ANALYSIS OF THE INPUT-OUTPUT EQUATION OF THE ONION PRODUCTION IN THE MUNICIPALITY OF AQUITANIA – BOYACÁ

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 Abstract

A systematic review was carried out on the production and publication of research papers referring to the study of the variables inputs, production, and onion industry, following the PRISMA approach (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The purpose of the analysis proposed in this document was to know the main characteristics of the publications registered in the Scopus and Wos databases and their scope in the study of the proposed variables, achieving the identification of 16 publications. Thanks to this first identification, it was possible to refine the results through the keywords entered in the search button of both platforms, which were inputs, production, and onion industry reaching a total of 12 documents, already excluding duplicates and those that did not meet the analysis criteria. From this analysis, it is expected to know the contributions of the scientific community to the study of the relationship that exists between the inputs and the product within onion production, extrapolating the details of the scientific production at a global level, on the most relevant characteristics of the onion industry in the municipality of Aquitania, Boyacá. In this way, it is possible to determine which are the most determinant aspects in the production of this vegetable, taking into account variables such as technology, climate change, inputs such as fertilizers and their correct use, and organic products, among others.
Keywords: Tax Reforms, Income Taxes, Public Budget.

1. INTRODUCTION

Agricultural production is a fundamental activity for the economic and social development of rural communities. In this context, input-output analysis becomes a key tool to evaluate the efficiency and profitability of crops. In the municipality of Aquitania, in the province of Boyacá, onion production is an agricultural activity of great importance, both locally and regionally.

Input-output analysis in onion production in Aquitania helps to evaluate the relationship between the inputs used in the production process and the resulting production and profitability. This involves a detailed analysis of the various inputs used, such as seeds, fertilizers, water, labor, and agrochemicals, and their impact on onion production. First, seeds play an important role in the success of onion cultivation. Selecting quality seeds adapted to local conditions is essential to obtain good yields and quality crops. In addition, it is important to evaluate the number of seeds used per hectare and their cost, to determine the efficiency in the use of this input.

On the other hand, fertilizers are essential to provide the necessary nutrients for onion plants. In Aquitaine, the nutritional needs of the crop must be properly assessed and the right fertilizer applied in the right amount and at the right time. This involves observing the levels of nitrogen, phosphorus, and potassium needed to achieve optimum production. Water is another essential input in onion production. Since Aquitaine is located in an area with limited water resources, it is essential to establish efficient irrigation systems and manage this resource well. This involves evaluating the amount of water used per hectare and its impact on crop production and profitability. Labor also plays an important role in onion production. From planting to harvesting and packing, trained and

adequate personnel are required to perform various tasks. The availability of skilled labor can affect the efficiency and profitability of agriculture, so it is necessary to evaluate its cost and availability in the municipality of Aquitania. Finally, the use of agrochemicals may be necessary to control pests that affect onion production. However, it is essential to use these products responsibly and follow technical recommendations to avoid negative impacts on the environment and human health.

Input-output analysis in onion production in Aquitania involves evaluating the relationship between the quantity and quality of inputs used and the results obtained in terms of production and profitability. Indicators such as yield per hectare, production cost per unit area, and profit margin can be used for this purpose. In addition, it is important to consider external factors that may affect onion production, such as weather conditions, market prices, and demand. These factors can affect crop profitability and should be included in the input-output analysis. The input-output analysis of onion production in the municipality of Aquitania, Boyacá, makes it possible to evaluate the relationship between the inputs used and the results obtained in terms of production and profitability. This analysis is fundamental for decision-making in onion production and for improving the efficiency and profitability of the crop.

2. GENERAL OBJECTIVE

To analyze from a bibliometric and bibliographic perspective, the production of research papers on the variables *inputs, production,* and *onion industry*, published in high-impact journals indexed in Scopus and Wos databases.

3. METHODOLOGY

The present study is of qualitative type, and according to Hernández *et al.* (2015), qualitative approaches correspond to studies that perform the procedure of obtaining information to review and interpret the results obtained in such studies. To this end, information was collected from the Scopus and Wos databases using the words *inputs, production,* and *onion industry*.

3.1 Research design

The research design proposed for the present research was the Systematic Review which involves a set of guidelines to carry out the analysis of the data collected, which are framed in a process that began with the codification until the visualization of theories (Strauss & Corbin, 2016). On the other hand, it is stated that the text corresponds to a descriptive narrative because it is intended to find out how the levels of the variable affect, and that it is systematic since, after reviewing the academic material obtained from scientific journals, the theories on knowledge management were analyzed and interpreted (Hernández *et al.* 2015).
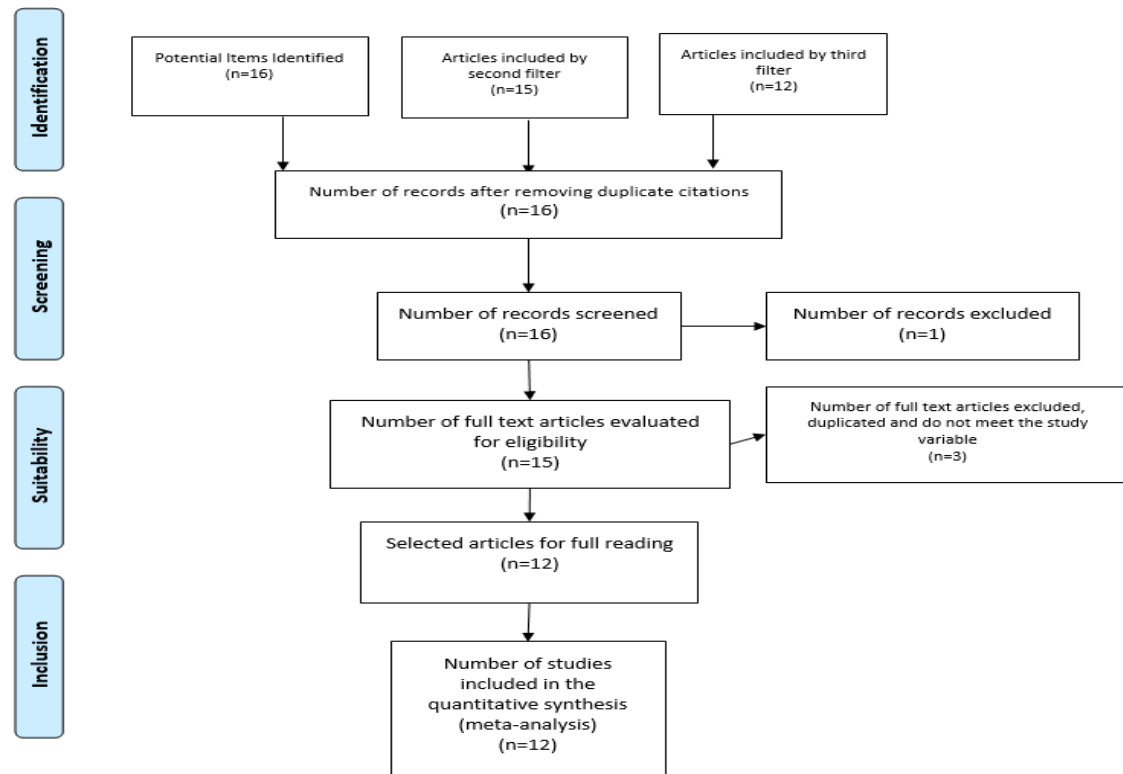
Figure 1. Flowchart of systematic review performed under PRISMA technique.
Source: Own elaboration based on the Prisma Group proposal (Moher et al., 2009).

4. Results

Table 1 shows the results after applying the search filters related to the methodology proposed for this study, after recognizing the relevance of each of the referenced works.

Table 1. List of analyzed articles

No	TITLE OF THE STUDY	AUTHOR/YEAR	COUNTRY	TYPE OF STUDY	INDICATION
1	*The plight of the onion industry in the onion capital of the Philippines: Basis for intervention strategies*	Domingo, A. (2023).	PHILIPPINES	Qualitative	Scopus
2	*Prediction Model of Production Patterns of Shallot Development in Low and Medium Plains Regions, Indonesia*	Andayani, S. A., Sukmawani, R., Marina, I., Sulaksana, J., Rahman, U. I. L., Sumekar, Y., ... & Dani, U. (2021)	INDONESIA	Qualitative	Scopus
3	*High efficiency eco-agriculture model obtain both larger yield and economic benefit: A*	Jang, G., Zheng, Y., Guanglei, W., Liu, H., Chi, Y. X., Feng,	CHINA	Quantitative	Scopus

	case study in Hongyi Organic Farm	S., ... & Su, B. (2017)			
4	Estimate of the global warming potential of the Tasmanian pyrethrum industry in comparison to other crops, potato and onion	Hay, F., & Pethybridge, S. J. (2011, November).	AUSTRALIA	Quantitative	Scopus
5	Trends of fresh-cut vegetables in Japan	Shiina, T., & Hasegawa, Y. (2007, August).	JAPAN	Quantitative	Scopus
6	Wide span - Re-mechanising vegetable production	Pedersen, H. H., Oudshoorn, F. W., McPhee, J. E., & Chamen, W. C. T. (2014, August).	UNITED KINGDOM, AUSTRALIA, DENMARK	Qualitative	Scopus
7	Assessment of the thermodynamic, environmental and economic output of agro-ecosystems: onion set versus onion production	Nadi, F., & Campbell, D. (2023)	IRAN, UNITED STATES	Qualitative	WOS
8	Shortwave infrared hyperspectral imaging for detecting sour skin (Burkholderia cepacia)-infected onions	Wang, W., Li, C., Tollner, E. W., Gitaitis, R. D., & Rains, G. C. (2012).	UNITED STATES	Qualitative	WOS
9	Spring onion seed demand forecasting using a hybrid Holt-Winters and support vector machine model	Zhu, Y., Zhao, Y., Zhang, J., Geng, N., & Huang, D. (2019).	CHINA	Qualitative	WOS
10	Biocontrol Laboratory: Research linked to agricultural production	Rivera-Méndez, W., Brenes-Madriz, J., & Zúñiga-Vega, C. (2019)	COSTA RICA	Quantitative	WOS
11	The contribution of vegetable value chains to the Guatemalan economy	Dürr, J. (2017).	GUATEMALA	Qualitative	WOS
12	STL-ATTLSTM: Vegetable Price Forecasting Using STL and Attention Mechanism-Based LSTM	Yin, H., Jin, D., Gu, Y. H., Park, C. J., Han, S. K., & Yoo, S. J. (2020).	KOREA	Qualitative	WOS

Source: Own elaboration

4.1 Co-occurrence of words
Figure 2 shows the relationship between the keywords used for the search of the study material for the elaboration of the systematic analysis proposed for this study.

Figure 2. Keyword co-occurrence.

Source: Own elaboration
Figure 2 shows the most frequently used keywords and their correlation with research on topics associated with problems in the analysis of input consumption in agricultural production. Thus, it is possible to affirm that Agriculture constitutes the central axis of the research identified for the analysis developed in this article, directly related to research on Food Safety, Fertilizer Applications, Productivity, Crop Production, Sustainable Agriculture, and Crop Yields, among others, confirming the importance of a proper analysis of input-output in agricultural production, since it allows to plan, manage and make decisions regarding production. Its importance lies in the ability to provide in detail how to distribute the costs and benefits of production and thus how to optimize resources and maximize efficiency and profitability. Input-output analysis is a valuable tool for farmers, agricultural planners, and policymakers, as it provides the information needed to improve the efficiency, profitability, and sustainability of agricultural production.

4.2 Discussion
The purpose of this article is to analyze, from a systematic perspective, the contribution of the authors through their publications, to the study of the problems of INPUTS, PRODUCTION, and ONION INDUSTRY, carried out in high-impact journals indexed in the Scopus and Wos databases by authors affiliated to Latin American institutions. In this way, it is possible to affirm that the publications indicated in the body of this document have carried out research at different levels whose findings contribute to the generation of new knowledge regarding the variables proposed for the present study. Thus, great contributions are identified as contemplated in the article entitled "The plight of the onion industry in the onion capital of the Philippines: basis for intervention strategies" (Domingo, 2023). The present study whose objective was based on assessing the plight of the onion industry in Bongabon, Nueva Ecija, known as the onion capital of the Philippines, the described study employed a descriptive methodology, which revealed that most of the farmers are tenant farmers of the landowners.

Significant problems faced by onion growers included rising costs of production and farm inputs as these are imported, which could greatly affect net income. The industrialized factor in farm mechanization is limited in nature and a shortage of farm workers prevailed. Climatic changes and the severity of pest infestations greatly influenced production volumes.

Therefore, it is necessary to know firsthand their real needs to focus on strategies that pursue success in their training. Supporting the above idea, the contribution made by the development of the article entitled "Evaluation of the thermodynamic, environmental and economic performance of agroecosystems: onion fruit set versus onion production" is evident (Fatemeh Nadi, 2022), whose objective was to perform thermodynamic analysis which determined a higher sustainability and capacity of the production of onion sets; however, the present economic analysis estimated a higher profitability of onion production and an environmental analysis revealed a lower emission of greenhouse gases per ton of onion production.

The results exposed by the present analysis showed that the implementation of both systems, chemical fertilizer had a greater impact on cumulative energy consumption and greenhouse gas emissions in CO^2 equivalent. Human labor input had a significant impact on energy consumption and production costs for both products. The effects of two alternative scenarios, (1) the use of more renewable resources in production and (2) the use of waste to produce bioethanol, were investigated in both systems. The use of more renewable resources has the greatest impact on driving both systems toward greater sustainability.

However, like any methodology, it is not exempt from presenting problems through its use, as shown in the article entitled "Forecasting chive seed demand using a hybrid Holt-Winters and a support vector machine model" (Yihang Zhu, 2019), whose purpose is to provide a novel perspective on spring onion seed demand forecasting and proposes a hybrid Holt-Winters forecasting model and a support vector machine (SVM).

The model uses dynamic factors, including historical seed sales, seed inventory, the market price of the spring onion crop, and weather data, as inputs to forecasting spring onion seed demand. The forecast error, i.e., the difference between actual and forecast demand, is evaluated. Two advanced machine learning models are trained on the same dataset as the reference models. Numerical experiments using actual commercial sales data for three chive seed varieties show that the proposed hybrid model outperformed the statistically based models for all three forecast errors. Seed inventory, the market price of the chive crop, and historical seed sales are the most important dynamic factors, among which seed inventory has a short-term influence, while two others have a medium-term influence on the seed demand forecast. Absolute minimum temperature is the only factor that has long-term influence. This study provides a promising model for forecasting chive seed demand that helps to understand the relationships between seed demand and other dynamic factors and the model could potentially be applied to seed demand forecasting of other crops to reduce total operating costs.

5. CONCLUSIONS

This review article concludes by highlighting the importance of knowing the updated status of the bibliography published in databases such as Scopus or Wos, referring to the study of the *inputs*, *production*, and *onion industry* during the period between the years 2017 and 2021, and how it has impacted, in a positive way, the adequate realization of the analyses of input product of onion production in the municipality of Aquitania, Boyacá, which shows that this agricultural sector is of great importance for the local economy. It has been determined that the main inputs used in onion production are seeds, fertilizers, pesticides, and water. These inputs are necessary to ensure crop growth and development, as well as to prevent and control diseases and pests. On the other hand, good input management and the implementation of sustainable practices are necessary to ensure long-term development. It is essential to promote research and training in sustainable farming techniques, as well as to foster collaboration between farmers, government organizations, and industry players to achieve efficient, more profitable, and sustainable onion production. On the other hand, it has been found that onion production generates an important economic impact in the region,

as its commercialization contributes to employment generation and increased farmer income. However, several challenges have also been identified in this sector, such as farmers' dependence on imported inputs, which can affect the profitability of production. In addition, there is a need to implement sustainable and environmentally friendly measures to reduce the use of pesticides and chemical fertilizers.

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