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CONTRIBUTION OF FOOD SECURITY IN LATIN AMERICA TO SUSTAINING WORLD FOOD TRADE

Erika Quiñónez-Alvarado¹, Cristian Fernan Muñoz-Muñoz², Felipe Lozano-Rodríguez³, Ramiro Campos-González⁴, Carla Andrade-Arteaga⁵, Clarkent Mackay-Castro⁶, Katia del Rocío Ruiz-Molina⁷, Guido Poveda-Burgos⁸

Abstract

A documentary review was carried out on the production and publication of research papers related to the study of the variables FOOD SAFETY, FOOD INDUSTRY and SUSTAINABILITY. The purpose of the bibliometric analysis proposed in this document was to know the main characteristics of the volume of publications registered in the Scopus database during the period 2017-2022 by Latin American institutions, achieving the identification of 48 publications. The information provided by this platform was organized through graphs and figures categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics have been described, the position of different authors towards the proposed theme is referenced through a qualitative analysis. Among the main findings made through this research, it is found that Brazil with 19 publications was the Latin American country with the highest scientific production registered in the name of authors affiliated with institutions of that nation. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material regarding the study of Food Security in Latin America and sustainability in world food trade was Agriculture and Biological Sciences with 27 published documents, and the Type of Publication most used during the period indicated above were Journal Articles with 65% of the total scientific production.

Keywords: Food Safety, Food Industry, Sustainability, Latin America.

Introduction

Food safety is an issue of international interest since it not only harms people but also the social welfare of the population, this issue of global interest plays a fundamental role in maintaining the stability and global character of world trade. For this part, Latin America a region is sufficient with diversity such as, its cultures, climates and extensive agricultural regions which contribute to the

¹ Docente de la Universidad de Guayaquil, erika.quinoneza@ug.edu.ec

² Docente Corporación Universitaria Minuto de Dios – Uniminuto, cmunozmunoz@uniminuto.edu.co

³ Corporación de Estudios Tecnológicos del Norte del Valle, icagropecuarias@cotecnova.edu.co

⁴ Fonoaudiólogo, Máster en Seguridad y Salud Ocupacional, máster en auditoría de servicios de salud, Doctor en Administración Educativa, Docente Universitario, liccampos2002@yahoo.com

⁵ Docente de la Universidad de Guayaquil, carla.andradea@ug.edu.ec

⁶ Docente de la Universidad de Guayaquil, ruben.mackayc@ug.edu.ec

⁷ Docente de la Universidad de Guayaquil, katia.ruizmo@ug.edu.ec

⁸ Docente de la Universidad de Guayaquil, guido.povedabu@ug.edu.ec

world food trade. In this article we examine the great impact that this region manages to have on food security to the sustainable development of the world food trade.

Latin America, a region of more than 20 countries stretching from Mexico to the southern tip of Argentina and Chile, is home to many agricultural traditions. Latin America has fertile soil, a pleasant climate and a variety of agricultural products, and is an important center of food production and export. The region plays an important role not only in feeding people, but also in sustaining the global food trade and ensuring a sustainable and affordable food supply for countries around the world. One of Latin America's notable contributions to global food security is its role as a major supplier of crops and raw materials. The region produces a lot of corn, wheat, rice and other cereals, as well as soybeans and sugar to meet the growing demand in the international market. In addition, Latin America excels in the production of livestock such as beef, chicken and pork, making it a major player in the global protein supply.

In addition, the variety of growing seasons and agricultural regions in Latin America allows the cultivation of many fruits and vegetables. From citrus fruits to avocados, coffee, cocoa and tropical fruits, the region's agricultural production is characterized by its richness and diversity. These exports play an important role in the global fresh food supply and play a vital role in combating global supply shortages and food insecurity.

In addition, Latin America implements sustainable and responsible agricultural practices, promotes environmentally friendly agricultural practices and emphasizes biodiversity conservation. As the world faces the challenges of climate change and environmental degradation, this practice not only strengthens local food security, but also sets an example for the rest of the world to maintain sustainable development and ensure the future of the entire world. Sustainable agriculture and abundance in food businesses.

Finally, Latin America's contribution to food security is part of maintaining global food trade. The region's abundant agricultural production, dietary diversity and commitment to permaculture practices not only ensure food supply for the population, but also livelihoods for countries around the world. To delve deeper into this topic, we look specifically at how Latin American agricultural capacities impact global grain trade and contribute to the overall stability of the global food supply. 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 FOOD SAFETY, FOOD INDUSTRY and SUSTAINABILITY, as well. As the description of the position of certain authors affiliated with institutions, during the period between 2017 and 2022.

General Objective

Analyze from a bibliometric and bibliographic perspective, the elaboration and publication of research papers in high-impact journals indexed in the Scopus database on the variables FOOD

SECURITY, FOOD INDUSTRY and SUSTAINABILITY during the period 2017-2022 by Latin American institutions.

Methodology

This article is carried out through a research with mixed orientation 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 the variables FOOD SAFETY, FOOD INDUSTRY and SUSTAINABILITY. 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 towards the proposed topic. It is important to note that the entire search was performed through Scopus, managing to establish the parameters referenced in *Figure 1*.

Methodological design

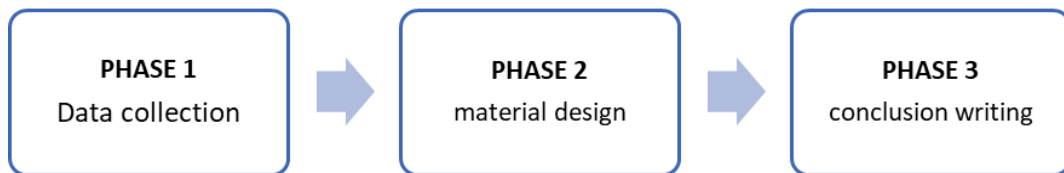


Figure 1. Methodological design

Source: Authors

Phase 1: Data collection

Data collection was executed from the Search tool on the Scopus website, where 48 publications were obtained from the choice of the following filters:

TITLE-ABS-KEY (food AND security, AND food AND industry, AND sustainability) AND PUBYEAR > 2016 AND PUBYEAR < 2023 AND (LIMIT-TO (AFFILCOUNTRY , "Brazil") OR LIMIT-TO (AFFILCOUNTRY , "Mexico") OR LIMIT-TO (AFFILCOUNTRY , "Colombia") OR LIMIT-TO (AFFILCOUNTRY , "Chile") OR LIMIT-TO (

AFFILCOUNTRY , "Venezuela") OR LIMIT-TO (AFFILCOUNTRY , "Uruguay") OR LIMIT-TO (AFFILCOUNTRY , "Peru") OR LIMIT-TO (AFFILCOUNTRY , "Guatemala") OR LIMIT-TO (AFFILCOUNTRY , "Ecuador") OR LIMIT-TO (AFFILCOUNTRY , "Cuba") OR LIMIT-TO (AFFILCOUNTRY , "Costa Rica") OR LIMIT-TO (AFFILCOUNTRY , "Argentina"))

- Published documents whose study variables are related to the study of the variables Food Safety, Food Industry and Sustainability.
- Limited to the period 2017-2022.
- Limited to Latin American countries.
- Without distinction of area of knowledge.
- Regardless of type of publication.

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.

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.

Results

Co-occurrence of words

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

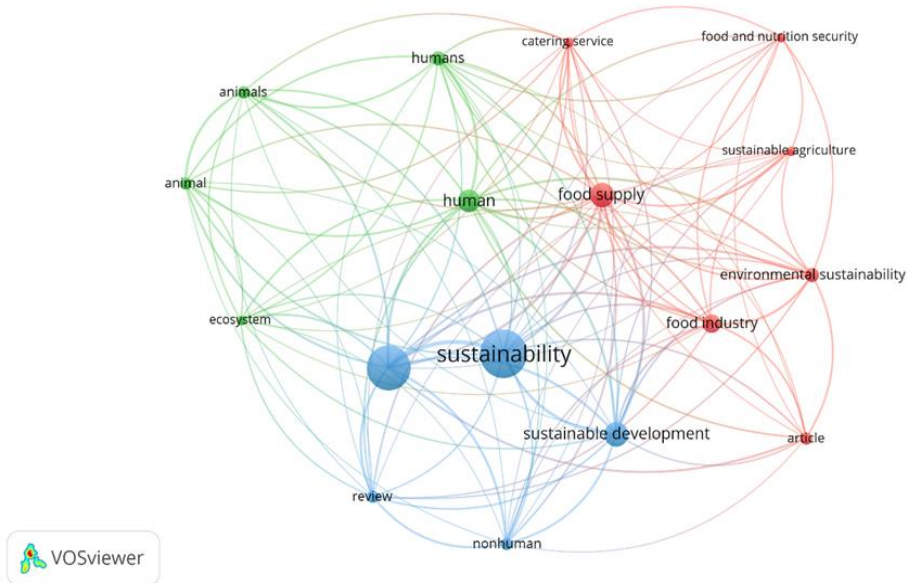


Figure 2. Co-occurrence of words

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

Food Safety 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. Food Sustainability is among the most frequently used variables, associated with variables such as Food Industry, Sustainable Development, Sustainable Agriculture, Food Security and Nutrition. From the above, it is striking that the Latin American region is one of the main exporters of food globally. Countries such as Brazil, Mexico and Argentina are leaders in the export of agricultural products, we find products such as grains, meat, fruits and vegetables. The importance of food safety in these countries guarantees the quality and availability of the same allowing quality products for international trade. Moreover, Latin America's contribution to sustaining world food trade cannot be underestimated. The region's agricultural diversity, adoption of modern technologies and commitment to sustainable agricultural practices have positioned it as a major player in global food markets. By ensuring food security within the region, Latin America contributes to global food security by providing a stable supply of high-quality food products. However, continued efforts are needed to address challenges and build resilience to evolving global food demand and environmental pressures.

Distribution of scientific production by year of publication

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

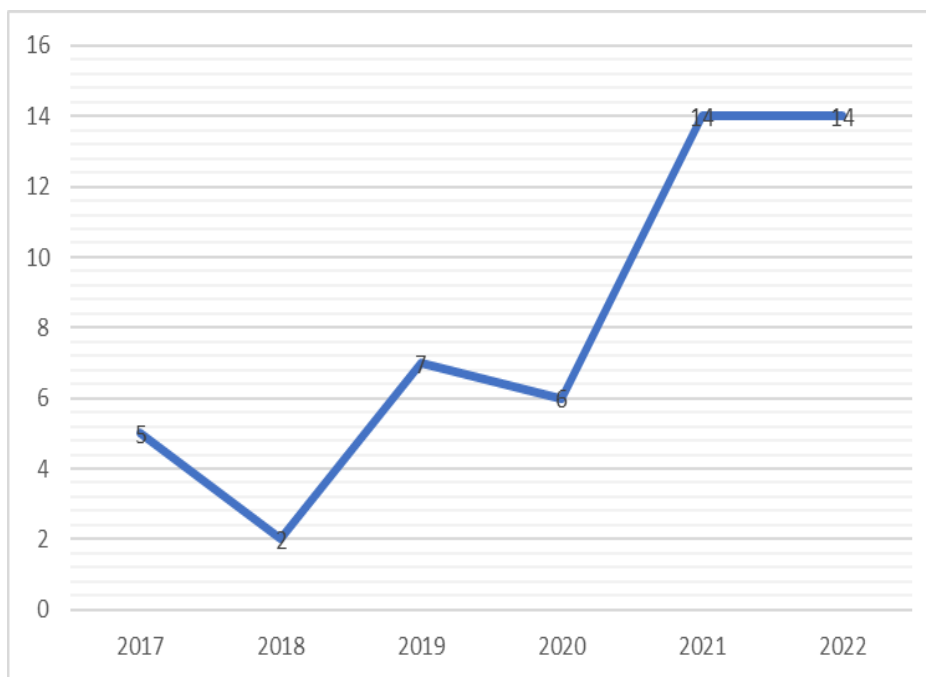


Figure 3. Distribution of scientific production by year of publication.

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

Among the main characteristics evidenced by the distribution of scientific production by year of publication, a level of number of publications registered in Scopus is notorious were the years 2021-2022, reaching a total of 14 documents published in journals indexed in said platform. This can be explained thanks to articles such as the one entitled "ON THE USE OF RESIDUES OF THE COMPANY GYDEMA FOR THE PRODUCTION OF REFINED CORN OIL" the objective of this work was to evaluate the feasibility of producing refined corn oil from the residual germ of the production process of the UEB Glucose Cienfuegos. Through a simulation in the Aspen HYSYS software, it was estimated that approximately 1022 L of refined oil / day can be obtained, generating as a co-product 151.2 kg / day of soaps. An average initial investment of \$2.04 million is required to implement the technology and the most likely payback period is 4.8 years. The level of risk of the investment is considered medium and in general it was identified that the current low production flow is the factor that most threatens the viability of the proposal. However, the implementation of the technological proposal can contribute to achieving greater food security in the territory and greater benefits in the company since it allows to obtain a product with great social demand from the valorization of a waste. In addition, the co-product obtained favors the diversification of the company's assortment and the productive chain with other industries in the national territory.(Valdés López, 2022)

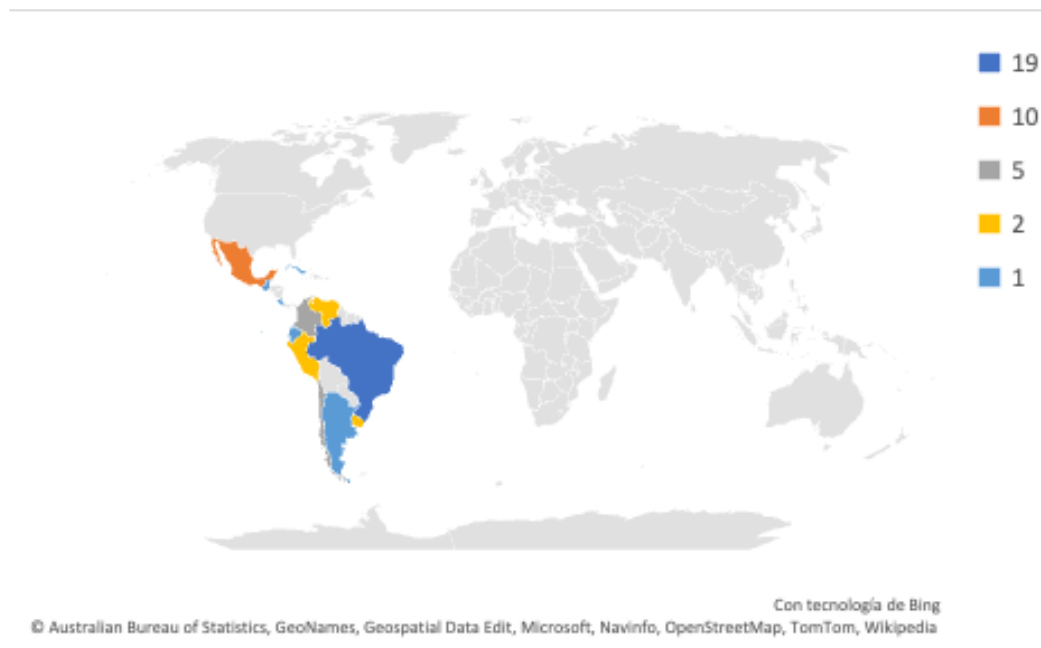
Distribution of scientific production by country of origin

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 19 publications in total. Secondly, Mexico with 10 scientific papers, and Colombia occupying the third place presenting to the scientific community, with a total of 5 documents among which is the article entitled "Multidimensional dataset of open data and satellite imagery for the characterization of food security and nutrition" this article aims to propose a multidimensional dataset of open data and satellite images for characterize food security in the department of Cauca, Colombia. Methods: The food security dataset integrates multiple open data sources; therefore, the methodology of the Intersectoral Standard Process for Data Mining was used to guide the construction of the dataset. It includes sources such as population and agricultural censuses, nutrition surveys and satellite imagery. Results: An open multidimensional dataset is configured for the Department of Cauca with 926 attributes and 9 rows (each row represents a Municipality) from multiple sources in Colombia. Machine learning models were then used to characterize food security and nutrition in the Department of Cauca. As a result, the food security index calculated for Cauca using a linear regression model (Mean Absolute Error of 0.391) is 57.444 in a range between 0 and 100, with 100

being the best score. In addition, an approach to extract four features (Agriculture, Housing, Roads, Water) from satellite imagery was tested with the ResNet50 model trained from scratch, obtaining the best performance with macroaccuracy, macroprecision, macrorecovery and macro-F1 score of 91.7, 86.2, 66.91 and 74.92%, respectively.(Restrepo, 2022)

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.

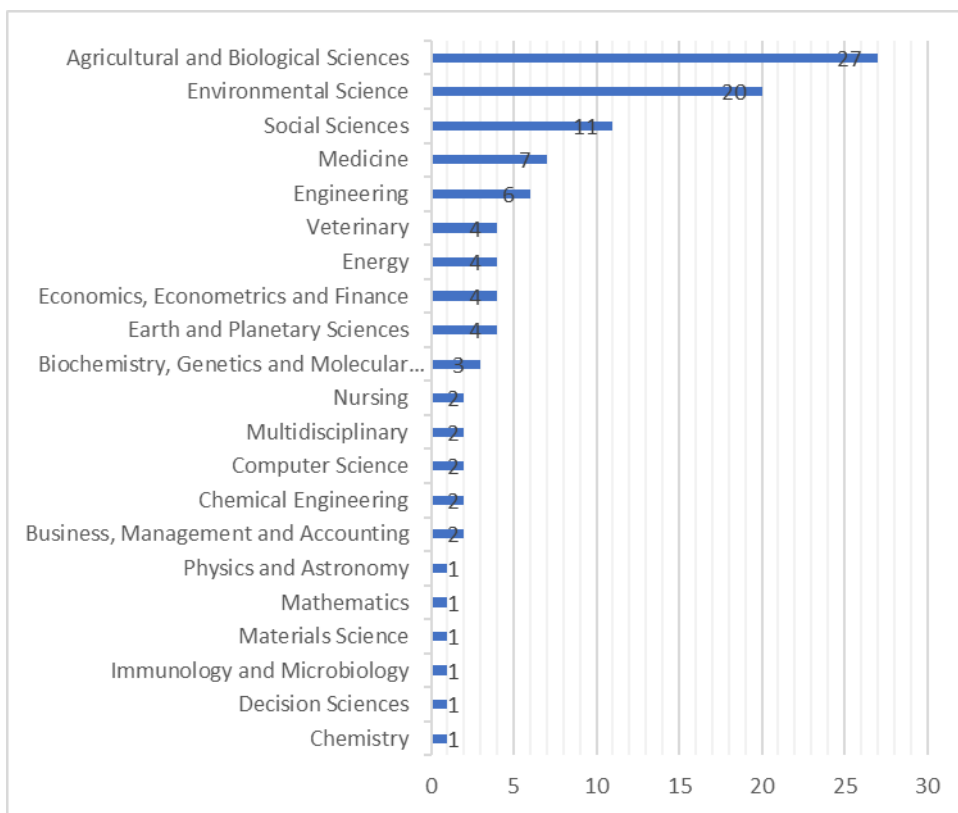


Figure 5. Distribution of scientific production by area of knowledge.

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

Agricultural and Biological Sciences was the area of knowledge with the highest number of publications registered in Scopus with a total of 27 documents that have based their variable methodologies FOOD SAFETY, FOOD INDUSTRY and SUSTAINABILITY. In second place, Environmental Science with 20 articles and Social Sciences in third place with 11. The above can be explained thanks to the contribution and study of different branches, the article with the greatest impact was registered by the area of Agricultural and Biological Sciences entitled "Vegetable flour

as a strategy of use and valorization-asparagus. Part II: Particularities of the agro-industry of the II asparagus range: flavouring flours and powders, preliminary studies-Review" the objective of this study was to elaborate a review of the characteristics of the crop, quality requirements, consumption benefits, market, experiences of the agribusiness (flours and powdered flavorings), market potential of asparagus powder (uses, market trends and type of consumers), tending to intensify the use of raw materials (by-products) taking national and international sources of information as reference. These product categories would promote the recovery/conversion of lost/wasted food, from production to consumption, into nutritious, safe and value-added food and would represent alternatives to optimize the diet of the population, contributing to improved health, food security and environmental sustainability.(Díaz K.E, 2022)

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.

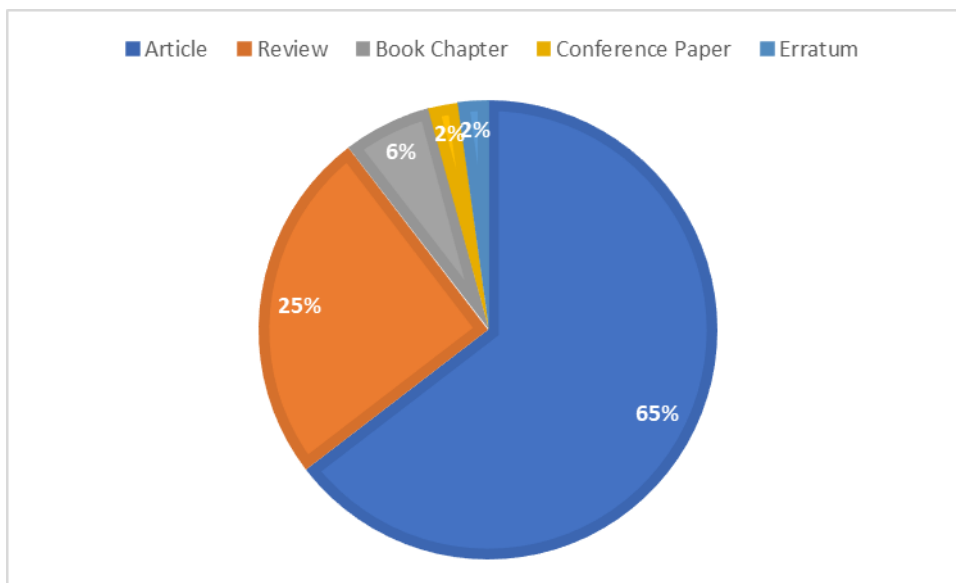


Figure 6. Type of publication.

Fountain: 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 entitled Journal Articles with 65% of the total production identified for analysis, followed by Journal with 25%. Chapter of the Book are part of this classification, representing 6% of the research papers published during the period 2017-2022, in journals indexed in Scopus. In this last category, the one entitled "The human right to adequate food and the sustainable development goals: collective interference with children in vulnerable urban peripheries" stands

out. This study aimed to analyze the relationship between the Human Right to Adequate Food (HRAF) and the Sustainable Development Goals (SDGs) resulting from a dialogic experience with children and adolescents from the periphery of São Vicente, São Paulo. Using the methodological framework of participatory research, the observation of community assemblies and the alliance between the university and social movements point to a place of attention to children / adolescents that allows collective diagnostic readings on food.

The dialogic processes allow us to problematize the dimensions of the HRAF based on the chain of production, marketing and consumption of food, and the instability to which these children / adolescents are subjected in a complex network of determinants that produce hunger and malnutrition in the territories in which they are located. They live. The results show that these dimensions dialogue with all the SDGs, as they demand the cultural, economic, social and environmental sustainability of food. The association and integration between university and society strengthens and enhances spaces for social control and training of actors for advocacy in the HRAF. It can also change inequalities in the territories and recognize children as subjects of rights with deep ethical commitment in the construction of inclusive listening and qualified practices.(Frutuoso, 2022)

Conclusions

Through the bibliometric analysis carried out in this research work, it was established that Brazil was the country with the largest number of records published with regard to the variables FOOD SAFETY, FOOD INDUSTRY and SUSTAINABILITY. with a total of 19 publications in the Scopus database. Likewise, it was established that the application of theories framed in the area of Agricultural and Biological Sciences were used more frequently in the impact generated by the performance of Latin America in the contribution of food trade at the international level. The main attributes of the diversity of this region have positioned it as the main export actor of various agricultural products such as cereals, wheat, meat, fruits and vegetables which contribute significantly to the global food demand.

Good agricultural practices in Latin America have managed to evolve in order to adopt new modern technologies and thus achieve agricultural methods in a more sustainable way. This vast region has witnessed a moment in investment and development, which has led it to improve its profitability and yields of its large-scale crops and achieve higher productivity. These great advances not only great satisfy the domestic demand for food, but also allow a greater volume of production which brings to the forefront this region a greater export of food globally.

The adoption of sustainable agricultural practices, such as organic farming and precision farming, ensures the production of high-quality food and minimizes environmental impact. These practices enhance the region's reputation as a reliable and responsible supplier in the global food trade. In

addition, Latin America's food security initiatives have focused on reducing poverty, improving access to nutritious food and promoting agricultural development. Governments and international organizations have implemented programs to support smallholder farmers, improve rural infrastructure, and provide access to credit and markets. In addition, addressing income disparities and improving access to education and health care are vital to creating an enabling environment for sustainable agricultural development.

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