Gestão & Regionalidade

Received: 18/04/2021
Accepted: 11/04/2022

Performance of the main brazilian states exporting erva-mate tea (2000-2020)

Leticia Favaretto[1], ORCID: https://orcid.org/0000-0003-4868-0335; **Juliana Favaretto**[2], ORCID: https://orcid.org/0000-0002-3140-146X; **Fernanda Cigainski Lisbinski**[3], ORCID: https://orcid.org/0000-0001-9131-5996; **Daniel Arruda Coronel**[4], ORCID: https://orcid.org/0000-0003-0264-6502

1. Bacharel em Ciências Econômicas pela UFSM (UFSM - Universidade Federal de Santa Maria- Santa Maria- Rio Grande do Sul – Brasil). E-mail: leticiafavaretto18@gmail.com
2. Discente do Curso de Graduação em Ciências Econômicas E Bolsista de Iniciação Científica (PIBIC) do CNPq. (UFSM - Universidade Federal de Santa Maria- Santa Maria- Rio Grande do Sul – Brasil). E-mail: julianafavaretto07@hotmail.com
3. Doutoranda em Economia pela ESALQ-USP e Mestra em Economia e Desenvolvimento pela UFSM. (UFSM - Universidade Federal de Santa Maria- Santa Maria- Rio Grande do Sul – Brasil). E-mail: fernandacl32@hotmail.com
4. Professor Associado do Curso de Graduação em Ciências Econômicas e dos Programas de Pós-Graduação de Economia e Desenvolvimento, Gestão de Organizações Públicas e Agronegócios da UFSM e Bolsista de Produtividade do CNPQ. (UFSM - Universidade Federal de Santa Maria- Santa Maria- Rio Grande do Sul – Brasil). E-mail: daniel.coronel@uol.com.br

Abstract

This study analyzed the performance and efficiency of the main yerba mate exporting states in Brazil, in the period from 2000 to 2020. To achieve this objective, the Revealed Comparative Advantages (IVCR) and Position indices were used. Relative (IPR) and a performance matrix was constructed according to the linear trend of the historical series of these two indices. The states considered in this study were: Paraná, Rio Grande do Sul and Santa Catarina. Among these, it was reported that the three states in the southern region have comparative advantages revealed in the export of this product; however, only Rio Grande do Sul showed an increasing trend for the IVCR. Results of the IPR demonstrated that the analyzed states are net exporters of yerba mate. Paraná, Rio Grande do Sul and Santa Catarina are eficiente when considering the performance matrix
Keywords: Yerba Mate. IVCR. IPR Performance Matrix; Brazilian states.

Resumo
Este estudo objetivou analisar o desempenho e a eficiência dos principais estados brasileiros exportadores de erva-mate, no período que compreende os anos de 2000 a 2020. Para atingir esse objetivo, utilizaram-se os índices de Vantagens Comparativas Reveladas (IVCR) e de Posição Relativa (IPR) e construiu-se uma matriz de desempenho conforme a tendência linear da série histórica desses dois índices. Os estados considerados no presente estudo foram Paraná, Rio Grande do Sul e Santa Catarina. Dentre esses, verificou-se que os três estados da Região Sul do país possuem vantagens comparativas reveladas na exportação desse produto, no entanto, apenas o Rio Grande do Sul apresenta tendência crescente para o IVCR. Os resultados do IPR mostraram que os estados analisados são exportadores líquidos de erva-mate. Quanto à matriz de desempenho, constatou-se que Paraná, Rio Grande do Sul e Santa Catarina são eficientes.
Palavras-chave: Erva-Mate. IVCR. IPR. Matriz de Desempenho. Estados Brasileiros.

Citation: FAVARETTO, L.; FAVARETTO, J.; LISBINSKI, F.C.; CORONEL, D.A. Performance of the main brazilian states exporting erva-mate tea (2000-2020). *Gestão & Regionalidade*, v. 39, e20237824, 2023. DOI. https//doi.org/10.13037/gr.vol39.e20237824

1 INTRODUCTION

Historically, yerba mate (IlexParaguariensisAug. St. –Hill) had high importance for the developing of the southern region of Brazil, and for neighboring countries (Argentina, Uruguay and Paraguay). Initially, native peoples consumed it, especially the Guarani, and later it was assimilated by European colonizer and widely exploited by the Jesuits (JABOINSKI, 2003).

Yerba mate is the main non-timber product of forestry agribusiness in Southern Brazil. Due to its economic, social, and ecological importance, the herb crop is an option for employment and income, especially for small and medium-sized rural producers, enabling the preservation of native forest physiognomy (SIGNOR et al., 2015).

In 2019, Brazil was the world's leading producer of yerba mate, with a production of 939,580 thousand tons, followed by Argentina, with 809,000 tons, and Paraguay, with a production of 105,000 tons. Although, it is the largest producer in the world, the position of largest exporter belongs to Argentina, which, in the same year, exported an amount equivalent to US$ 91.6 million (46.59%), followed by Brazil, with US$ 82.4 million (41.92%) and Paraguay, with US$ 3.26 million (1.66%), according to data from the Department of Rural Economy – DERAL – of Paraná State (2020).

Currently, its production is intended for the domestic market, with a small portion destined for the foreign market. Additionally, despite being the largest producer in the world, Brazil continues to import yerba mate from Argentina due to the commercial strategies adopted by the country and industrialists (SCHIRIGATTI, 2014).

Recently, the interest in the international market for this plant properties has increased. In this sense, there is a wide space that can be occupied by Brazil, through the development of new products such as energy drinks, cosmetics, and cleaning products using yerba mate as a raw material. Such applications may expand the market and also increase the added value of the product (Brazilian Agricultural Research Corporation - EMBRAPA, 2020). Market opportunities are growing, but little is known about the performance of Brazilian yerba mate in the international market.

Therefore, this study analyzed the performance and efficiency of the main Brazilian yerba mate exporting states for the period from 2000 to 2020. The specific objectives were: a) use indices of a revealed comparative advantage and of relative position that demonstrates the importance and efficiency of exporting yerba mate to the Brazilian States; and b) build, from the linear trend of the historical series of these indices, a performance matrix for the states.

The relevance of yerba mate produced several studies, which have analyzed, under different aspects, the product competitiveness. Among them, Balcewicz (2000), Rocha Jr., Rinaldi and Rocha (2004), Hoff, Blume and Pedrozo (2008), Wolf and Pereira (2015, 2016), Schirigattiet al. (2018) and Zanin and Meyer (2018). However, on the performance of the main states, there are few studies, so this study seeks to expand knowledge and contribute to the existing literature on the yerba mate international trade.

This research can contribute to decision making and also to the elaboration of public policies that promote competitiveness, the activity dynamism, and the insertion of the product into the international market.

Additionally, this study is structured into five additional sections. In the following section, there is the theoretical reference for the theories of comparative advantages in international trade. In the third section, some studies analyzed the competitiveness of yerba mate in the regional and international scenarios. In the fourth section, the methodology applied

in the study is discussed. In the fifth section, the results are presented and discussed. Finally, in the sixth section, the conclusions are presented.

2 THEORETICAL REFERENCE

Several theories deal with international trade, analyzing and explaining trade interactions among countries. The pioneers in studying this subject were Adam Smith, David Ricardo, and John Stuart Mill, who developed the following theories: Absolute Advantages, Comparative Advantages, and Reciprocal Demand, which are based on labor value. However, over the years, these theories have changed, generating modern theories of international trade (which address the Production Possibility Curve, Opportunity Cost, Indifference Curve, Production and Consumption), considering that the production is the result of the combination of raw material, capital, and work (SILVA, 2005).

The Theory of Absolute Advantages, described by Smith, stated that each country should specialize in the production of the good whose production is more efficient compared to other goods. Therefore, the bilateral trade flow would be based on the demand for a certain product whose production comes from an absolute advantage (SMITH, 1937). However, this theory has limitations and could not explain the existence of international trade flow when a country is more efficient in the production of all goods (CARMO; MARIANO, 2010).

To overcome these limitations, Ricardo developed the Theory of Comparative Advantage. This theory explained the benefit of bilateral trade between nations that presented absolute advantage in the production of all goods, or did not present an absolute advantage in the production of any good, considering the different productivity between countries (RICARDO, 1963). In this sense, each nation should specialize in the production of goods that present greater productive efficiency and import goods whose production has a higher cost. In this way, specialization would generate increased productivity and commercialization (CARMO; MARIANO, 2010).

In he Reciprocal Demand Theory, John Stuart defined the reasons that determine exchanges. This theory established that the relationship by which goods are exchanged depends on the intensity and elasticity of the demand curve of each nation for products of another nation, and this relationship is stable when imports are equal to exports (GONÇALVES et al. 1998). For Ellsworth (1978), the real reason why goods are exchanged depends on the strength and elasticity of demand in each country for the good produced in another, or on reciprocal demand. Mill considered as reciprocal demand the quantity of exported products that a country will offer at different terms of trade, for varying quantities of imported products.

However, over the years, markets have expanded and become more complex and dynamic, so other factors began to interfere in international trade relations, such as contracts, greater demand for product quality, trade, and non-tariff barriers, and others. Because of this, the term competitiveness in international trade has emerged, which has a meaning that goes beyond the endowment of factors and resources, that is, the theories presented so far. According to Coutinho and Ferraz (1994), competitiveness in commerce can be analyzed by considering internal factors (macroeconomic and political conditions, distortions in the agricultural sector, the relative endowment of factors and productivity, the tax burden, the flow of production and storage; quality, phytosanitary standards, and advertising) and external (protectionism in the international market and regionalization,and economic blocs formation).

According to Silva (2005), the Theory of Competitive Advantage substituted the Theory of Comparative Advantage, as it presents a deeper understanding of competition,

considering that competition is dynamic and evolutionary. For Fontes (1992) and Hidalgo (1998), comparative advantages reflect bilateral trade flows, determined by relative production costs, assuming trade without interventions, while competitiveness reflects market price differentials. Thus, competitiveness includes several variables that impact market prices, such as marketing costs, subsidies, taxes,and others.

In this way, international trade came to be analyzed by inter-industry and intra-industry trade. In the first, this entire process of creation and international diffusion of new products and techniques increases the absolute advantages by adjusting prices and costs, and supports international exchanges, basing them on comparative advantages. The Heckscher-Ohlin theory explained this type of trade or the factor endowment theorem, which advocates that the flow of products occurs with different factor intensities, that is, a country with a large supply of skilled labor tends to export products with higher added value; while those with a higher volume of low-skilled labor tend to export products with lower added value. Conversely, those countries that have a greater extension of land and natural resources tend to present an export agenda based on agricultural products or that require, in their production, greater use of natural resources. Given this, the relationship of inter-industry trade would occur between sectors and between different activities (GUIMARÃES, 2007).

Krugman and Obsfeld (2005) explained intra-industry trade as trade in close, but not identical, substitute products made by companies in the same industry. Thus, factors such as product differentiation, the barrier to entry, technological progress and economies of scale play an important role, consistent with the new consumers demand.

Finally, despite the limitations in the analysis of international trade, indicators of revealed comparative advantage have been widely used due to their ease of construction and greater adequacy to international trade databases. Additionally, the use of such indicators is important in the analysis of international trade, as they allow the monitoring of the evolution of the flow of foreign trade of goods, over time, and serve as important guidelines in the detection of positive and/or negative impacts of policies carried out (FIGUEIREDO E SANTOS, 2005).

3 LITERATURE REVIEW

Several studies explain the competitiveness of Brazilian yerba mate in the regional and international scenarios. In this research, some national and international studies are presented aiming to portray the competitiveness of the product using the most diverse methods. Among the studies, Balcewicz (2000), Rocha Jr., Rinaldi and Rocha (2004), Hoff, Blume and Pedrozo (2008), Wolf and Pereira (2015, 2016), Schirigattiet al. (2018), Zanin and Meyer (2018), Costa et al. (2019) and Samoggia, Landuzzi and Vicién (2021).

Balcewicz (2000) analyzed the competitiveness of the yerba mate crop in the Paraná State, at different technological levels and in a context of economic integration with yerba mate produced in the Province of Missiones, Argentina. According to the author, after the elimination of barriers and restrictions between Mercosur member countries, there was an intensification in the yerba mate trade between Paraná and Missiones. This fact motivated the comparison between the two regions in relation to aspects such as planted area, production, productivity, cost, price received by the producer, and level of profitability of the activity.

The analysis carried out by the author reported that, from 1995 to the end of 1997, there was an increase of more than 300% in Brazilian imports of yerba mate “cancheada” originating in the Province of Missiones. Subsequently, in 1998 and 1999, successive reductions in imports occurred, motivated especially by the change in the Brazilian exchange rate policy. Also, in

1999, more than 90% of the yerba mate imported from Argentina was internalized by companies in Paraná to meet industrial demand. This contributed to the reduction in prices received by rural producers due to the lower demand for yerba mate produced in the state. Finally, the author stated that yerba mate is an economically profitable activity, and the profitability in Paraná is superior to that obtained in Missiones, in the three technological levels (low, médium, and high technology), when considering or not the fixed costs of culture in both regions.

Rocha Jr., Rinaldi and Rocha (2004) studied the yerba mate product having the product design as a theoretical reference, analyzing the factors that affect competitiveness. In this context, they used the prospective structural matrix as a data collection instrument. The system was composed of forty variables and a 40x40 quadratic matrix was constructed, which was filled in through interviews. After building the matrices, the authors created a matrix with the mode of the respondents' answers, which went through a process, which highlighted the most driving and the most dependent. Results indicated that the factors that influenced (most driving) the competitiveness of the yerba mate product was the variables of lifestyle, age, ordinances (303, 302, and 519), and culture. Regarding the most dependent variables, the following stand out: packaging, differentiation, blend, and flavor, which are especially related to the marketing mix.

Hoff, Blume and Pedrozo (2008), through a case study of the only Brazilian property that had yerba mate certification via FSC (Forest Stewardship Council), verified whether such certification can make competitiveness and environmental preservation converge for the generation competitive advantage for adopters. Results showed that certification allows an increase in the price of the final product, as well as access to new market niches (ecological and organic products), new markets (cosmetic industry), and potential market opening (pharmaceutical industry).

Wolf and Pereira (2015) carried out an economic analysis of the historical evolution of yerba mate in Mato Grosso do Sul. More specifically, the authors analyzed the reasons that led yerba mate to lose space in the current economy of the state, becoming a product without relevance from an economic perspective. Through a descriptive analysis, the authors reported that the yerba mate produced in the state has been losing ground to other states and countries and to other cultures. Thus, it was proved that the production of yerba mate in Mato Grosso do Sul has a negative trend. Additionally, the authors concluded that the loss of economic importance of yerba mate in Mato Grosso do Sul occurs to competition with other producing regions, and due to the competitiveness of the yerba mate production process with other crops.

Later, in 2016, in a new research, Wolf and Pereira analyzed the effects of yerba mate trade flows between the states of Brazil and the other Mercosur countries. Using shift-share analysis, the authors analyzed yerba mate production in Brazil, between Brazilian States and Mercosur, and between the Brazilian States and the world, except Mercosur. Results indicated that the commercial relationship between Brazil and Mercosur is favorable to the Brazilian producing states, since there is a predominance of exports from these states to Mercosur, and the imports made by the Brazilian States of Mercosur members do not replace domestic production, or that is, these states are not exposed to Mercosur, except for Mato Grosso do Sul, which proved to be more vulnerable to competition.

In this perspective, the components of trade between Brazilian states with the rest of the world showed that foreign sales have a negative impact on the production of yerba mate, and imports, except Mato Grosso do Sul, indicate that foreign products do not directly influence the production of each state, but have a smaller influence than that observed in the relationship with

Mercosur. The regional component shows that the competitiveness between the Brazilian states that produce yerba mate in relation to the rest of the world is fragile, considering that, excepting Mato Grosso do Sul, the other states have negative coefficients, both for exports and for the import. Therefore, the authors reported that there is a possible threat to the continuity of the yerba mate producers business, as the sector presents, among other flaws, the lack of strategic planning for commercialization, distribution, and marketing (WOLF; PEREIRA, 2016).

Schirigatti et al. (2018) analyzed the performance of exports from Brazil and Argentina in the international mate market. For this, they used the Index of the Revealed Comparative Advantage (IVCR) of Brazilian and Argentine mate, taking the period from 1997 to 2011 as a reference. First, the authors verified the presence of structural breaks in the time series and then, they investigated the market growth rate and the Symmetrical Revealed Comparative Advantage Index (IVCRS), identifying the position of each country's mate in the competitiveness matrix. The main results obtained over the full period showed that both Brazilian and Argentine mate presented products with a comparative advantage within markets that have growing demand.

Zanin and Meyer (2018) investigated the evolution of the yerba mate marketing margin in the Rio Grande do Sul market, in the period from 1998 to 2016. In addition, the authors investigated the behavior of production, consumption and foreign trade. Results pointed to an increase in cultivated production, because of deregulation. Foreign trade continues to be only marginal in the sectorial context, and consumption is strongly regionalized. Regarding the margin, results indicated that the stability of this, and of prices, was affected only by supply shock in 2013. As it is a permanent crop, whose supply is inelastic to prices, it may take time to return to the level previous. Finally, the authors highlighted the importance of diversifying consumption and the need to organize sectorial information as tools to promote the development of the sector and the local economies linked to it.

Costa et al. (2019) analyzed the Brazilian competitiveness in the world market of the main non-timber forest products (NTFPs) exported by Brazil during the sub-periods from 2006 to 2010 and from 2011 to 2016. The products were selected based on their relevance to the Brazilian export of NTFPs. To analyze competitiveness, the authors made use of the competitiveness matrix, which is given by the performance of products. In the construction of this matrix, the authors used the Symmetrical Comparative Advantage index on the vertical axis, while the horizontal axis was represented by the growth rate. Results showed that natural rubber was in the "missed opportunities" quadrant in the first period and in the "retreat" quadrant in the second analyzed period. Conversely, honey, yerba mate and cashew nuts positioned themselves in the "optimal" sector in both periods, although cashew nuts showed a drop in the world growth rate. In summary, the authors concluded that Brazil is competitive in exports of honey and yerba mate, but in relation to cashew nuts, it has been losing competitiveness, and natural rubber is declining in terms of exports.

Samoggia, Landuzzi and Vicién (2021) explored the behavior of buying and consuming yerba mate in Argentina and Italy, as well as the perceptions of these consumers about the use of yerba mate. For data collection, they used the qualitative method, with interviews with producers, processors, consumers, and quantitative surveys with consumers. Data collection was carried out in Argentina and Italy. Results showed that, in Argentina, yerba mate consumption is driven by habits and tradition, and, in Italy, the motivation for yerba mate consumption is almost always unknown. Consumers tend to drink yerba mate in Argentina and other caffeine-containing beverages in Italy for socializing and as a source of energy. It was observed that consumers have little awareness of the antioxidant properties of yerba mate.

Italians perceive it as energy or relaxing drink, with a drinking experience similar to teas and infusions. The authors also verified the need to update the yerba mate marketing strategy in Italy.

4 METHODOLOGY

To analyze the performance of Brazilian states that export yerba mate, the following indices were used: Revealed Comparative Advantage Index (IVCR) and Relative Position Index (IPR). Based on the values and linear trend of the historical series of these indicators, a performance matrix was created. This methodological procedure has already been adopted in previous studies, such as those by Farias and Farias (2018) and Lucena, Sousa and Coronel (2020).

4.1 The Revealed Comparative Advantage Index

The Revealed Comparative Advantage Index (IVCR) is based on the classical assumptions of international trade theory, especially David Ricardo's classical theory of Comparative Advantage. Proposed by Balassa in 1965, this index is a revealed measure, as its quantification is based on post-trade data (SIQUEIRA; PINHA, 2011). The IVCR indicates the share of exports of a product from a given region in relation to the share of that region in the country's total exports (PEREIRA et al., 2009). Therefore, it can be represented according to Equation (1):

$$IVCR_{ij} = \frac{(X_{ij}/X_i)}{(X_{zj}/X_z)} \quad (1)$$

Where:j= product under analysis (yerba mate); i = states considered (Paraná, Rio Grande do Sul and Santa Catarina); z = country analyzed (Brazil); X_ij = represents the value of exports of product j in state i; X_i= represents the total value of exports from each state; X_zj = represents the value of Brazilian exports of product j; X_z = represents the total value of Brazilian exports.

The indicator results can vary from zero to infinity, and values greater than unity indicate that the state has revealed a comparative advantage for the product, but values smaller than unity indicate that state i has not revealed comparative advantage for product j. A result equal to unity indicated that there is no advantage or disadvantage in trading the product. The higher the index, the greater the comparative advantage (ILHA; WEGNER; DORNELLES, 2010

4.2 Relative Position Index

The Relative Position Index (RPI) was proposed by Lafay (1999). It is a performance indicator whose objective is to determine the position of a country, an economic bloc, or a state, in the international or national market of a certain commodity (CORONEL; SOUSA; AMORIM, 2011). This index can be represented by Equation (2):

$$IPR_{ij} = 100.\frac{(X_{ij}-M_{ij})}{(X_{zj}+M_{zj})} \quad (2)$$

Where: j= product under analysis (yerba mate); i = states considered (Paraná, Rio Grande do Sul and Santa Catarina); z = country analyzed (Brazil); X_ij = represents the value of exports of product j in state i; M_ij = represents the value of imports of product j in state i; X_zj = represents the value of Brazilian exports of product j; M_zj= represents the value of Brazilian imports of product j;

Results demonstrate whether a given country's net exports/imports are growing at higher or lower rates than world trade. The higher the result of the index, the greater the intensity of participation of the domestic product in international trade; if the indicator is positive, the country will be a net exporter; if it is negative, it will be a net importer (ESPERANÇA et al., 2011).

4.3 Linear trend of the IVCR and IPR historical series

To analyze the trend of historical time series, this study adopted linear trend analysis. Therefore, the series of IVCR and IPR indices of yerba mate, in each state considered in this study, was adjusted in a linear regression using the Ordinary Least Squares (OLS) method represented by Equations (3) and (4):

$$IVCR = \propto_{IVCR} + \beta_{IVCR}\, t \quad (3)$$

$$IPR = \propto_{IPR} + \beta_{IPR}\, t \quad (4)$$

Where:
t : indicates the time (in years);
∝_IVCRe ∝_IPR : refer to linear coefficients (intercept); and
β_IVCR and β_IPR : constitute the angular coefficients of the regression lines, adjusted to the IVCR and IPR indices, respectively.

After the adjustment, the values of the angular coefficients (s) were verified to know whether or not they can be considered equal to zero. For this, the Student's t test was used, with a significance level of 5% (GREENE, 2008). In this regard, considered equal to zero, the IVCR and IPR indices have stable behavior. Alternatively, if considered to be different from zero, the indices may show increasing behavior β>0 or decreasing behavior (β<0).

4.4 Performance matrix of the main yerba mate exporting states

To relate the IVCR and IPR indices and characterize the Brazilian States that export yerba mate, a performance matrix was created. According to Farias and Farias (2018), states can be classified as: efficient when IVCR>1 and RPI>0, in this case, the product is important in the state's export agenda, and its commercialization in the foreign market is taking place efficiently; with external potential when IVCR>1 and IPR<0, in this case, the product is important in the state's exports list, but needs to advance in commercialization efficiency; with internal potential when the IVCR<1 and IPR>0. In this case, there is efficiency in the commercialization, but the product needs to obtain better results in the export list, being able to improve the comparative advantage; and, inefficient when the IVCR<1 and IPR<0. So, in this case, yerba mate is not a relevant agenda in the state's exports, and there is also no efficiency in the commercialization of the product in the foreign market;

According to these classifications, a performance matrix of Brazilian states that export yerba mate was constructed, based on the research of Lucena, Sousa and Coronel (2020), as shown in Table 1.

Table 1 – Performance matrix of Brazilian states exporting yerba mate, 2000 to 2020

<table>
<tr><td colspan="2" rowspan="2">Indices and trends</td><td colspan="3">IPR>0</td><td colspan="3">IPR<0</td></tr>
<tr><td>↑</td><td>↔</td><td>↓</td><td>↑</td><td>↔</td><td>↓</td></tr>
<tr><td rowspan="3">IVCR>1</td><td>↑</td><td colspan="2">Efficient and increasing</td><td rowspan="3"></td><td rowspan="3">With external and growing potential</td><td rowspan="3">With external and stable potential</td><td rowspan="3">With external and decreasing potential</td></tr>
<tr><td>↔</td><td colspan="2">Efficient and stable</td></tr>
<tr><td>↓</td><td colspan="3">Efficient and decreasing</td></tr>
<tr><td rowspan="3">IVCR<1</td><td>↑</td><td colspan="3">With internal and growing potential</td><td>Inefficient and increasing</td><td></td><td rowspan="2"></td></tr>
<tr><td>↔</td><td colspan="3">With internal potential and stable</td><td colspan="2">Ineficiente and stable</td></tr>
<tr><td>↓</td><td colspan="3">With internal and decreasing potential</td><td colspan="3">Inefficient e decreasing</td></tr>
</table>

Source: Lucena, Sousa e Coronel (2020).

In the following subsection, the data source for the construction of the Performance Matrix and the calculation of competitiveness indicators will be presented.

4.5 Data Source

The data used in this study refer to yerba mate exports and imports from the analyzed states, Brazilian yerba mate exports, and imports, as well as total exports from the considered states and from Brazil, whose annual values are expressed in FOB (Freeon Board) and in American currency - dollar (US$). These data were collected in the Brazilian foreign trade query and extraction system ComexStat (MDIC, 2021), and refer to the period from 2000 to 2020.

Based on data from the MDIC (2021), it was reported that 97.96% of the exported value of yerba mate, in 2020, was concentrated in Rio Grande do Sul, Paraná, and Santa Catarina, which justifies the analysis being carried out only for the three states. Regarding the period used in the analysis, the year 2000 is the period immediately after the adoption of the floating exchange rate regime in Brazil, and the year 2020 is the last year for which data are available.

For this purpose, the eight-digit Common Nomenclature of Mercosur (NCM) was used, with their respective codes: (0903.00.10), which corresponds to the simply cancheado yerba mate, and (0903.00.90) referring to other types of yerba mate. The first code designates the yerba mate that undergoes the primary processing of crushing and drying, serving as the basis for the production of yearb mate products. The second code encompasses products that have already been processed, such as: mate, tea and tereré.

5 ANÁLYSIS AND DISCUSSION OF RESULTS

In this section, the results of the calculated indices are presented, as well as the discussions. In this sense, at first, a characterization of the Brazilian market of yerba mate was

made. Later, the analysis of the results reported through the calculation of the Revealed Comparative Advantage Index and the Relative Position Indicator is presented. Finally, the performance matrix and the interpretation of the results reported from its construction are presented.

5.1 Characterization of the Brazilian Yerba mate market

According to the Department of Rural Economy - DERAL - of Paraná State (2020), in 2019, Brazil was the world's leading producer of yerba mate, with 939,580 thousand tons of green yerba mate, followed by Argentina, with 809 thousand tons and Paraguay, with a production of 105 thousand tons. However, in this same year, the biggest world exporter was Argentina, with US$91.6 million (46.59%), followed by Brazil, with US$82.4 million (41.92%), and in third place is Paraguay, with US$3.26 million (1.66%).

In Table 1, it can be seen that the amount of yerba mate produced in Brazil fluctuated during the analyzed period, decreasing between 2001 and 2004, then increasing between 2005 and 2017, and then again reducing in the last two. However, it is possible to observe that the amount exported grew over the years analyzed, despite having a low percentage of exports, which demonstrates that the main market for yerba mate is the domestic one.

According to Zanin and Meyer (2018), Rio Grande do Sul has the highest annual per capita consumption of yerba mate in the country, with consumption of 4.5 kg per inhabitant/year, and this value is almost ten times higher than the national average. Paraná occupies the second place, with a per capita consumption of 1.9 kg/person/year, followed by Santa Catarina (1.55 kg/person/year) and Mato Grosso do Sul (1.45 kg/person/year). person/year).

Table 1 – Amount of yerba mate produced and exported in Brazil (2000-2019)

Year	Quantity Produced (KG)	Quantity Exported(KG)	(%) Exported	Production (R$)	FOB Value Exported R$)	(%) Exportation
2000	522019000	26555004	5.09	91810000	15396014.64	16.77
2001	645965000	26696913	4.13	131634000	11797522.55	8.96
2002	513526000	25483521	4.96	119334000	7185301.931	6.02
2003	501702000	25689448	5.12	100936000	5180337.524	5.13
2004	403281000	28552196	7.08	118156000	6187447.965	5.24
2005	429730000	31539777	7.34	107130000	10578060.53	9.87
2006	434483000	31625346	7.28	132402000	14842447.96	11.21
2007	438474000	31063541	7.08	143613000	18566733.41	12.93
2008	434727000	31598917	7.27	148592000	24993995.97	16.82
2009	443126000	31050698	7.01	156385000	21407556.57	13.69
2010	430305000	33269921	7.73	160778000	28948460.49	18.01
2011	443635000	35436761	7.99	173589000	36409530.15	20.97
2012	513256000	36271919	7.07	234199000	35158394.04	15.01
2013	515451000	38009940	7.37	406518000	45748861.7	11.25
2014	602559000	34599486	5.74	670201000	48477391.43	7.23
2015	602929000	35955606	5.96	579131000	30469158.04	5.26
2016	630556000	35324764	5.60	555171000	23596657.69	4.25
2017	619771000	33625468	5.43	494263000	24696488.72	5.00
2018	509949000	36163534	7.09	426368000	23244915.44	5.45
2019	517779000	36188964	6.99	476935000	20404579.56	4.28

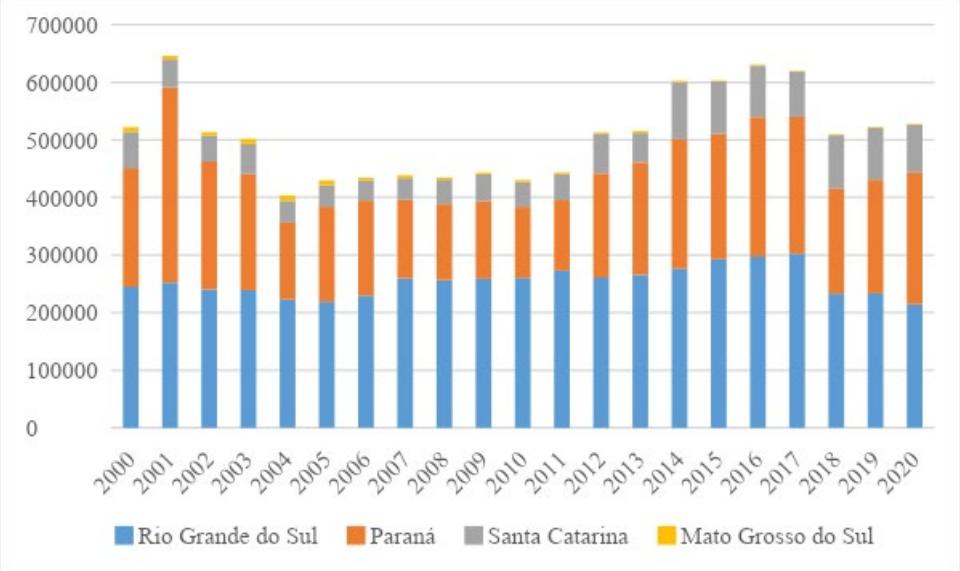
Fonte: Elaborated from MDIC (2020) and PAM-IBGE (2020).

In Figure 1, it is possible to observe that the South Region is the largest Brazilian producer of yerba mate, representing, in 2019, about 99.76% of the total produced by the

country. Medrado and Vilcahuaman (2010), estimated that approximately 700 thousand hectares of herbs are distributed in about 180 thousand properties located in about 480 municipalities, with the South Region being the largest producer. The main producer is Paraná State, which concentrates around 41.8% of the total produced, followed by Rio Grande do Sul (34.7%) and Santa Catarina (23.26%).

Herb activity generates around 700 thousand direct and indirect jobs; however, the social image of this sector is, in general, affected by some circumstances of exploitation of employees who work in pruning, difficult conditions and without work contract or registration in the National Social Security Card (LIMA; SURKAMP, 2012).

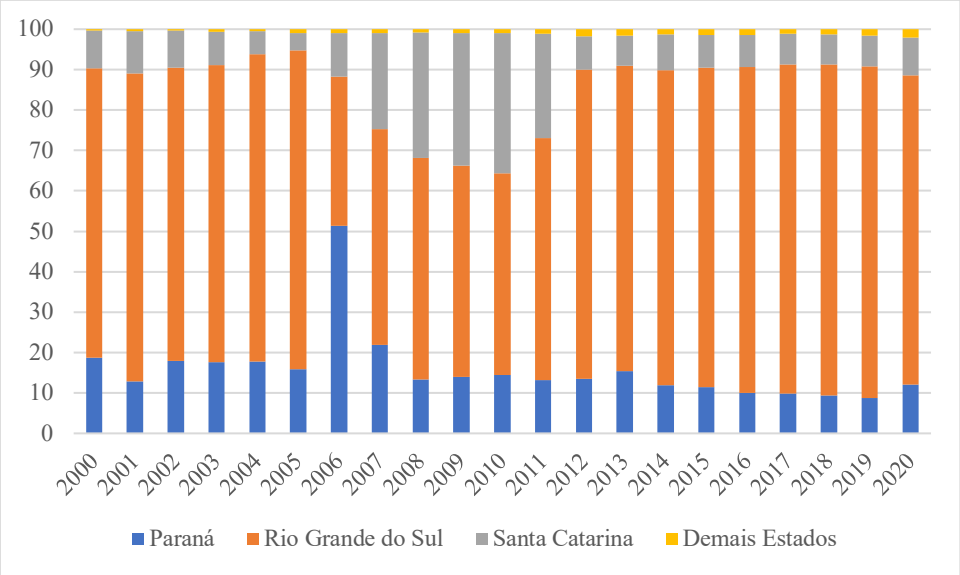
Figure 1 – State participation in the national production of yerba mate (2000 – 2020)



Source: Elaborated from PAM-IBGE (2021).

In Figure 2, it is observed that, despite Paraná State being the largest producer, it is Eo Rio Grande do Sul that most export yerba mate. In 2019, about 81.89% (29121480 kg) of the total exported yerba mate were from Rio Grande do Sul. Santa Catarina State contributed with around 9.74% of total exports and Paraná exported 8.75% of the total of yerba mate exported by the country. According to Schirigatti (2014); although, Rio Grande do Sul is not the largest producer of yerba mate cancheada, as this placement belongs to Paraná, Rio Grande do Sul is the largest exporter of other types of yerba mate, as the state buys yerba mate simply cancheado from Paraná, processes it and sends it to the foreign market.

Figure 2 - Participation of states in the Brazilian export of yerba mate (2000 – 2020)



Fonte: Elaborated from MDIC (2021)

In Table 2, it is possible to observe that the main destination of Brazilian yerba mate is Uruguay, which in 2019, represented about 84.86% of the total exported by Brazil, followed by Chile (4.10%) and Argentina (3.04%). According to Zanin and Meyer (2018), yerba mate is exported in the processed form and its main destination is Uruguay, as this country has a similar tradition to the southern states of Brazil regarding the consumption of yerba mate, but without presenting in-house production.

Table 2 - Relative Participation of Yerba Mate Importing Countries from Brazil (2000 to 2020)

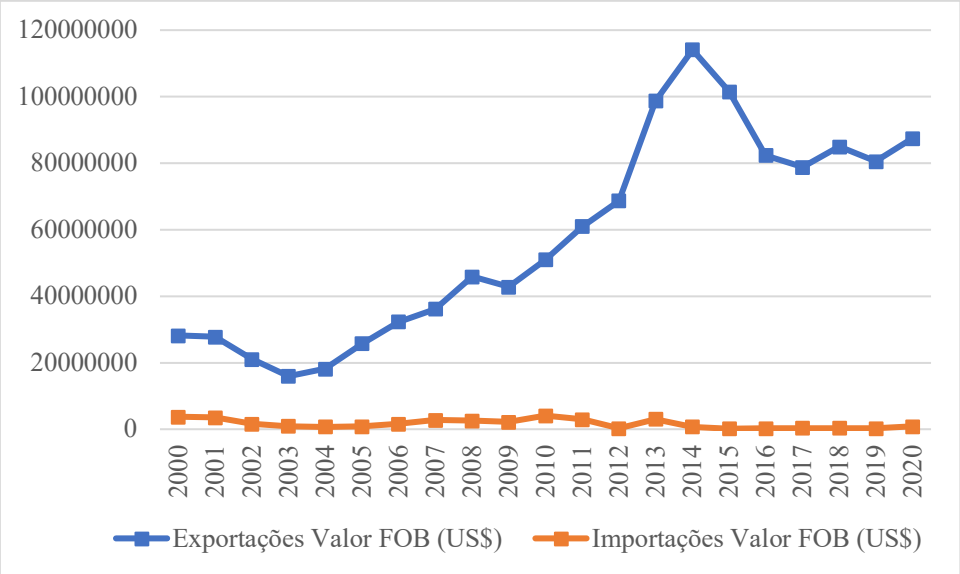
	Uruguay	Chile	Argentina	Germany	United States
2000	84,45	10,89	1,97	1,11	0,51
2001	86,19	9,53	1,29	0,82	1,32
2002	83,70	10,79	0,06	1,79	2,06
2003	81,35	11,37	0,00	3,34	2,08
2004	82,14	10,55	0,17	2,33	1,89
2005	86,72	8,14	0,20	1,86	0,90
2006	87,43	6,22	0,88	1,12	1,71
2007	85,62	6,53	1,07	1,80	1,80
2008	90,28	3,78	0,75	1,23	1,65
2009	89,66	4,54	0,59	1,08	1,80
2010	88,04	5,10	0,99	1,32	1,36
2011	88,65	4,40	0,61	1,84	1,92
2012	82,86	5,88	0,49	2,17	1,79
2013	84,11	6,98	0,25	2,56	1,93
2014	87,32	3,33	0,16	2,19	2,84
2015	86,02	4,58	0,17	2,81	3,20
2016	84,36	3,69	0,45	3,10	3,83
2017	85,10	3,24	0,75	2,91	3,34

2018	85,11	3,18	1,07	3,62	2,95
2019	83,85	2,86	2,09	3,19	3,22
2020	70,81	2,93	15,84	2,71	2,31

Fonte: Elaborated from MDIC (2021).

Figure 3, We observed that the yerba mate trade balance, despite the oscillations presented, showed a surplus throughout the analyzed period, around US $27 million/year, demonstrating that Brazil exports more than it imports. Regarding imports, the main country from which they come is Argentina, around 95% in 2019. From this perspective, around 90% of these imports are from yerba mate cancheada, which has lower added value and complements the domestic industrial supply (MDIC, 2021).

Figure 3 - Brazilian Yerba Mate Trade Balance (2000-2020)



Fonte: Elaborated from MDIC (2021).

According to Zanin and Meyer (2018), in 2014, the price paid to the producer reached 20.29 R$/kg; however, the producer price grew at a greater proportion than the retail price. So

that the relative margin showed a reduction, while there was an increase in the absolute margin. This increase is due to crop failure due to weather problems in the previous year. The dry climate followed by frost was largely responsible for the reduction in productivity. However, recently, from 2015 to 2019, the domestic prices proved to be higher than the foreign price, thus justifying the low export of herb production.

Therefore, the production of yerba mate, considered a permanent crop, assumes particular importance in the three states of the Southern Region of Brazil. Research has been conducted, on creating food, pharmacological and, cosmetic products, among others, derived from yerba mate. Yerba mate has great potential for growth in terms of exports; however, it is necessary to diversify markets such as the creation of new products, as well as their dissemination (ZANIN; MEYER, 2018).

5. 2 Indicator of Revealed Comparative Advantage (IVCR)

Table 3 shows the behavior of the revealed comparative advantages of the three yerba mate exporting states. According to the results, on average, all the states analyzed have a revealed comparative advantage. During the entire period analyzed, the Santa Catarina State did not only present advantages in 2005, when its IVCR was below the unit (0.90), but, in the rest of the period and in the other two states, the index was always above the unit, indicating that yerba mate is a relevant export agenda.

Table 3 - Revealed Comparative Advantage Index (2000-2020)

	Paraná	Rio Grande do Sul	Santa Catarina
2000	2,34	6,82	1,90
2001	1,40	6,98	2,02
2002	1,90	6,85	1,76
2003	1,80	6,69	1,61
2004	1,82	7,41	1,15
2005	1,87	8,97	0,90
2006	7,07	4,34	2,48
2007	2,84	5,74	5,15
2008	1,72	5,92	7,38
2009	1,91	5,26	7,83
2010	2,06	6,56	9,29
2011	1,94	7,91	7,34
2012	1,84	10,69	2,26
2013	2,04	7,28	2,10
2014	1,65	9,39	2,21
2015	1,47	8,60	2,04
2016	1,23	8,99	1,96
2017	1,19	9,96	1,95
2018	1,12	9,31	1,95
2019	1,20	9,96	1,89
2020	1,54	11,43	2,40
Média	2,00	7,86	3,22

Fonte: elaborated by the authors com based on ComexStat (MDIC, 2021)

Rio Grande do Sul State occupies a prominent position compared to Santa Catarina and Paraná, presenting an average IVCR of 7.86, well above Santa Catarina and Paraná, with average values of 3.22 and 2.00, respectively. During the analyzed period, the state only did not occupy the position of the largest exporter of yerba mate in 2006, when it was behind Paraná

(MDIC, 2021). Additionally, the state exports the most processed products, such as the herb for mate, tereré, and mate tea (classified in the NCM as other types of mate).

The adoption of yerba mate quality certification, developed by the Technical Assistance and Rural Extension Company of Rio Grande do Sul - EMATER/RS, was a strategy adopted to conquer the foreign market and increase the international insertion of the product. In this certification process, approximately 150 items are audited to ensure the adoption of good agricultural and manufacturing practices, in addition to meeting standards and legislation with the objective of qualifying, differentiating and valuing the product in the national market (ATLAS SOCIOECONÔMICO DO RIO GRANDE DO SUL, 2020).

Paraná had its largest IVCR recorded in 2006, the year in which it also ranked as the largest exporter of yerba mate. From 2007 onwards, the values of the IVCR of Santa Catarina overlapped those of Paraná, with emphasis on the years 2008, 2009, and 2010 when the IVCR of Santa Catarina was higher than Rio Grande do Sul. Recently, there is a trend of growth in the index in Rio Grande do Sul, while in Paraná and Santa Catarina there is a trend toward stability.

According to the Socioeconomic Atlas of Rio Grande do Sul (2020), Brazil, especially the South Region, has stood out in the cultivation of yerba mate worldwide because of the various initiatives to improve cultivars in small and medium-sized rural properties, developing silvicultural techniques, and introducing mechanization in part of the production process of this sector.

5.3 Relative Position Indicator (IPR)

Table 4 shows the behavior of the Relative Position indicator. The three states presented positive IPR throughout the analyzed period, that is, they were net exporters of yerba mate. The results show that; although, it has fluctuated over the years analyzed, especially in the second half of the 2000s, Rio Grande do Sul has a considerable share in the foreign sales of yerba mate.

Paraná has the second best IPR average, and the state has a tradition of being a major producer and exporter of the product, as well as Santa Catarina, both states present similar results in terms of participation in foreign sales. Their results were better in the second half of the 2000s, and they are stable today

Table 4 - Relative Position Index (2000-2020)

	Paraná	Rio Grande do Sul	Santa Catarina
2000	10,25	61,47	5,19
2001	4,76	65,28	7,31
2002	12,47	66,07	7,26
2003	13,30	68,89	6,87
2004	15,29	71,33	5,17
2005	15,08	74,36	3,73
2006	48,67	32,12	8,85
2007	19,81	45,01	19,97
2008	12,19	49,60	26,88
2009	13,11	48,84	27,52
2010	11,79	44,51	28,06
2011	12,04	56,81	20,95
2012	13,34	76,23	8,02
2013	14,43	72,89	5,12
2014	11,74	77,38	8,27
2015	11,48	78,80	8,06

2016	10,03	80,28	7,83
2017	9,80	81,08	7,26
2018	9,09	81,50	7,31
2019	8,51	81,69	7,43
2020	11,15	75,86	9,08
Média	13,73	66,19	11,24

Fonte: Elaborated by the authors based on ComexStat (MDIC, 2021)

Schirigatti (2014) corroborated those found in this research. When analyzing Brazil's IPRM in yerba mate exports, for the period from 1997 to 2011, the author concluded that the country obtained positive results throughout the period. For Zanin and Meyer (2018), since the 1990s, the balance of Brazilian mate exports has been largely positive, and since 2010 the value of exports has grown even more, especially due to high prices.

5.4 Construction of the Performance Matrix

Based on the results reported in the Revealed Comparative Advantage Index (IVCR) and Relative Position Index (IPR) and on the values and linear trend of the historical series of these indices, a performance matrix was created. Table 5 summarizes the results and Table 2 presents the matrix.

Table 5 - Results for the Performance Matrix

IVCR	Minimum	Average	Maximum	Standard Deviation	B	p-value
Paraná	1,1248	2,0018	7,0707	1,2321	-0,0646	0,150
Rio Grande do Sul	4,3397	7,8647	11,4391	1,8851	0,2080	0,001
Santa Catarina	0,9084	3,2219	9,2927	2,5112	-0,0033	0,972
IPR	Minimum	Average	Maximum	Standard Deviation	B	p-value
Paraná	4,7610	13,7329	48,6740	8,5443	-0,2869	0,365
Rio Grande do Sul	32,1257	66,1954	81,6952	14,6392	1,1717	0,022
Santa Catarina	3,7325	11,2476	28,0599	7,9926	-0,0136	0,964

Fonte: Elaborated by the authors based on MDIC (2021).

Table 2 - Performance matrix of the main Brazilian states exporting yerba mate from 2000 to 2020

Efficient			
Classification	IVCR > 1	IPR > 0	Brazilian States exporting Yerba Mate
Increasing	↑	↑	Rio Grande do Sul
Stable	↔	↔	Paraná - Santa Catarina

Source: Elaborated by the authors (2021)

In agreement with the classification presented in the methodology section, considering the average values of IVCR and IPR, it can be inferred that Paraná, Rio Grande do Sul and Santa Catarina are efficient exporters of yerba mate, as the IVCR of these states was higher to unity and the IPR greater than zero. In other words, the three states have a revealed comparative advantage and are net exporters of yerba mate. Regarding the trend, Rio Grande do Sul showed an increasing trend, while Paraná and Santa Catarina showed stability at both indices.

6 CONCLUSION

This study analyzed the performance of the main Brazilian States that exported yerba mate from 2000 to 2020. Additionally, it measured the efficiency of states in the export of this commodity. To this end, only the main states that exported the product were considered, namely, Paraná, Rio Grande do Sul and Santa Catarina.

The results of the Revealed Comparative Advantage Index showed that Rio Grande do Sul, Paraná and Santa Catarina revealed a comparative advantage in yerba mate exports throughout the study period, except in 2005 for Santa Catarina. However, only Rio Grande do Sul showed a growth trend in the index during the period considered.

For the Relative Position Index, the three states are net exporters of yerba mate, but Rio Grande do Sul occupies a prominent position compared to the others, followed by Paraná, with the second best average, and by Santa Catarina. Regarding the performance matrix, the states of Rio Grande do Sul, Paraná and Santa Catarina were classified as efficient.

As limitations of this research, we highlight the use of static indices that do not allow intertemporal comparisons, since they do not consider the economy in all its specificity and; therefore, ignore qualitative issues such as trade barriers, climatic conditions, and prices. Thus, for a more robust analysis, we suggest the use of other competitiveness indicators, as well as the use of Gravitational and Dynamic General Equilibrium Models, which simulate more complex scenarios and measure the impact of economic policies on yerba mate production.

REFERENCES

ATLAS SOCIOECONOMICO DO RIO GRANDE DO SUL. **Erva-Mate**: O Rio Grande do Sul é o maior produtor nacional de folha verde de erva-mate, 2020. Disponível em: <https://atlassocioeconomico.rs.gov.br/erva-mate>.Acessoem: 27 de jan. 2021.

BALASSA, B. **Trade liberalization and "Revealed"** comparative advantage. Oxford: Manchester Schoolof Economic and Social Studies, 1965. p. 99-123.

BALCEWICZ, L. C. **A competitividade da cultura de erva-mate, num contexto de integração econômica, no MERCOSUL**. 2000. 119 f. Dissertação (Mestrado) – Curso de Pós-Graduação em Engenharia Florestal, Universidade Federal do Paraná, Curitiba, 2000. Disponível em: <http://acervodigital.ufpr.br/bitstream/handle/1884/25951/D%20-%20BALCEWICZ,%20LUIZ%20CARLOS.pdf>. Acesso em: 27 de jan. 2021.

CARMO, E. C.; MARIANO J. **Economia Internacional**. 2ª ed. São Paulo: Editora Saraiva, 2010.

CORONEL, D. A.; SOUSA, E. P.; AMORIM, A. L. Desempenho exportador do mel natural nos estados brasileiros. **Pesquisa & Debate**, São Paulo, v. 22, n. 2 (40), p. 343-360, 2011. Disponível em: <https://revistas.pucsp.br/rpe/article/view/11749>. Acessoem: 22 jan 2021.

COSTA, F. *et al.* Competitiveness overview of four Brazilian non-timber forest products. **Journal of Agricultural Science**, v. 11, n. 10, p. 131-139, 2019.

COUTINHO, L. G., FERRAZ, J. C. (Coord). **Estudo da competitividade da indústria brasileira**. 2º ed. Campinas: Paperies, 1994.

DEPARTAMENTO DE ECONOMIA RURAL DO ESTADO DO PARANÁ – DERAL. **Erva-Mate Análise da Conjuntura – Safra 2019/20,** 2020. Disponível em < http://www.agricultura.pr.gov.br/sites/default/arquivos_restritos/files/documento/2019-12/erva-mate_2020.pdf>acesso em: 27 de jan. 2021.

ELLSWORTH, P. T. **Economia internacional**. São Paulo, Atlas, 1978.

EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA. **Transferência de tecnologia florestal** – Erva-mate, 2020. Disponível em <https://www.embrapa.br/florestas/transferencia-de-tecnologia/erva-mate> Acesso em: 07 dez. 2020.

ESPERANÇA, A. A.; LÍRIO, V. S.; MENDONÇA, T. G. de. Análise comparativa do desempenho exportador de flores e plantas ornamentais nos estados de São Paulo e Ceará. **Revista Econômica do Nordeste**, Fortaleza, v. 42, n. 2, p. 259-286. abr./jun. 2011. Disponível em: <https://www.bnb.gov.br/revista/index.php/ren/article/view/145/124>. Acesso em: 26 jan 2021.

FARIAS, A. C. S.; FARIAS, R. B. A. Desempenho comparativo entre países exportadores de pescado no comércio internacional: Brasil eficiente? **Revista de Economia e Sociologia Rural**, Piracicaba, v. 56, n. 03, p. 451-466, jul./set. 2018. Disponível em: <https://www.scielo.br/pdf/resr/v56n3/1806-9479-resr-56-03-451.pdf>. Acesso em: 21 dez 2020.

FIGUEIREDO, A. M.; SANTOS, M. L. Evolução das vantagens comparativas do Brasil no comércio mundial de soja. **Revista de Política Agrícola**, v. 14, n. 1, p. 9-16, 2005.

FONTES, R. M. O. **Competitividade agrícola e blocos.** Viçosa: UFV, 1992.

GONÇALVES, R. *et al.***A nova economia internacional**: uma perspectiva brasileira.Rio de Janeiro: Campus, 1998.

GREENE, W. H. **EconometricsAnalysis**. 6. ed. New Jersey: Pearson Education, 2008.

GUIMARÃES, M. C. **O Mercosul e o desempenho do comércio intra-indústria do setor brasileiro de papel e celulose**.2007. 118 f.Dissertação de Mestrado em Economia Aplicada. Universidade Federalde Viçosa, Viçosa, 2007.

HIDALGO, A. B. Especialização e competitividade do Nordeste no mercado internacional. **Revista Econômica do Nordeste**, Fortaleza, v. 29, n. especial, p. 491-515, jul. 1998.

HOFF, D. N.; BLUME, R.; PEDROZO, E. A. Construindo competitividade a partir da Certificação Florestal: um estudo na Ervateira Putinguense, RS. **Desenvolvimento e Meio**

ambiente, n. 17, p. 121-132, jan./jun. 2008. Disponível em: <https://revistas.ufpr.br/made/article/view/13416>. Acesso em: 27 jan. 2021.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA – IBGE. **Produção Agrícola Municipal** – PAM. 2019. Disponível em: <https://sidra.ibge.gov.br/pesquisa/pam/tabelas>. Acesso em: 12 jan. 2021.

ILHA, A. S.; WEGNER, R. C.; DORNELLES, J. P. O agronegócio gaúcho na perspectiva da vantagem competitiva revelada (1996-2006). **Análise**, Porto Alegre, v. 21, n. 1, p. 63-71, jan/jun 2010.

JABOINSKI, N. J. **A avaliação da eficiência produtiva da cultura da erva-mate no Alto Uruguai gaúcho através da utilização de um diagrama de causa e efeito**. 2003. 115 f. Dissertação (Mestrado em Agronegócio) – Escola de Administração, Universidade Federal do Rio Grande do Sul, Porto Alegre, 2003.

KRUGMAN, P. R.; OBSTFELD, M. **Economia Internacional – Teoria e Política**. São Paulo: MAKRON Books, 2005.

LAFAY, G. *et al.***Nations et mondialisation**. Paris: Economica, 1999.

LIMA, B.; SURKAMP, L. **Erva-mate**: Erva que escraviza. Fortaleza: La Barca, 2012.

LUCENA, M. A.; SOUSA, E. P.; CORONEL, D. A. Desempenho dos principais estados brasileiros exportadores de café. In: Congresso Brasileiro de Economia, Administração e Sociologia Rural, 58., 2020, Foz do Iguaçu. **Anais**...Foz do Iguaçu: SOBER, 2020. Disponível em: <https://even3.blob.core.windows.net/anais/246370.pdf>. Acesso em: 21 dez 2020.

MDIC. **Ministério da Economia Indústria, Comércio Exterior e Serviços**. Disponível em: <www.mdic.gov.br>. Acesso em: 16 jan. 2021.

MEDRADO, M. J. S.; VILCAHUAMAN, L. J. M. **Importância socioeconômica e ambiental.** Sistema de Produção: EMBRAPA FLORESTAS, n. 1, 2. e. 2010. Disponível em: <http://sistemasdeproducao.cnptia.embrapa.br/FontesHTML/Ervamate/CultivodaErvaMate_2ed/Importancia.htm>. Acesso em: 27 de jan. 2021.

PEREIRA, B. D.; SILVA, P. L.; FARIA, A. M. de M.; SILVA, G. R.; JOSEPH, L. C. Especialização e vantagens competitivas do Estado de Mato Grosso no mercado internacional: um estudo de indicadores de comércio exterior no período 1996-2007. **Revista de Economia**, v. 35, n. 2 (ano 33), p. 41-58, set./dez. 2009. Editora UFPR. Disponível em: <https://revistas.ufpr.br/economia/article/view/16707>. Acesso em: 25 jan. 2021.

RICARDO, D. **The principles of political economy and taxation**. New York: The Modern Library, 1963.

ROCHA JR, W. F.; RINALDI, R. N.; ROCHA, V. L. B. F. Identificação de fatores competitivos no desenvolvimento do produto erva-mate. **Revista Produção Online**, v. 4, n. 3, 2004.

SAMOGGIA, A.; LANDUZZI, P.; VICIÉN, C. E. Market Expansion of Caffeine-Containing Products: Italian and Argentinian Yerba Mate Consumer Behavior and Health Perception. **International Journal of Environmental Research and Public Health**, v. 18, n. 15, p. 8117, 2021.

SCHIRIGATTI, E. L. **Dinâmica das exportações e avaliação da competitividade do setor de mate Brasileiro**. 2014. 304 f. Tese (Doutorado) - Universidade Federal do Paraná, Setor de Ciências Agrárias, Programa de Pós-Graduação em Engenharia Florestal. Curitiba, 2014.

SCHIRIGATTI, E, L. *et al.* Vantagem comparativa e matriz de competitividade do mate brasileiro e argentino, no período de 1997-2011. **Ciência Florestal (01039954)**, v. 28, n. 4, 2018. Disponível em:<https://periodicos.ufsm.br/cienciaflorestal/article/view/35360/pdf>. Acesso em: 08 jan 2021.

SIGNOR, P.; GOMES, G. S.; WATZLAWICK, L. F. Produção de erva-mate e conservação de Floresta com Araucária. **Pesquisa Florestal Brasileira**. Colombo, v. 35, n. 83, p. 199-208, jul./set. 2015. Disponível em: <https://pfb.cnpf.embrapa.br/pfb/index.php/pfb/article/view/898/428>. Acesso em: 12 jan 2021.

SILVA, T. A. **Desempenho da pauta de exportações agroindustriais de Minas Gerais no período de 1990 a 2003**. 2005. 86 f. Dissertação (Mestrado em Economia Aplicada) - Universidade Federal de Viçosa, Viçosa. 2005.

SIQUEIRA, K. B.; PINHA, L. C. Vantagens Comparativas Reveladas do Brasil no comércio internacional de lácteos. **Boletim de Pesquisa e Desenvolvimento**. Embrapa Gado, 2011. Disponível em: <https://ainfo.cnptia.embrapa.br/digital/bitstream/item/57092/1/BOP-34-Vantagens-comparativas-reveladas-do-Brasil-no-comercio-internacional-de-lacteos.pdf>. Acessoem: 26 jan. 2021.

SMITH, A. **The wealth of nations**. New York: The Modern Library, 1937.

WOLF, R.; PEREIRA, M. W. G. Análise econômica da evolução histórica da erva-mate em Mato Grosso do Sul. **Revista em Agronegócio e Meio Ambiente**, v. 8, n. 1, p. 57-78, 2015.

WOLF, R.; PEREIRA, M. W. G. Análise dos efeitos dos fluxos de comércio da erva-mate entre estados brasileiros e o Mercosul, entre 2002 e 2012. **Ensaios FEE**, v. 37, n. 3, p. 673-690, 2016.

ZANIN, V.; MEYER, L. G. Evolução da margem de comercialização da erva mate no Rio Grande do Sul. **Revista IPecege**, v. 4, n. 1, p. 7-18, 2018.