

MATHEMATICAL SKILLS IN LATIN AMERICAN STUDENTS REGARDING DECISION MAKING

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Abstract: *Through this document, it was possible to analyze the main characteristics of the volume of scientific production regarding the study of the variables Decision making, Finance, students. A bibliometric analysis was proposed to analyze details such as Year of Publication, Country of Origin of the publication, Area of Knowledge in which the published research is carried out and the Type of Publication most frequently used by the authors of each document published in high-impact journals indexed in the Scopus database during the period between 2017 and 2022. Among the main findings, it was possible to determine that, for the execution of the different research methodologies, the report of 18 scientific documents related to the study of Decision Making, Finance, students was achieved. The maximum number of publications made in a year was 5 papers submitted in 2022. The country of origin of the institutions that reported the highest number of records in Scopus was Brazil with 8 documents. The area of knowledge with the greatest influence at the time of executing the research projects that resulted in scientific publications was Social Sciences, which contributed great theoretical material in a total of 7 publications, same number presented by the area of Business Administration and Accounting. Finally, the type of publication most frequently used to publicize findings from the analysis of the aforementioned variables was the Article, which represented 78% of the total scientific production.*

Keywords: *Decision making, Finance, students*

1. INTRODUCTION

Quantitative reasoning consists of the ability to analyze and understand situations that arise from decision-making that require skills that develop mathematical skills; Skills that are acquired through the academic training of every human being.

In this order of ideas, it is also inferred that financial decisions are the product of the sociodemographic conditions of the human being and the context in which they are presented, however, the study of the variables of this (Lusardi & Mitchell, 2014) academic document, are not limited only to these external conditions, but also affect the cognitive abilities and the intrinsic characteristics of the human being, such as personality, for financial decision making.

And epistemologically mathematics as a science, is a conduit to mediate social activity, to make informed judgments of it, use them and relate to the world as we know it (Organisation for Economic Co-operation and Development, 2009).

The general objective of this article is to determine the relevance of quantitative reasoning in the population that corresponds to the level of higher education in Latin American countries, in relation to financial decision-making. Dichotomous study, focused on the analysis of the causes of indebtedness and its tolerance; on the occasion of the consumption of goods and services by the consumer (Denegri,

2007). For this reason, this article seeks to describe the main characteristics of the compendium of publications indexed in the Scopus database related to the variables Decision making, Finance, students, as well as the description of the position of certain authors affiliated with institutions. during the period between 2017 and 2022.

2. GENERAL Objective

Analyze from a bibliometric approach, the characteristics in the volume of scientific production related to Decision making, Finance, students, registered in Scopus during the period 2017-2022.

3. METHODOLOGY

This article is carried out through a mixed orientation research that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of scientific production corresponding to the study of Decision making, Finance, students.

On the other hand, examples of some research works published in the area of study indicated above are analyzed from a qualitative perspective, starting from a bibliographic approach that allows describing the position of different authors against the proposed topic.

It is important to note that the entire research was carried out through Scopus, managing to establish the parameters referenced in *Figure 1*.

3.1 Methodological design



Figure 1. Methodological design

Source: Authors.

3.1.1 Phase 1: Data collection

Data collection was executed from the Search tool on the Scopus website, where 16 publications were obtained from the choice of the following filters:

- TITLE-ABS-KEY (economic AND analysis, AND accounting AND analysis, AND business AND competitiveness) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017))

TITLE-ABS

KEY (decision AND making, AND finance, AND students) AND (EXCLUDE (PUBYEAR , 2023)) AND (LIMIT-TO (AFFILCOUNTRY , "Brazil") OR LIMIT-TO (AFFILCOUNTRY , "Colombia") OR LIMIT-TO (AFFILCOUNTRY , "Mexico") OR LIMIT-TO (AFFILCOUNTRY , "Peru") OR LIMIT-TO (AFFILCOUNTRY , "Chile") OR LIMIT-TO (AFFILCOUNTRY , "Ecuador") OR LIMIT-TO (AFFILCOUNTRY , "Uruguay") OR LIMIT-TO (AFFILCOUNTRY , "Venezuela"))

- Published documents whose study variables are related to the study of Decision Making, Finance, students.
- Works published in journals indexed in Scopus during the period 2017-2022.

- No distinction by country of origin
- Without distinction in areas of knowledge.
- Regardless of type of publication.

3.1.2 Phase 2: Construction of analysis material

The information collected in Scopus during the previous phase is organized and subsequently classified by graphs, figures and tables as follows:

- Co-occurrence of Words.
 - Year of publication.
 - Country of origin of the publication.
 - Area of knowledge.
 - Type of Publication.

3.1.3 Phase 3: Drafting of conclusions and outcome document

In this phase, we proceed with the analysis of the results previously yielded resulting in the determination of conclusions and, consequently, the obtaining of the final document.

4. Resultados

4.1 Co-occurrence of words

Figure 2 shows the co-occurrence of keywords found in the publications identified in the Scopus database.

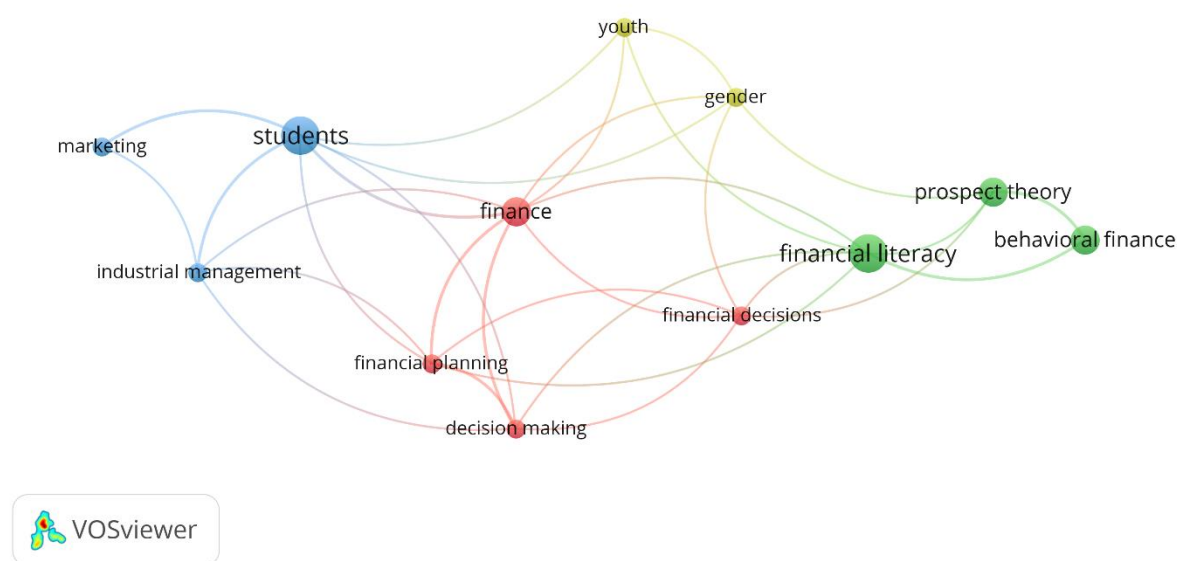


Figure 2. Co-occurrence of words

Source: Own elaboration (2023); based on data exported from Scopus.

Finance was the most frequently used keyword within the studies identified through the execution of Phase 1 of the Methodological Design proposed for the development of this article. Financial decisions are also among the most frequently used variables, associated with the variables Decision Making, Students, Marketing. The university students are the ones who become the main objective within the analysis proposed in the methodology of this research, since they are considered a vulnerable population for the management of finances, due to the little knowledge acquired and the scarce experience in the management of quantitative reasoning itself. In this order of ideas, it is hardly logical that words such as financial education, behavioral finance and decision making, are framed with predominated presence within the study, since from their lack of knowledge, the

aforementioned vulnerability within Latin American students emerges, shortcomings that if not addressed, really studied. and applied in everyday life, lead not only to the financial failure of the aforementioned subject, but also generate the presence of destabilizing emotional states of the personality such as stress, anxiety, depression and even suicidal behaviors.

However, the conduction and balance between the words with more representation within the research object of search in Scopus database, in the application to reality must generate a well-being and more optimal results when maximizing the application of quantitative reasoning in the real world.

4.2 Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year of publication.

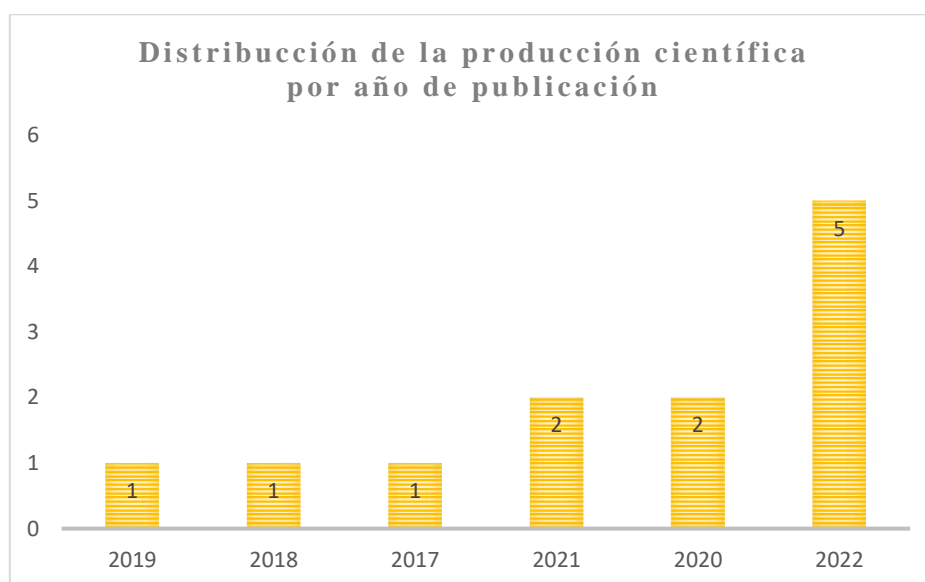


Figure 3. Distribution of scientific production by year of publication.

Source: Own elaboration (2023); based on data exported from Scopus

In observance of Figure 3 corresponding to this numeral, it is evident through the distribution of scientific production by year of publication, that the validity with the highest number of publications registered in the Scopus database was in the year 2022, with a total of 5 documents published in journals indexed in said platform, among which it is important to emphasize the article entitled "Financial modeling in turbulent scenarios: A didactic for the financial valuation of companies and projects", (Cárdenas, Castilla, & de Mogollón, 2022) whose objective was to analyze the years of experience in the different levels of schooling (courses of finance, undergraduate, graduate) of mixed groups of students of the Faculty of Engineering and Business School of the Technological University of Bolívar, Cartagena in the country of Colombia, to determine the skill of the current professional in the development of the management of large volumes of information in the different contexts and vicissitudes of today's world, Finding that it is of vital importance, the study of the different areas of knowledge, especially those of logic-mathematics, for the construction of an optimal quantitative reasoning and the application of projected economic models with a financial valuation of support for the maintenance of a company or project, this conclusion is born from the use of different didactic approaches and the use of tools such as spreadsheets, etc, which are of great need for planning from the extraction of local information, that is, the values consigned in a real scenario and that after being duly justified are used for the formulation and execution of the data thrown.

On the other hand, it is found in the analysis of the variables of this document that the years 2020 and 2021, made contributions in an equal number of publications with 2, which are of great importance for the analysis proposed in the methodological design of this work.

4.3 Distribution of scientific production by country of origin.

Figure 4 shows how scientific production is distributed according to the nationality of the authors.

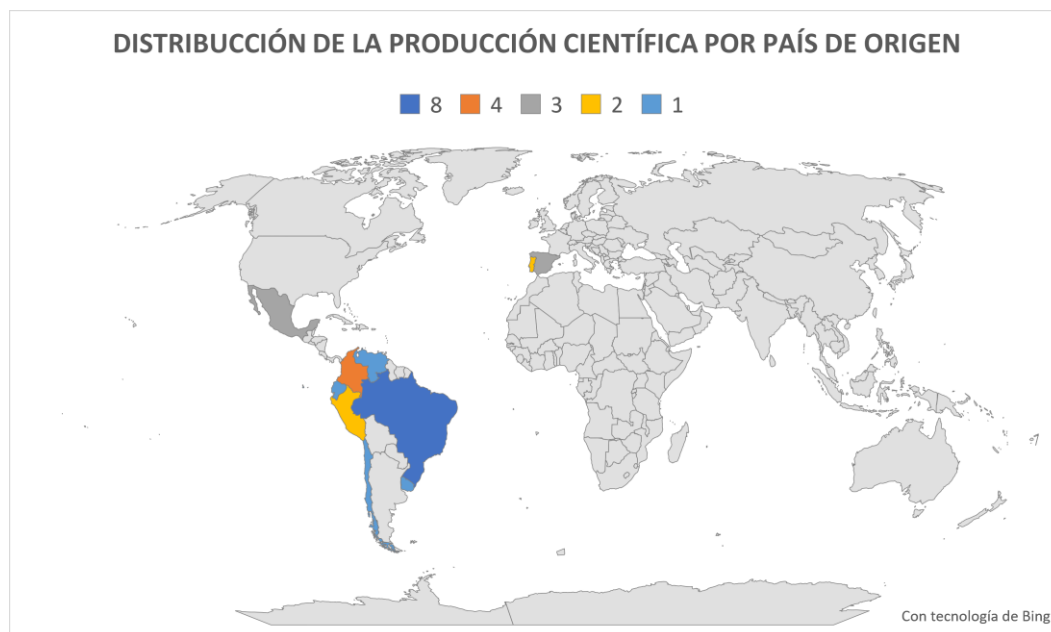


Figure 4. *Distribution of scientific production by country of origin.*

Source: Own elaboration (2023); based on data provided by Scopus.

Within the distribution of scientific production by country of origin, records from institutions were taken into account, establishing Brazil, as the country of that community, with the highest number of publications indexed in Scopus during the period 2017-2022, with a total of 8 publications in total. In second place, Colombia with 4 scientific documents, and Mexico occupying the third place presenting to the scientific community, with a total of 3 documents among which is the article entitled "Influence of the level of educational progress and gender in financial decision making: an approach from the prospect theory" (de Guevara, Paredones, Varas, & Mejía, 2020), whose objective was focused on studying the influence on financial decision-making, in aspects such as educational level and gender identity, for the above, it was required the application to six hundred (600) students of the seminal experiment of Kahneman and Tversky (1979), of the data thrown from the applied experiment, proceeded to the analysis of them by: 1) the independence test 2) the nonparametric Kruskal-Wallis test; and 3) the nonparametric Mann-Whitney test. Of which, it was concluded, that financial decisions presented independence, based on the empirical evidence of the Prospect Theory, depending on the variables used for this study, likewise it was evident that women take more into account the aversion of risks when making a financial decision and that the level of education has little to do with determining actions that lead to the procurement of goods and services.

4.4 Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.

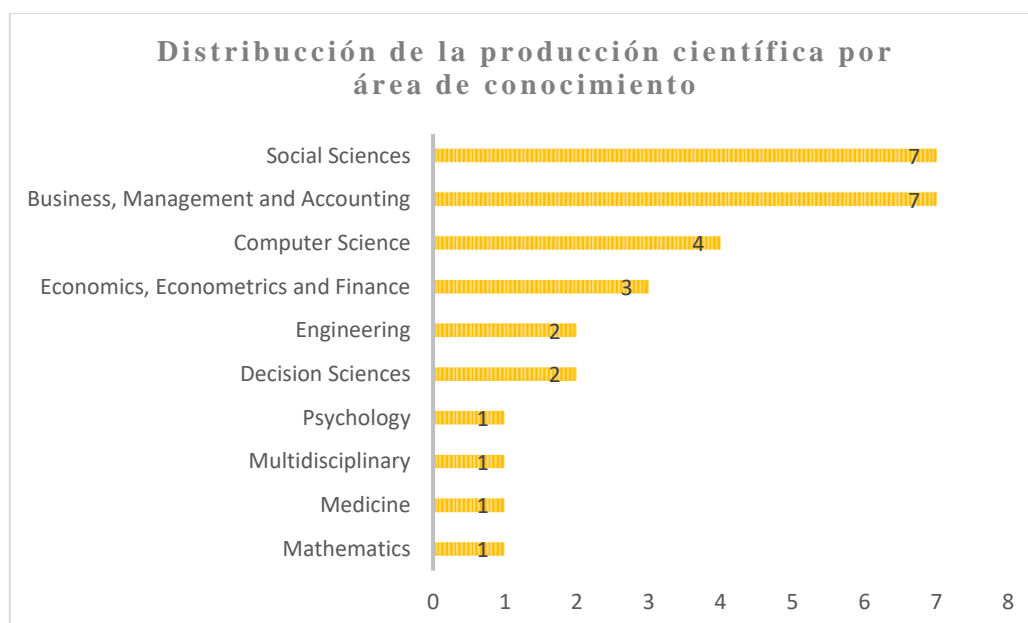


Figure 5. Distribution of scientific production by area of knowledge.

Source: Own elaboration (2023); based on data provided by Scopus.

Social Sciences was the area of knowledge with the highest number of publications registered in Scopus with a total of 7 documents that have based their methodologies on the variables of decision making, finance and students. In second place, Business, Administration and Accounting with equal number of articles and Computer Science in third place with 4. The above makes sense, since, for the required analysis, it is necessary to converge the different areas of knowledge, to interpret jointly and from the orbit of the corresponding perspectives, the achievement of theories, data and conclusions. In this order of ideas, it is necessary to highlight the article of the area of knowledge of Economics, Econometrics and Finance, entitled "How do low-income university students deal with risk and time preferences in Brazil? , (dos Santos, Klotzle, da Gama Silva, & Pinto, 2022) whose purpose consisted of the analysis of 54 low-income Brazilian students and 5940 draws, through the application of prospect theory and especially to the distortion of probability of the agents as one of the fundamental pillars of the same and that also finds its foundation in

"the theory of prospective and hyperbolic discounting and used value, weighting and quasi-hyperbolic discount functions within a maximum likelihood methodology to estimate risk and time parameters with sociodemographic variables, and with the moderating variable Financial Literacy Index, in a private environment"(dos Santos, Klotzle, da Gama Silva, & Pinto, 2022)

For which it is concluded that the vulnerable population subjected to the stages of the theory indicated in the Brazilian country and that belongs to an emerging economy, do not present great disparity in relation to variables such as risk aversion and loss between rural regions of first level countries and with developing economies, Likewise, it is observed that of the population analyzed and that thanks to the socio-economic conditions in which they are returned, they have preference to the present as a determining factor in quantitative reasoning, leading to better financial decision making, however, with the application of studies of this nature, it is undeniable to conclude that a better financial education could lead to a Less distortion of probability, likewise the application of financial literacy in low-income students and their study is an important gateway to configure national plans of great importance for mitigation in the parameters of risk and time.

4.5 Type of publication

In the following graph, you will observe the distribution of the bibliographic finding according to the type of publication made by each of the authors found in Scopus.



Figure 6. *Type of publication.*

Source: Own elaboration (2023); based on data provided by Scopus.

The type of publication most frequently used by the researchers referenced in the body of this document was the Journal Article with 78% of the total production identified for analysis, followed by Conference Articles with 22%. In this last category, the one entitled "Empirical study on financial knowledge in high school students in Veracruz" stands out, (Moreno-Garcia, Garcia-Santillan, & Navarrete, 2022) whose main objective was to determine the structure of variables that determine the level of knowledge possessed by the students of the Mexican country belonging to secondary schools, about the quantitative reasoning for financial decision making and everything that that implies (Income, flow management, savings, investment, credit and spending), for that an average of 100 students who were part of the Boca del Río high school, Veracruz, were used, to which the test designed by Contrera - Rodriguez was applied, a study that within its conclusions showed that the instrument used has a relatively low Cronbach's alpha (0.597), which is used to determine the measurement and quantification of psychological variables of the human psyche, on the other hand it was also determined that the variables not being identity configured data, which could be measured through a factor analysis of data component, establishing that there is no gender difference in decision making. In this sense, it is inescapable to infer that financial education should be established as mandatory in educational institutions in Latin American countries, in order to contribute to their future inclusion in the financial system.

5. CONCLUSIONS


Through the bibliometric analysis carried out in the present research work, it was established that Brazil was the country that has the largest number of records published for the variables Decision Making, Finance, Students, in order to know the impact of providing early financial education in educational institutions in Latin American countries, to reinforce an optimal quantitative reasoning in financial decision making with a total of 8 publications in the Scopus database. In the same way, it was established that the application of theories framed in the area of Social Sciences, as an area of knowledge were the most frequently used in the measurement of these variables as a starting point to determine the indices that determine the scope of the levels in academic institutions at the Latin American level. to face financial challenges in the real world and what it means to know, analyze and determine decisions of the same nature consciously from a knowledge of the facts. This type of conclusions required the observance of internal and external factors, ranging from the evaluation of personality traits, to the cognitive abilities of the human being, reasoning capacity according to gender and the development of the socio-demographic contexts in which the population groups operate.

In this sense, it is preponderant to highlight the importance from the institutional point of view and of the authorities of a political nature of Latin American countries with emerging economies in raising awareness from their policies of early inclusion in learning dogmas; Financial education, as a resource for a more complete understanding of the world in which we live, optimize decision-making, be responsible citizens and get rid of the manipulation of the system, as the bibliometric analysis proposed in this scientific document, there are still inadequacies on the part of the corresponding entities to deepen, deepen and diversify this topic, which represents a positive change for the dynamism of the economies at the Latin American level and of course worldwide, due to the globalization of the new news and the synergy of the economy in general.

However, the application of the above, helps in every point of view to improve intrinsic personality traits in a particular way in each one, which affect their behavior in the development of actions and certain competences of a logical-mathematical nature and their reasoning as a backbone for decision-making from the particular as an active entity in society, The knowledge of the studies proposed throughout this document represent the starting point for a quantitative reasoning of another level.

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