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ANALYSIS OF PRODUCTIVITY IN ECONOMIC, ADMINISTRATIVE AND ACCOUNTING RESEARCH BASED ON GOOGLE SCHOLAR PROFILES: THE CASE OF THE UNIVERSITY OF CARTAGENA.

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Abstract:

This paper analyzes the h-index and its different variations (h5, i10) in programs related to economic, administrative and accounting areas, taking as a case study the Faculty of Economic Sciences, FCE, of the University of Cartagena. A descriptive methodology was used with a sample of 37 teachers; the analysis included the collection of the h-index of each author, considering the academic programs of the FCE. A statistical calculation was performed to address the initial question of the study. In addition to evaluating the h-index, aspects such as academic background, program to which they belong, gender and the most productive author were explored. The study sought to provide a complete understanding of the academic landscape in economic sciences at the University of Cartagena, using the aforementioned methodology and presenting the current state of the indexes according to the theoretical review.

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Keywords. Bibliometric analysis, h-index, measurement, evaluation, performance

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ANÁLISE DA PRODUTIVIDADE DA INVESTIGAÇÃO ECONÓMICA, ADMINISTRATIVA E CONTABILÍSTICA A PARTIR DOS PERFIS GOOGLE SCHOLAR: O CASO DA UNIVERSIDADE DE CARTAGENA

Resumen:

Este trabajo analiza el índice h y sus diferentes variaciones (h5, i10) en programas relacionados con las áreas económica, administrativa y contable, tomando como caso de estudio la Facultad de Ciencias Económicas, FCE, de la Universidad de Cartagena. Se utilizó una metodología descriptiva con una muestra de 37 docentes; el análisis incluyó la recolección del índice h de cada autor, considerando los programas académicos de la FCE. Se realizó un cálculo estadístico para responder a la pregunta inicial del estudio. Además de evaluar el índice h, se exploraron aspectos como la formación académica, el programa al que pertenecen, el género y el autor más productivo. El estudio buscó proporcionar un conocimiento completo del panorama académico en ciencias económicas en la Universidad de Cartagena, utilizando la metodología mencionada y presentando el estado actual de los índices de acuerdo con la revisión teórica.

Palabras clave: análisis bibliométrico, índice h, medición, evaluación, rendimiento

ANÁLISIS DE LA PRODUCTIVIDAD EN LA INVESTIGACIÓN ECONÓMICA, ADMINISTRATIVA Y CONTABLE A PARTIR DE LOS PERFILES DE GOOGLE SCHOLAR: EL CASO DE LA UNIVERSIDAD DE CARTAGENA

Resumo:

This paper analyzes the h-index and its different variations (h5, i10) in programs related to the economic, administrative and accounting areas, taking as a case study the Faculty of Economic Sciences, FCE, of the University of Cartagena. A descriptive methodology was used with a sample of 37 teachers; the analysis included the collection of the h-index of each author, considering the academic programs of the FCE. A statistical calculation was performed to answer the initial question of the study. In addition to evaluating the h-index, aspects such as academic background, the program to which they belong, gender and the most productive author were explored. The study sought to provide a complete understanding of the academic landscape in economic sciences at the University of Cartagena, using the aforementioned methodology and presenting the current state of the indexes according to the theoretical review.

Key words: bibliometric analysis, h-index, measurement, evaluation, performance.

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1. INTRODUCTION:

One of the main objectives of universities and research centers is to positively impact society through the results of their research. For this it is necessary to have a body of researchers with academic productivity, but at the same time these documents must generate impact, where this variable is measured, among other ways, by the number of citations received by a given document. To measure both variables -productivity and impact- several metrics have been developed, but these generally reviewed these two items separately until the h-index was developed. According to Martín-Martín et al., (2018), this index is one of the most complete metrics as it provides a global view of both the productivity and the impact that a researcher has. This index is calculated by WOS, Scopus and Google Scholar. This paper is based on the analysis made of this index by the latter platform taking as a case study the researchers in the Faculty of Economics of the University of Cartagena,

In this sense, the question that guides this research arises: what is the current state of the different indexes of academic productivity in the area of economic, administrative and accounting sciences, taking as a case study the Faculty of Economic Sciences of the University of Cartagena? In this way, this document performs an analysis of the h-index and its different variations (h5 index, i10 index) crossing it with demographic aspects of the researchers such as their gender, education, among others, and aspects related to the type of publication. The document is structured as follows: a review of the literature on the main productivity and impact metrics is presented, followed by the methodology and finally the results and conclusions.

2. THEORERICAL REVIEW :

The metrics for evaluating the scientific production of researchers, journals, and academic institutions are of vital importance because they allow the influence and impact of a scientific community's research to be analyzed. A brief theoretical review of each of these metrics is presented below:

2.1 The h-index: was proposed by the scientist Jorge Hirsch in 2005 at the University of California with the purpose of having an indicator that would allow measuring both the quantity and the impact of scientific production. Over time, the h-index has been consolidated as a system for scientific quality and dissemination that acts

2.2 as an indicator of productivity and as an impact evaluator. According to Arencibia & Carvajal (2008), the main characteristics of the h-index include the following:

It is easy to calculate from a mathematical point of view.

It can be applied at any level of aggregation, i.e., both at the individual level and at the level of groups or institutions.

It tends to assess scientific effort over the entire academic career, although it can also be used to evaluate specific periods of time.

It is a robust indicator, which means that an increase in the number of articles published by an author does not necessarily have an immediate impact on the value of the H-index.

A highly cited article does not directly affect the value of the H-index, just as poorly cited articles do not influence its calculation.

Although the h-index has gained popularity, it has some limitations that may bias a researcher's impact assessment. This is recorded by Miró & Burbano (2013), based on Beltrán (2006) as noted below:

Table 1. Some limitations in the use of the h-index.

The h-index tends to disadvantage authors who prioritize quality over quantity.
The h-index tends to benefit scientists with longer careers, while it disadvantages those who are newer to the field
The h-index does not allow comparing researchers from different areas due to different publication and citation habits in each field.
The h-index does not consider the nature of the citations of a document, since it does not distinguish whether they are complimentary or critical of the article.
The h-index does not consider the quality of the journals in which the papers are published.
The h-index does not take into account the quality of the journals they cite.
The h-index also has technical limitations: homonymy problems, signature variants, typographical errors and lack of standardization.
The h-index of a researcher may vary according to the database used for its calculation (WoS, Scopus or Google Scholar).

Source:(Miró & Urbano, 2013).

Based on these limitations of the index studied, the evolution and relevance as a metric of scientific impact are highlighted, as well as the proposals for variations that seek to improve its accuracy and fairness in the evaluation of academic research. In order to address variations of the h-index and thus improve its impact assessment capabilities, several variations have been proposed among them:

2.3. The g-index: is a bibliometric metric proposed by Leo Egghe in 2006 (Delgado-López-Cózar et al., 2014) as a variant of the h-index. The "G" index is proposed as an alternative measure to the h-index to assess the scientific impact of researchers, addressing some of its limitations. To calculate it, a researcher's publications are ordered by the number of citations they have received, from highest to lowest. Numbers are then assigned to each position and two additional columns are created: one for the cumulative total of citations and one for the square of the corresponding position. The "G" index is determined at the point where the cumulative total of citations equals or exceeds the square of the position number. That is, an author has a "G" index if, considering his or her "G" most cited articles, the total number of cumulative citations for those articles is greater than "G" squared (ULPGC, 2024).

An author has an index of "G" when considering the "G" most cited articles by that author, the number of citations accumulated by these "G" articles is greater than "G" squared.

According to Arencibia & Carvajal (2008), the g-index is similar in its fundamental idea to the h-index, but it does not consider all the publications of a

researcher, but only considers the citations received by the first most cited papers. In other words, the g-index is a metric that seeks to address the limitations of the h-index, in other words, by taking into account the distribution of citations in the publications, the g-index is the maximum number of citations that the researcher's most cited articles have. By employing the g-index, it seeks to avoid overvaluing researchers who have a large number of poorly cited publications. Instead, it focuses on the researcher's most influential papers, which provides a more balanced measure of the impact of his or her research. This index has been widely used in the field of scientific evaluation and has proven to be a useful tool to complement the h-index and obtain a more complete and equitable view of the impact of an individual's research. In addition, the g-index is calculated by ordering the researcher's publications according to the number of citations received from highest to lowest and then finding the point at which the number of citations is equal to or greater than the number of papers considered (g).

2.3 h5 index: this index takes into account only the citations received in the last five years, highlighting the most recent impact of research (Castro et al., 2020).

2.4 Impact factor (IF), proposed by Eugene Garfield and Irvin Sher in 1963, is one of the most widely used bibliometric indexes in the scientific community; it measures the frequency with which articles from a specific journal are cited in other articles during a given period of time, making a comparison of journals and evaluating the relative importance of a specific journal within the same scientific field. The IF is subject to bibliographic parameters that are not related to quality. The IF is calculated by taking the recent citations of the articles published in the journals and dividing by the total number of recent articles (Beltran, 2006).

$$FI = \frac{N° \ Citas \ recibidas \ de \ artículos \ publicados \ los \ 2 \ años \ previos}{N° de \ artículos \ citables \ publicados \ los \ 2 \ años \ previos}$$

** The SCI considers original articles, clinical notes and reviews as citable.*

The strengths of the Impact Factor are notable and can be summarized as follows:

- Easy to calculate: it is calculated very simply, as a ratio between two numbers. This simplicity makes it easy to understand and has led to its wide acceptance in the scientific community.

- Objectivity and Transparency: The IF is calculated by the Institute for Scientific Information (ISI) and its results are published annually in the Journal Citation Reports (JCR). This gives it a high degree of objectivity and transparency.

- Journal Comparison: The IF becomes a valuable tool to compare the impact of different journals objectively. This is especially useful in decision making related to research and information dissemination, given that there are a large number of journals available. For example, educational institutions can use the IF to select the most influential journals for their subscriptions, and researchers can submit their work to the journals with the highest IF in their respective fields.

- Tracking impact over time: The annual calculation of the IF makes it possible to track how the impact of a journal evolves as time goes by. This is reflected in the way in which articles published in the journal generate a greater impact on the scientific community over time, which can be considered an indicator of the journal's growth (Zarate B & Cerda L, 2007).

From a conceptual point of view, the number of citations made to a journal's articles is considered to be a measure of its "impact" because it reflects the influence that these articles have had on the scientific community. This idea comes from Garfield, (2005) who argues that when a researcher cites an article in his work, he is indicating in some way that this article has been relevant and influential for his research. Therefore, if this idea is applied to all the articles in a journal and all the citations they have received are added up, a measure of the influence that the journal has had on the scientific community is obtained. In other words, the number of citations reflects the cumulative contribution and impact of a journal in the advancement of scientific knowledge.

The weaknesses of the Impact Factor (IF) have been highlighted in the international literature, especially in its ability to reflect the quality of a journal and its articles. These weaknesses are related to biases in its construction. Some of the most relevant ones are presented below:

Selection bias: The IF is affected by the selection of journals that are part of the Science Citation Index (SCI), representing less than a quarter of all existing journals. This fact implies that many valuable journals and papers are excluded from the IF calculation. In addition, some scientific areas are under-represented in the SCI, which is detrimental to journals specialized in these areas (Beltrán, 2006).

Strategies to increase the IF: Some journals adopt strategies to artificially increase their IF, such as publishing a large number of review articles or very long articles, which tend to be cited more frequently. In addition, offering free access through the Internet can increase visibility and, therefore, the number of citations, without necessarily improving the quality of the articles (Beltrán, 2006).

Preference for the English language: The SCI favors journals in English, which may hinder the position of journals in other languages. This dilemma poses a conflict between the desire to globalize knowledge through English and the objective of providing scientific information in the original language to facilitate access at the national level. Some journals adopt mixed approaches to address this issue (Beltran, 2006).

Bias in the IF calculation: The IF calculation itself is biased, since the denominator includes only "citable" articles (such as research and reviews), while the numerator includes all types of documents, such as editorials. The deliberate inclusion of these documents, especially when they generate controversy or when many self-citations are made, can artificially increase the IF of a journal (Beltrán, 2006).

For the authors, this indicator is of utmost importance, since publishing their work in a major journal (IF) generates a greater dissemination of their work, which allows the author to increase his prestige and visibility in the academic community. Likewise, it

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should be taken into account that for an author it is necessary to have his work evaluated by the scientific community, this being a necessary exercise, and in this way university researchers receive benefits and recognition through the evaluations of institutional bodies and Min Ciencias. Table 2 presents other limitations of this index.

Table 2. Limitations in the use of the impact factor

The IF can be affected by inappropriate self-citation practices.
The IF benefits journals with few and large articles, and those with immediate informative value (research fronts), rather than journals that publish archival knowledge articles.
The IF does not allow comparing the values of journals from different disciplines.
The calculation of the IF takes precedence over literature that has a high level of obsolescence.
The IF is affected by the visibility and accessibility of the journal and its articles.
The typology of published articles influences their citation. Original and review articles are the most cited types of papers; clinical notes and letters to the editor are cited very occasionally.
The IF of a journal depends on the field of research to which it belongs.
Journals with a high frequency of publication (many issues per year) generate a large number of self-citations and, therefore, a higher IF.
The citation impact of a research field is directly proportional to the number of journals included in the catalog and the average number of references included per article.
Citation habits and dynamics can be very different from one research field to another.
The IF does not take into account the quality of the journals in which the citation appears.

Source:(Miró & Urbano, 2013) pag.373.

3 METHODOLOGY

The document follows a quantitative, descriptive, non-experimental approach where the Google Scholar platform was used as a source, identifying and consolidating the status of the number of publications, the research trends of the last five years, and the most cited authors. The sample corresponds to 37 professors from the programs of economics, administration, industrial administration and accounting of the faculty of economic sciences of the University of Cartagena and the data were taken in June 2023. For the analysis, each of the indexes presented in the theoretical review is calculated for the different programs of the FCE.

4. RESULTS:

Within the framework of this study, an exhaustive analysis of the profile of 37 researchers belonging to the Faculty of Economic Sciences of the University of Cartagena was carried out. During this process, data were extracted from the h-index of each author, considering the various academic programs that make up the faculty. Subsequently, the corresponding calculation was made by means of descriptive statistics at the faculty level. This methodology was implemented with the purpose of addressing the initial question: what is the current state of the h-index in the area of economic, administrative and accounting sciences, taking as a case study the

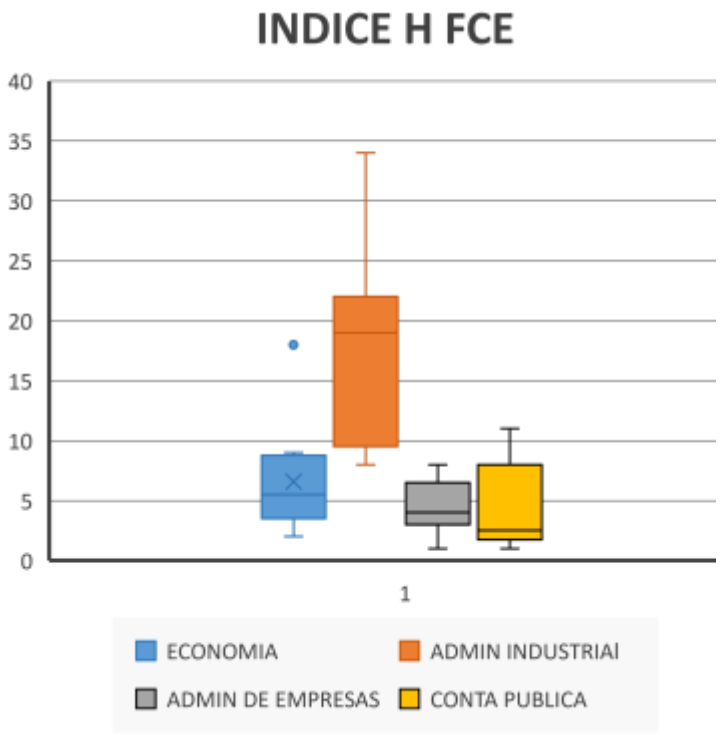
Faculty of Economic Sciences of the University of Cartagena? As a continuation of this analysis, other fundamental aspects linked to the authors investigated were explored, such as their academic background, the academic program to which they belong, gender and who is considered the most productive author. The current status of the different indexes presented in the theoretical review for the case study is presented below.

4.1. h-index

In relation to the h-index, the first graph highlights that the industrial administration program exhibits the best results at the group level in this specific index. In this program, it was observed that 50% of the professors have an h-index between 22 and 12. In contrast, in the economics program, this same percentage is between 5 and 9, as detailed in Table 1. These visual results offer a clear perception of the disparities in h-indexes among the different academic programs of the faculty.

Graph 1.

Box Plot Index h per program FCE



Note: This Box Plot graph does not show an outlier for the economics program, which is (76), this being the maximum value for this program, as shown in Table 4.

Table 3. Distance programs

PROGRAMS	INDEX H
Tourism and Hotel Administration	25
Business Administration-Distance	23

Source: Google Scholar

Table 4. Descriptive statistics h index FCE

	ECONOMY	INDUSTRIAL MANAGEMENT	BUSINESS ADMINISTRATION	PUBLIC ACCOUNTING
Min	2	8	1	1
Q1	5	12,5	3	2
MEDIUM	6	19	4	2,5

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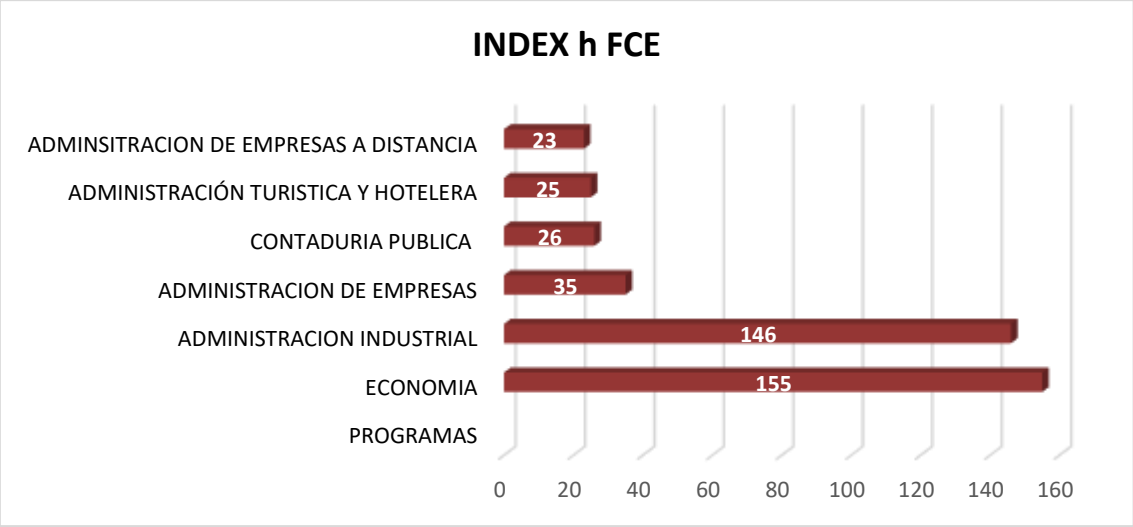
Q3	9	22	5,5	6
Max	76	34	8	11

Source: Google Scholar

The descriptive statistics of the h-index show how the economics program presents a greater range and therefore a greater variation in the production of its faculty. Industrial administration is the most homogeneous.

Graph 2. Sum of the FCE h-Index by program



Source: Google Scholar

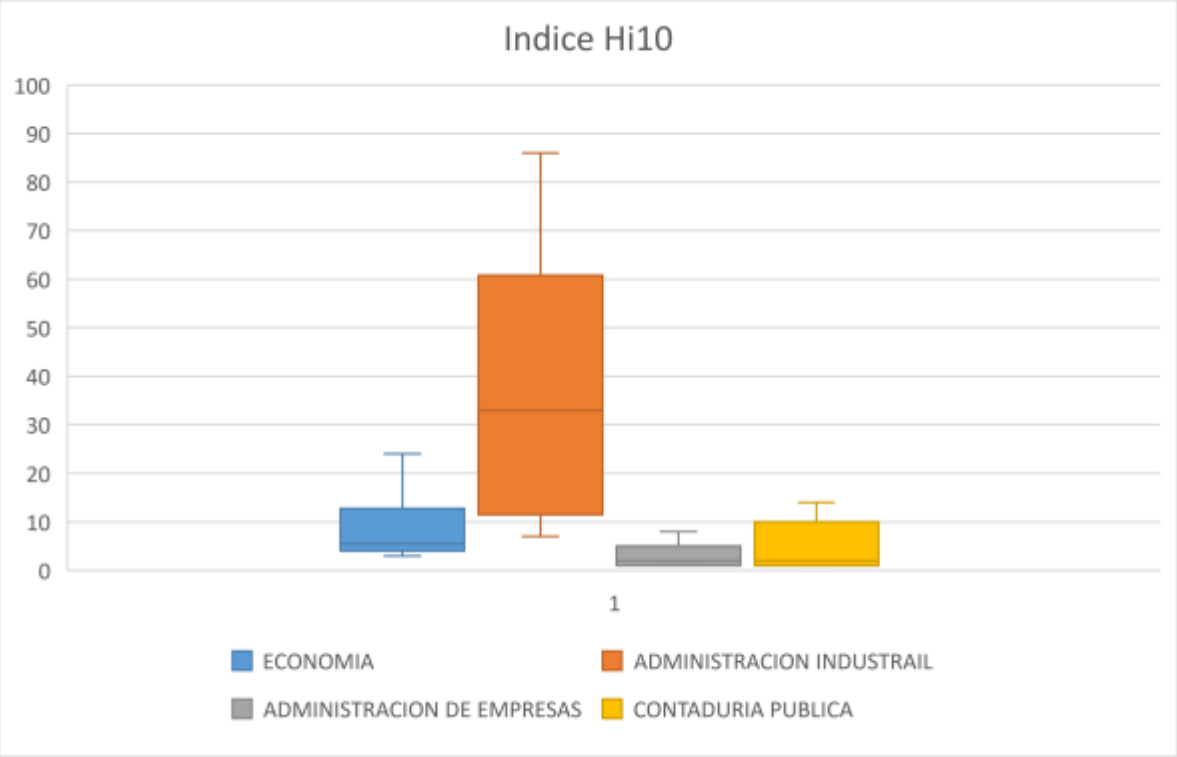
4.3. i10 index: This is the number of articles that have received at least ten citations and is therefore an indicator of impact rather than productivity. The industrial administration program stands out in this index.

Table 5 Descriptive statistics i10 index FCE

	ECONOMY	INDUSTRIAL MANAGEMENT	BUSINESS ADMINISTRATION	PUBLIC ACCOUNTING
Min	3	7	1	1
Q1	4	15	1	1
MEDIUM	5	33	2	2
Q3	7,5	58,25	4	6
Max	181	86	8	14

Source: Google Scholar

Graph 3. i10 index



Source: Google Scholar

Note: For the Hi10 index there is an outlier for the economics program with a figure of 181, this is not evident in the previous Box Plot graph, in order to better visualize the other graphs of the different programs of the FCE.

Table 6. h10 Index Programs

PROGRAMS	Hi10 INDEX
TOURISM AND HOTEL MANAGEMENT	58
BUSINESS ADMINISTRATION-DISTANCE	40

Source: Google Scholar.

Total number of articles and citations

Programs	Researchers	Scientific production	
Business administration	8	Articles	21
		Dates	775
Remote admin	1	Articles	40
		Dates	2.103
Tourism and hotel management	1	Articles	58
		Dates	2.803
Industrial admin	8	Articles	308
		Dates	16.105
Public accounting	6	Articles	24
		Dates	944
Economy	13	Articles	247
		Dates	137.888

Source: Google Scholar

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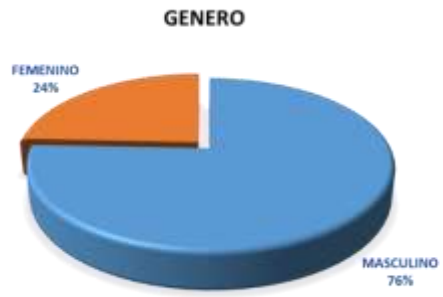
Table 8. Scientific production

SCIENTIFIC PRODUCTION OF THE FACULTY OF ECONOMIC SCIENCES BY PROGRAM 2017-2021.							
PROGRAM	**2017**	**2018**	**2019**	**2020**	**2021**	**TOTAL**	**%**
Economy	0	104	51	49	14	362	58%
Industrial Management	34	40	31	35	15	155	25%
Business Administration	26	21	17	8	5	77	12%
Accounting	7	2	4	1	0	14	2%
Tourism and Hotel Business Administration	0	3	8	3	0	14	2%
TOTAL	**212**	**173**	**111**	**96**	**34**	**626**	1

The following graphs present the researchers according to their training and gender characteristics.

Figure 4. Gender and Training



In terms of gender, 76% of the researchers are male, while 24% are female. In parallel, the academic background of these researchers is revealed, showing that 68% have a PhD degree, while 32% have a Master's degree. This diversity of academic background demonstrates the presence of experts with extensive knowledge and skills in the group of researchers. Regarding the most productive author of the Faculty of Economic Sciences (FCE), among the 37 researchers, 2.7% stand out as the most productive, presenting an h-index of 76, hi10 of 181 and total citations of 135,012. This data highlights the significant contribution and outstanding productivity of this particular researcher.

5. CONCLUSIONS

The h-index, an indicator that has gained relevance in recent years in the research community, has become an essential tool for measuring the quality of researchers' output. It provides a more complete measure of the real impact of their work in the scientific community.

As can be seen, the Industrial Administration and Economics programs are those with the highest h indexes. When considering the articles published by the different researchers of the (FCE), it is evident that the highest production of articles is found in the Industrial Administration program, with a total of hi10 equivalent to 308, representing 44% in relation to the other programs of the faculty. This program has 7 PhDs and one master's degree, as well as 7 male researchers and one female researcher.

In terms of citations, the Economics program stands out, contributing 85% of the citations, equivalent to 137,888. On the other hand, the Industrial Administration program, with an article production of 44%, represents 308 articles in the last 5 years (2017-2021).

In short, by evaluating the scientific production of the FCE, we offer a comprehensive view of the quality and quantity of publications, as well as the influence that researchers have had, enriching knowledge in various areas.

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