunities for high-impact publications, is key to enhancing the global reputation of Ecuadorian universities.

Therefore, this study aims to examine the dynamics of Ecuadorian institutions within the global rankings, especially the ARWU and THE, analyzing their evolution over the last two years. We seek to identify those centers or institutions that have achieved outstanding positions in these global rankings.

2. Research Problem

1. Although the implementation of the Organic Law of Higher Education (LOES) in 2010 significantly increased scientific production in Ecuador, with a 358.41% rise in the annual average of publications [19] Ecuadorian universities have yet to achieve prominent global recognition [20]. Even though LOES fostered a more favorable environment for research, driving a notable increase in publication output, these improvements have not translated into equivalent international visibility. This highlights a persistent challenge in terms of global positioning and reputation for Ecuadorian institutions.
2. The relevance of this issue is clear: global rankings have a direct impact on institutional reputation, access to funding, and the ability to attract international students and academics. Moreover, higher visibility in these rankings would help project a stronger image of Ecuador's educational system globally, enabling these universities to better integrate into international academic cooperation networks. Theoretically, this study offers a valuable contribution by being the first to apply dynamic multivariate techniques to analyze the performance of Ecuadorian universities in these rankings, providing an innovative approach that can be replicated in other regions with similar characteristics.

3. Background

3.1. Methodologies and Critiques of International Rankings

International rankings, such as ARWU and THE, have been the subject of extensive analysis due to their influence on the global perception of universities. ARWU stands out for prioritizing indicators such as international awards and publications in high-impact journals, while THE adopts a more balanced approach by including indicators related to teaching, internationalization, and industry engagement [8]. However, both rankings have been criticized for favoring resource-rich institutions, disadvantaging universities in developing countries that often rely on publications in local languages and lack robust structures for scientific research [16, 21].

3.2. Specific Challenges Faced by Universities in Developing Countries

Universities in developing countries face structural barriers that limit their ability to compete on equal terms in global rankings. These barriers include limited research funding, reliance on government financing, and restricted access to international collaboration networks [20]. Additionally, the literature highlights that universities in these regions often prioritize disciplines such as social sciences and humanities, which are less represented in the impact indicators used by rankings like ARWU [11]. This imbalance underscores the need to adopt strategies tailored to regional contexts.

3.3. Impact of Internationalization on University Performance

Internationalization has become a key pillar for improving the positioning of universities in global rankings. Strategies such as student mobility, international academic collaborations, and participation in global networks have proven effective in increasing universities' visibility and impact [4, 6]. In Ecuador's case, previous studies indicate that, while internationalization has been promoted as a public policy, its outcomes have been limited due to structural and cultural barriers [22].

The literature review demonstrates that international rankings not only reflect academic performance but also structural inequalities across regions. In this context, this study adopts a multivariate approach to analyze how Ecuadorian universities have started positioning themselves in global rankings such as THE, identifying strategies that could enhance their international visibility and local impact. By exploring these dynamics, the study aims to contribute to the understanding of the challenges and opportunities faced by institutions in developing countries.

4. Methodology

Numerous studies have explored international rankings, focusing on discovering the relationships and contributions of different indicators. Methods such as factor analysis [23, 24] principal component analysis [25] regression analysis [26] and correlation analysis [27] have been employed to examine these rankings in detail. However, a gap has been observed in the literature regarding the application of dynamic multivariate techniques that facilitate the monitoring of the international projection of universities over time.

For this study, the two most prestigious and long-standing global rankings were selected: the Academic Ranking of World Universities (ARWU) and the Times Higher Education (THE).

The selection of the ARWU and THE rankings is justified by their relevance, influence, and diversity in evaluating higher education institutions globally. Both rankings are widely recognized and provide complementary insights into the strengths and weaknesses of universities.

1. ARWU (Academic Ranking of World Universities): This ranking is known for its rigorous and objective focus on academic research. ARWU prioritizes indicators such as scientific output, publications in high-impact journals, and international awards like Nobel Prizes and Fields Medals. For this study, ARWU is essential because of its robust capacity to measure excellence in research, which is crucial for assessing academic performance in terms of scientific production and global reputation.
2. THE (Times Higher Education): THE, on the other hand, offers a more balanced approach by considering, in addition to research, factors like teaching, internationalization, and industry engagement. These indicators reflect key aspects of university performance beyond scientific production, providing a more holistic view of the impact and relevance of universities. THE is particularly relevant to this study as it allows for the evaluation of important areas for Ecuadorian universities, such as their ability to attract international students and collaborate with industry, where these institutions have shown notable development.

For the development of the databases required for this analysis, the official websites of both rankings were used as primary sources of information.

This methodological approach ensures the use of updated and relevant data, allowing for an in-depth and comparative analysis of the global presence and recognition of higher education institutions.

The indicator data for the ranking were collected over two years, specifically from 2022 to 2023.

We will apply the dynamic biplot to various decompositions, the HJ-biplot stands out for its ability to optimally represent both variables and individuals, achieving a high-quality representation. This method allows us to simultaneously illustrate universities and ranking indicators in a two-dimensional space, where the proximity between universities reflects inverse similarities based on Euclidean distance, and the angles between indicators help determine their covariation: acute angles suggest positive correlations, obtuse angles indicate negative correlations and right angles denote independence between variables [28, 29].

The construction of the dynamic biplot is performed in two phases: initially, a biplot analysis is run for the bidirectional data matrix corresponding to the base year, followed by the projection of additional data onto the resulting biplot to map its evolutions in various environments. This process not only reveals the multivariate interrelationships between variables and entities but also captures the changing essence of the analysis over time.

To analyze the trajectory of the universities over the years, a multivariate technique such as the dynamic Biplot was chosen for the treatment of 3-way data: 1. Situations for the time; 2. THE ranking indicators for the columns.; 3. Universities for the observations [29].

In the biplot space where both Ecuadorian universities and ranking indicators are displayed, the principal axes are defined from the principal components, which emerge as eigenvectors derived from the covariance matrix between the indicators. The corresponding eigenvalues allow estimating the volume of information that each axe of the biplot contains (i.e., the explained variance).

The orientation of each indicator to the first factorial axis illustrates the degree to which that factor contributes to the variation of the indicator; a similar interpretation applies to the angle formed with the second factorial axis. The aggregation of these contributions reflects the precision with which the elements are represented in the biplot axes, ensuring a detailed and accurate interpretation of the data without directly replicating the original content.

All data analyses were performed using the R software [30] with the dynBioplotGUI package [29].

5. Results

5.1 ARWU Ranking

During the years 2022 and 2023, an exhaustive search of Ecuadorian universities in the Academic Ranking of World Universities (ARWU) was conducted to evaluate their presence and performance in this prestigious international context.

Unfortunately, no Ecuadorian universities were identified in this ranking.

5.2. THE Ranking

In the Times Higher Education (THE) ranking, six Ecuadorian universities have been included since 2022. This finding indicates a greater presence and recognition of Ecuadorian universities in the Times Higher Education ranking, suggesting that these institutions find a more favorable scenario for their ranking compared to the ARWU. This contrast could reflect differences in the evaluation criteria and methodologies applied by each ranking, where THE possibly offers a more accessible or relevant framework for the characteristics and strengths of Ecuadorian universities [31].

Table 1.
Ecuadorian Universities in the Ranking THE.

University	Abbreviation
San Francisco University of Quito	USFQ
Superior Polytechnic School of the Litoral	ESPOL
National Polytechnic School	EPN
Higher Polytechnic School of the Army	ESPE
Salesian Polytechnic University	UPS
Particular Technical University of Loja	UTPL

Note: This table shows the list of Ecuadorian universities included in the Times Higher Education ranking during 2022-2023. The institutions that have achieved greater international visibility are highlighted, emphasizing the key indicators that contribute to their ranking position.

The values of the variables were chosen from two years 2022 to 2023. The reference situation for the biplot was the year 2023, which was the most current ranking. In the HJ-Biplot, the Times Higher Education ranking indicators were represented as vectors and the Ecuadorian universities as points, in the HJ-Biplot graph the labels used are defined in Table 1.

Table 2.
THE indicators, averages and variation rates.

University	Year	Teaching	Research	Citation	Industry	Internationalization
USFQ	2022	18.2	9.2	46.6	35.2	64.8
	2023	16.7	9.8	42.8	37.7	65.6
AVERAGE		17.45	9.5	44.7	36.45	65.2
VARIATION		-8.24	6.52	-8.15	7.10	1.23
ESPOL	2022	16.6	9.3	30.3	35.2	54.7
	2023	16.1	10.2	35	37	54.3
AVERAGE		16.35	9.75	32.65	36.1	54.5
VARIATION		-3.01	9.68	15.51	5.11	-0.73
EPN	2022	16.7	9	23.3	35.9	52.6
	2023	15.8	9.4	20.3	37.3	49
AVERAGE		16.25	9.2	21.8	36.6	50.8
VARIATION		-5.39	4.44	-12.88	3.90	-6.84
ESPE	2022	14.4	9.4	13.2	35.1	42.3
	2023	15.1	9.4	20.3	37.3	49
AVERAGE		14.75	9.4	16.75	36.2	45.65
VARIATION		4.86	0.00	53.79	6.27	15.84
UPS	2022	13	9.3	16.4	34.8	48.8
	2023	13	8.8	14.5	37.4	46.4
AVERAGE		13	9.05	15.45	36.1	47.6
VARIATION		0.00	-5.38	-11.59	7.47	-4.92
UTPL	2022	11.9	7.9	13.1	35	47.4
	2023	11.6	7.8	10.2	37.1	51.8
AVERAGE		11.75	7.85	11.65	36.05	49.6
VARIATION		-2.52	-1.27	-22.14	6.00	9.28

Note: This table presents the Times Higher Education ranking indicators, their averages, and variation rates for Ecuadorian universities evaluated between 2022 and 2023. San Francisco de Quito stands out in teaching, citations, and internationalization, while the Polytechnic School of Litoral excels in research, reflecting significant growth in these areas.

In Table 2, San Francisco de Quito University stands out for obtaining the highest averages in the categories of teaching (17.45), citations (44.70), and internationalization (65.2), evidencing its strength in these areas. On the other hand, the Polytechnic School of Litoral excels in research with an average of 9.75 and presents the most notable variation rate (9.68%), reflecting its significant growth in this area. As for collaboration with industry, the National Polytechnic School leads with an average of 36.6. In addition, the Polytechnic Superior School of the Army registers the highest growth rates in teaching (4.86%), appointments (53.79%), and internationalization (15.84%). In comparison, the Salesian Polytechnic University stands out in cooperation with industry with a variation rate of 7.47%, showcasing the diversity of strengths among Ecuadorian universities in these key areas for development and international visibility.

5.3. HJ-Biplot

Three axes were selected, since together they capture 98.9% of the data variability as shown in Table 3, these three axes are sufficient to capture the position and trajectory of the Ecuadorian universities in the Times Higher Education ranking.

Table 3.
Eigenvalue, explained variance, and cumulative variance, ranking THE.

Axis	Eigenvalue	Explained variance	Cumulative Variance
Axis1	4.137	68.451	68.451
Axis 2	2.253	20.296	88.747
Axis 3	1.6	10.16	98.9

Note: The table shows the eigenvalues and the variance explained by the selected axes in the Times Higher Education ranking analysis. The three selected axes capture 989% of the data variability, adequately representing the differences between Ecuadorian universities and the evaluated indicators.

Table 4.
Contribution of the axes to the indicators, ranking THE.

Indicators	Axis1	Axis 2	Axis 3
Teaching	849	81	39
Research	742	217	31
Citation	952	1	37
Industry	263	551	185
Internationalization	617	164	217

Note: Table 4 shows the contribution of the axes to the variability of the Times Higher Education ranking indicators. The indicators of teaching, research, citations, and internationalization received more contribution from Axis 1, while the industry contributed information of interest to Axis 2.

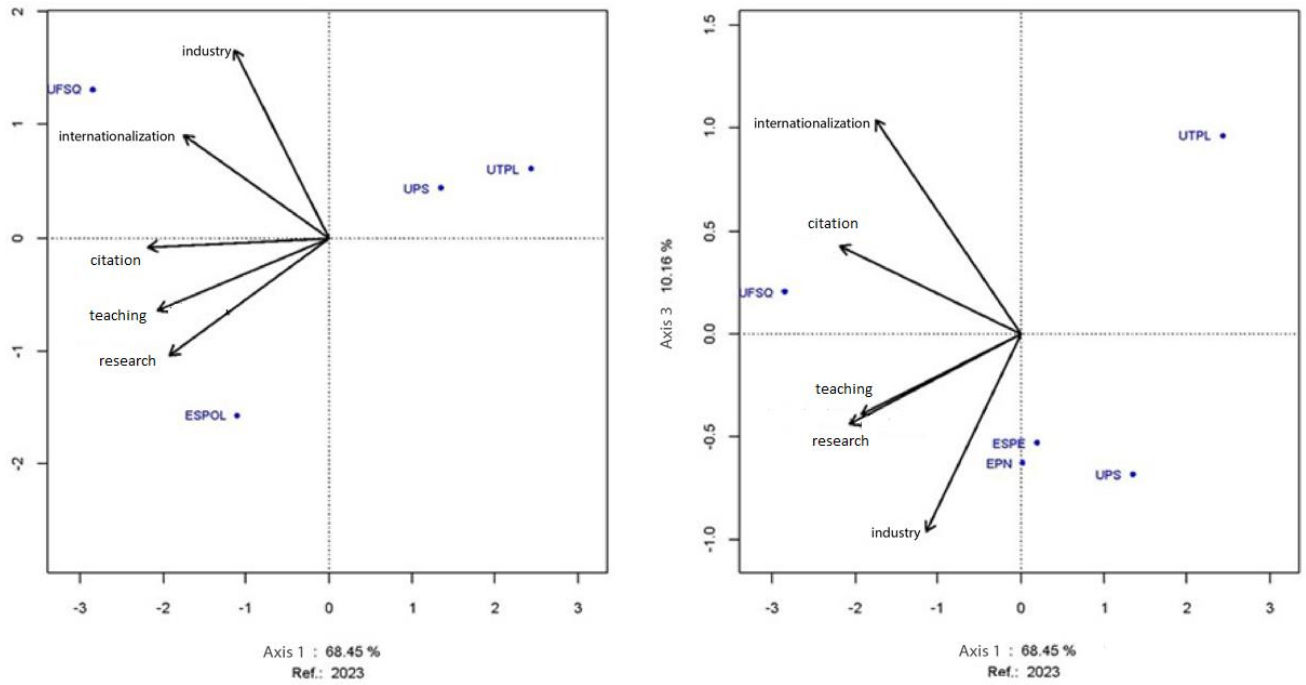

Figure 1.
HJ-Biplot Ranking THE (2023), axis 1-2 || HJ-Biplot Ranking THE (2023), axis 1-3.
Note: The HJ-Biplot graph shows the two-dimensional representation of Ecuadorian universities and the Times Higher Education ranking indicators on axes 1 and 2. A strong correlation is observed between the industry and internationalization indicators, while universities vary in their proximity to these key factors. The National Polytechnic School's performance in the industry category stands out, demonstrating sustained growth in this area during the analyzed years.

Figure 1 illustrates the HJ-Biplot corresponding to axes 1 and 2, based on the data matrix updated to the year 2023. It is highlighted that both the Polytechnic Superior School of the Army and the National Polytechnic School demonstrated an outstanding representation in axis 3, evidencing the effectiveness of this method in visualizing their performance. In addition, all indicators were effectively represented in axes 1-2, underscoring the ability of the HJ-Biplot to provide a comprehensive and detailed view of the positioning of these institutions based on various evaluation criteria.

The relationship between the industry and internationalization variables, as well as between citations and teaching, showed a direct and robust correlation, with teaching varying significantly with research. Additionally, teaching, research, and citations exhibited a weak association with internationalization. Conversely, the only variable that maintained notable independence was the relationship between industry and research, indicating distinct patterns of association within the Times Higher Education ranking.

In the Times Higher Education Ranking, San Francisco de Quito University occupies the first place, standing out especially around internationalization, as shown in Figure 1. When analyzing the data in Table 2, it is confirmed that San Francisco de Quito University leads in internationalization with an average of 65.2, while Polytechnic School of Litoral leads in research, registering the highest average and the most significant variation rate in this area, with 9.75 and 9.68% respectively. This analysis highlights the distinctive strengths of both institutions within ranking THE, reflecting their leadership and specialization in specific areas of academic and global performance.

The Salesian Polytechnic University stands out for its closeness to the industry indicator, evidenced by forming the smallest angle with it in the biplot analysis. This correlates with its outstanding variation rate of 7.47%, as shown in Table 2, indicating its relevance in this sector. In contrast, the Particular Technological University of Loja is positioned far from all indicators, reflecting that it does not stand out notably in any specific average or rate of variation. This contrast underscores the differences in academic and industrial focus and performance between the two institutions within the evaluated context.

The Army Polytechnic College and the National Polytechnic School stood out effectively in the 1-3 axes of the analysis. The Army Polytechnic College is positioned close to the teaching and industry indicators, reflecting its outstanding rate of change in the teaching of 4.86% and a significant average in the industry of 36.2, as detailed in Table 2. Meanwhile, the

National Polytechnic College, with the highest average in the industry of 36.6, is positioned close to this indicator in Figure 1, underscoring its leadership in this sector. These patterns of proximity demonstrate the strengths of each institution and highlight the relevance of their contributions in the areas of teaching and industry within the academic context evaluated.

Figure 2 shows the dynamic biplot corresponding to axes 1-2, revealing the evolution of San Francisco de Quito University (USFQ), Polytechnic School of Litoral (ESPOL), Salesian Polytechnic University (UPS), and Particular University of Loja (UTPL) over time, tracing their respective trajectories from 2022 to 2023. During this period, all four institutions experienced improvements in their indicators. USFQ distinguished itself, particularly in internationalization, the indicator for which it was most characterized. ESPOL, on the other hand, stood out in research, showing a clear trend towards this indicator. Although UTPL and UPS varied in their trajectories, they did not manage to stand out exceptionally in any specific indicator; however, they evidenced a notable adaptation towards the industry indicator, reflecting the dynamics and adaptability of the universities in response to the challenges and changes in their academic and research environments.

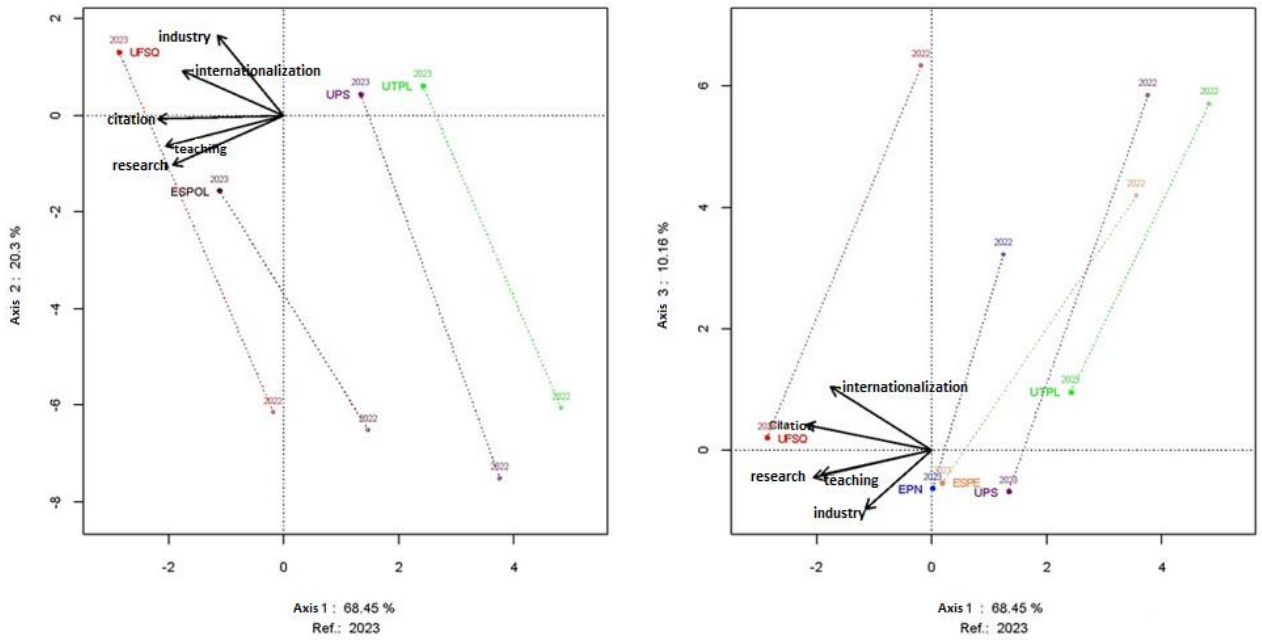

Figure 2.
Dynamic Biplot, Ranking THE, axis 1-2 || Dynamic Biplot, Ranking THE, axis 1-3.
Note: The figure shows the progress of Ecuadorian universities in the key indicators of the THE ranking, highlighting performance in internationalization and teaching.

In the analysis presented in Figure 2, using the dynamic biplot corresponding to axes 1-3, the evolution of the Polytechnic Superior School of the Army (ESPE) and the National Polytechnic School (EPN) between the years 2022 and 2023 are plotted. The ESPE, although it exhibits an outstanding trajectory, does not achieve an outstanding representation in a specific indicator. However, it approaches the industry indicator due to its consistent performance during both years and moves towards the teaching indicator, standing out for the highest rate of change observed (4.86). Despite these movements, ESPE does not achieve an outstanding representation. In contrast, EPN modifies its trajectory in the direction of the industry indicator, thanks to the higher average achieved (36.6) in this area during the period analyzed. However, this approximation does not translate into a clearly defined representation in the dynamic biplot. This analysis underlines the dynamics of change and adaptation of both institutions, although it reveals the challenges to achieving prominent representativeness in the context of the indicators evaluated in the Times Higher Education ranking.

6. Discussion

The results of this study contribute theoretically to the understanding of how universities in developing countries address specific challenges to improve their global positioning. This analysis complements the existing literature by considering the structural and contextual limitations that hinder equal competition with universities in resource-rich countries. Furthermore, it highlights the need to adapt international strategies to national contexts, providing a framework for future research in similar regions.

The dynamic biplot technique [29] was useful for the study of university performance according to the Times Higher Education ranking indicators, the variables in the Times Higher Education ranking showed strong and direct correlations except the Industry and Research indicators that showed independence.

Industry funding in research is a topic of concern, and studies show conflicting results [32]. There is evidence that industry-funded studies in implantology and rheumatology have similar results to non-industry-funded studies [33] however, research showed a strong and direct correlation between citations, teaching, and research that coincides with the study of the participation of Spanish universities in international rankings [34].

All indicators of THE Ranking showed a correlation with internationalization. The study by Shakirova and Smolnikova [35] found weak, very weak, and slightly negative correlation between the position in the rating and indicators of international

activity of Russian universities, with the strongest relationship observed between the share of joint articles and the place in the rating Uslu [36]. Leal, et al. [37] emphasized that international research, in the form of publication, constitutes the most significant indicator of internationalization for the investigated rankings [35]. Therefore, the overall findings suggest that indicators related to international activity do show some correlation with university rankings [36].

It is important to note that the relationship between perception of quality and research performance is complex and multifaceted. The rankings, ARWU, provide a measure of research performance and are increasingly used as a benchmark for institutional quality [38]. These rankings consider several indicators, including research reputation, publication output, and internationalization, which contribute to the overall ranking scores [39]. The performance of universities in these rankings and the trajectories of indicators and institutions can vary, highlighting the diverse nature of university excellence [40]. Rankings play an important role in shaping the perceptions of stakeholders, including students, academics, funders, and policymakers. However, it is important to consider a variety of factors beyond rankings to fully understand the interplay between perceptions of quality and research performance in the higher education sector.

Additionally, the results of this study show a clear difference in the performance of Ecuadorian universities in the ARWU and THE rankings. In the analysis carried out, the presence of Ecuadorian institutions in the ARWU ranking was not observed. This situation could be attributed to the evaluation criteria used by ARWU, which include indicators such as "Alumni" and "Awards". These focus on the number of alumni and staff members who have been awarded Nobel prizes and Fields medals, as indicated by Schotten, et al. [14] and Szluka, et al. [8].

While some institutions, such as the Universidad San Francisco de Quito, have made significant progress in the Times Higher Education ranking, their performance in the ARWU ranking remains limited. This contrast can be attributed to the different approaches of these rankings: THE evaluates a more diverse set of indicators, such as teaching, internationalization, and industry collaboration, while ARWU focuses on research and high-impact publications. These findings reinforce the idea that Ecuadorian universities have been able to excel in areas related to teaching and international collaboration but face significant challenges in terms of high-impact scientific production, which is crucial for improving their position in ARWU.

These results are consistent with those reported by Fauzi, et al. [21] who suggest that universities in developing countries face structural limitations that prevent them from competing on equal footing in international rankings. On the other hand, Vidal and Ferreira [41] analyze the pressures that rankings exert on universities, a crucial aspect for understanding how Ecuadorian institutions can respond strategically. The analysis by Pinar, et al. [42] and Tuesta, et al. [43] on the weighting of indicators and the economic impact on rankings is particularly relevant for Ecuador, where external economic factors can influence the international perception of its educational institutions.

Similarly, Esparrells [16] highlights that the reliance on publications in local languages and the lack of resources for research are critical factors that affect the performance of Latin American universities in global rankings. Likewise, the findings of this study align with those of Selten, et al. [44] who emphasize the importance of adopting long-term internationalization strategies to ensure continuous improvement in the positioning of universities in rankings such as THE.

The analysis of the results also suggests that the lack of a strategic focus on high-impact scientific production limits the growth of Ecuadorian universities in rankings like ARWU. This phenomenon has been discussed by Sunahara, et al. [18] who indicate that researchers tend to excel in either productivity or in publications in high-impact journals, but rarely in both areas simultaneously. In this context, it is essential for Ecuadorian universities to review their internationalization and academic production policies, not only to increase the volume of publications but also to improve their quality, focusing on higher-impact journals.

In this context, the study of Moskovkin, et al. [45] which focuses on a quantitative analysis of the rankings, and Gómez-Marcos, et al. [46] who question whether a good position in the Shanghai ranking guarantees high academic performance, provide critical points of reflection. In addition, the prospects for improvement in the ARWU rankings discussed by Ebzeeva and Gishkaeva [47] apply to understanding how Ecuadorian universities can advance in these indicators. Finally, the analysis by Safón and Docampo [48] on how reputational bias can influence rankings is significant for Ecuadorian universities seeking to identify and mitigate biases that could affect their rankings.

In Ecuador, with a total of 60 universities, the research reveals that these institutions exhibit modest performance in the five indicators evaluated by the Times Higher Education ranking. Of this group, only 10% manage to position themselves in international scenarios, which underlines limited participation in global prestige rankings. Among the six universities that stand out, San Francisco de Quito University, a private institution, is notable for its focus on internationalization, a significant aspect given that it has been a public policy objective for the Ecuadorian university sector [22]. This finding underscores the gap between the policies implemented and their actual effectiveness in positioning Ecuadorian universities in the global arena, highlighting the need to strengthen strategies that promote greater visibility and international competitiveness. Lastly, for Ecuadorian universities, supporting the long-term development of their researchers through policies that promote research throughout the various stages of their academic careers could be key to increasing their visibility and prestige on the international stage. These efforts will contribute to strengthening the global competitiveness of universities and bridging the gap between implemented policies and their effectiveness in the internationalization of higher education in Ecuador [18]. In the Ecuadorian context, internationalization must go hand in hand with programs that promote social cohesion and local development. Universities play a crucial role in transferring knowledge and technologies to address challenges such as environmental sustainability and reducing social inequality. In this regard, Ecuadorian universities must adapt their research policies to enhance both productivity and the impact of their publications in prestigious journals, thereby strengthening their global positioning.

7. Limitations

Despite the relevance of these findings, it is important to acknowledge some limitations of the study. First, the analysis focused exclusively on the ARWU and THE rankings, which may not provide a complete picture of the academic performance of Ecuadorian universities. The inclusion of other rankings, such as QS, which evaluate a wider diversity of indicators, could offer a more comprehensive view of the global positioning of these institutions. Additionally, it should be noted that the results of this study reflect a short-term perspective; therefore, future studies could adopt longitudinal approaches to evaluate the evolution of university performance across different rankings over time.

8. Recommendations

Fostering the creation of international collaboration networks is essential for sharing resources and best practices among academic institutions. These networks enable universities to access advanced experiences, methodologies, and technologies, thereby enhancing their research and teaching capacities. Additionally, such collaborations increase global visibility and strengthen their participation in high-impact international projects.

Implementing incentive policies to motivate researchers to achieve publications in high-impact indexed journals is crucial. These policies could include institutional recognition, additional funding for future projects, or benefits for professional development. By prioritizing the quality of publications, universities can improve their positioning in international rankings and promote the global impact of their research.

The design of training programs in scientific publishing skills and academic writing in English is a key strategy to overcome linguistic and technical barriers. These programs will not only help researchers effectively communicate their findings but also increase their chances of publishing in prestigious international journals, thereby strengthening the global projection of universities.

Aligning research objectives with national priorities, such as environmental sustainability and technological development, is fundamental to ensuring that universities contribute to the country's progress. This approach ensures that resources and efforts are directed toward areas of significant social and economic impact, promoting solutions that address the specific needs of local communities.

Finally, strengthening partnerships between academia and productive sectors is crucial for promoting the transfer of knowledge and technology to address local challenges. These partnerships not only drive innovation but also enable universities to become key players in sustainable development and the country’s economic competitiveness.

9. Conclusion

The findings of this study, based on the analysis of the performance indicators of Ecuadorian universities in the THE ranking, highlight the need to implement specific strategies to improve their global positioning. In particular, the leadership of the Universidad San Francisco de Quito (USFQ) in internationalization and the growth of the Escuela Politécnica del Litoral (ESPOL) in research stand out as key areas that can serve as models for other institutions in the country.

The results indicate that USFQ leads in internationalization indicators, with an outstanding average of 65.2, while ESPOL has demonstrated notable progress in research, with a positive variation of 9.68%. These differences reflect the importance of strengthening international collaboration networks and prioritizing strategic research areas to improve performance in international rankings. This analysis underscores the need to design specific policies that consolidate and enhance these advancements.

USFQ’s leading position in internationalization highlights the need to replicate its strategies in other universities across the country. This includes expanding academic exchange programs and promoting joint publications with international researchers.

Meanwhile, ESPOL’s growth in research demonstrates that sustained efforts in this area can generate significant impacts on rankings. To consolidate this progress, it is recommended to expand incentives for publications in high-impact journals and to encourage the creation of interdisciplinary collaborations, fostering innovation and scientific development.

However, the limited variation in some indicators, such as teaching and citations, suggests the need to develop more targeted strategies in these areas. This could include mentorship programs for faculty and researchers, as well as the implementation of policies that enhance the quality and visibility of academic publications.

The results of this study not only highlight the importance of global strategies such as internationalization but also underscore the need to strengthen the local impact of Ecuadorian universities. This includes developing research programs that address the country's socioeconomic and environmental challenges, as well as fostering partnerships with key sectors of the national economy.

Finally, the results highlight that universities with a clear focus on specific indicators tend to achieve better outcomes. Therefore, it is recommended that institutions adapt their strategies considering their strengths and the national context, prioritizing applied research that addresses local challenges, such as environmental sustainability, social inclusion, and technological development. These approaches will not only lead to improved performance in international rankings but also have a more significant impact on the country's development.

9.1. Practical Recommendations

Based on these results, it is recommended that Ecuadorian universities:

a) Establish mentoring and collaboration programs for young researchers, encouraging their participation in international projects.

b) Prioritize research areas with high national and international impact to maximize relevance and visibility.

c) Design incentives for publications in high-impact journals and promote international co-authorship.

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