



---

**Unification Of Agro-Industrial businesses In the Sugar-Energy Sector: A Study  
of The Value of the Company**

**Unificação De Agroindústrias Do Setor Sucroenergético: Um Estudo Do Valor  
Da Empresa**

Thiago Henrique Caraski

[t.caraski@unesp.br](mailto:t.caraski@unesp.br)

<https://orcid.org/0009-0001-1023-0382>

Adriano dos Reis Lucente

[adriano.lucente@unesp.br](mailto:adriano.lucente@unesp.br)

<https://orcid.org/0000-0003-4796-3843>

Luciana Aparecida Barbieri

[luciana.barbieri05@gmail.com](mailto:luciana.barbieri05@gmail.com)

<https://orcid.org/0000-0001-9240-0236>

Maria Carolina Martins Rodrigues

[macarol.rodrigues@gmail.com](mailto:macarol.rodrigues@gmail.com)

<https://orcid.org/0000-0003-2575-8611>



---

## ABSTRACT

**Objective:** Carrying out a comparative study to assess impact on company value next to the unification of two agro-industrial plants in the sugar-energy sector.

**Method:** Study with an applied nature consisting of two stages with different approaches. The first was qualitative and provided subsidies for the second stage, which was quantitative with predominantly exploratory characteristics. The technical procedure used was the case study with the use of research protocols and data collection gathered from in-depth interviews, documentary consultations and field observations. For the analysis' results, the Content Analysis technique was used, in addition to the calculation of the Discounted Cash Flow with risk analysis by the Monte Carlo Simulation.

**Result:** In summary, it can be said that it was possible to identify that the company opted for the correct decision by unifying its units.

**Originality:** The work draws a parallel between company mergers and the unification of the company under study. Subject not frequently addressed in the literature.

**Theoretical/Methodological Contributions:** The study provided a detailed structure with the steps to be followed with interview scripts, analysis of variables and calculations of Company Value and Risk Analysis for future unification movements of other companies, in this or another sector.

**Social Contributions:** The study can contribute to the perception of the top management of the company under study, converging on the result of unification.

**Keywords:** Risks; Sugar-energy sector; Valuation.



---

## RESUMO

**Objetivo:** Realizar um estudo comparativo para avaliar o impacto no valor da empresa após a unificação de duas plantas agroindustriais do setor sucroenergético.

**Método:** O estudo teve natureza aplicada composta por duas etapas com abordagens distintas. A primeira foi qualitativa e forneceu subsídios para a segunda etapa, que foi quantitativa com características predominantemente exploratórias. O procedimento técnico utilizado foi o estudo de caso com a utilização de protocolos de pesquisa e a coleta de dados ocorreu através de entrevistas em profundidade, consultas documentais e observações de campo. Para a análise dos resultados foi utilizada a técnica de Análise de Conteúdo, além do cálculo do Fluxo de Caixa Descontado com análise de riscos por meio da Simulação de Monte Carlo.

**Resultado:** Sintetizando pode-se afirmar que foi possível identificar que a empresa optou pela decisão correta unificando suas unidades.

**Originalidade:** O trabalho traça um paralelo entre as fusões de empresa e a unificação da empresa objeto de estudo. Assunto não abordado com frequência na literatura.

**Contribuições Teóricas/Metodológicas:** O estudo forneceu uma estrutura detalhada com as etapas a serem seguidas com roteiros de entrevistas, análise de variáveis e cálculos de Valor da Empresa e Análise de Risco para futuros movimentos de unificação de outras empresas, deste ou de outro setor.

**Contribuições Sociais:** O estudo pode contribuir com a percepção da alta gerência da empresa objeto de estudo convergindo para o resultado de unificação.

**Palavras-chaves:** Setor sucroenergético; Valuation; Riscos.



---

## 1. INTRODUCTION

Agro-industrial business has significant importance for the Brazilian economy. In the period from 2000 to 2020, its growth occurred in a more relevant way and contributed significantly to the Brazilian economy (Centro de Estudos Avançados em Economia Aplicada - Center for Advanced Studies in Applied Economics [CEPEA], 2021). Still in accordance to that entity (CEPEA, 2021), the GDP (Gross Domestic Product) of Brazilian agro-industrial business pointed out in 2020 an increase of 24.31% when compared to the previous year. This result was perceived in most segments of the production chain and ensures the participation of agro-industrial business at 26.6% in the country's total GDP (CEPEA, 2021).

With this expressive context, the objective of this study was to conduct a comparative analysis to evaluate the impact on the company's value after the unification of two agro-industrial plants in the sugar-energy sector.

According to the União Nacional de Bioenergia - National Bioenergy Union (UDOP) in 2020, Brazil allocated approximately 48% of sugarcane to sugar production in the 2020/2021 harvest. With this number, the record production volume of 41 million tons of sugar in the 2020/21 harvest, together with the production of ethanol from sugarcane estimated at around 27 billion liters, Brazil stood as one of the largest producers in this segment (UDOP, 2020).

According to the Food and Agriculture Organization (FAO) 2019 report, global sugar production is estimated to grow by around 14% by 2028, driven mainly by the increase in sugar consumption in the Asian continent, Middle East and the north of the African continent. To achieve this, it will be necessary for the sector to undergo expansion, investments and modernization in its production processes (FAO, 2019).

Analyzing from this point of view, in which demand must be increased and sugar prices are being projected at levels that tend to remunerate capital, investments and production modernizations must be part of the sugar-energy sector's portfolio for the coming years, as well as special attention to production costs in this segment.

In their study, Albanez et al. (2007) demonstrated that organizations in the sugar-energy sector must turn their cost management more robust, as it influences the companies' results. In this sense, it is known that more efficient management should mean a relevant gain in production processes, with resources savings, and providing better financial results, transformed into an increase in operating margin and investment capacity in new assets and modernization. However, the cost structure of sugar and ethanol plants has in its formation a portion of fixed costs that tend to minimize their result, if they do not have availability of all the sugarcane necessary for milling in order to fill in their installed capacity (Programa de Educação





---

Continuada em Economia e Gestão de Empresas - Continuing Education Program in Economics and Business Management [PECEGE], 2020).

Therefore, according to the Sociedade Nacional de Agricultura - National Agricultural Society (SNA), in 2020, the majority of costs in the sugar-energy segment are of fixed origin. According to PECEGE (2020), in the agricultural area, which absorbs 71% of all costs of a sugar and ethanol plant, fixed costs represent 86% of the total. The fixed portion of costs is also high in the industrial (75%) and administrative (50%) areas. With this cost structure, is therefore, necessary for companies to seek more efficient production to dilute the relative cost.

In the last two decades, there have been frequent movements for the purchase of Brazilian companies by multinationals and, also, there have been internal rearrangements, which have come to be considered as a fever of incorporations, mergers and acquisitions in the sectoral environment due to the great movement observed. Such a sequence of operations may be based on an economic logic of company concentration (Esberard et al., 2009).

According to Façanha (2012), in the sugar-energy chain, when it comes to mergers, acquisitions and strategic alliances, the greatest concentration occurs in acquisitions, in full or in part, mainly with regard to horizontal and vertical integrations. However, the core of this article is similar to the concept of company mergers, where organizational growth is determined by company combination strategies and one company merges with another to create a third company, resulting from the partnership (Correa et al., 2009).

In this way, some synergies caused by this companies merging, can be identified in this study. However, mergers occur between companies belonging to different companies. This research focuses on the productive union of 2 units of the same business group, which more adequately meet the concept of unification.

According to Esberard et al. (2009), sugar and ethanol production costs have become a strategic differentiator for business success. Companies began to seek to optimize their horizontal boundaries using, mainly, the economy of scale strategy to provide them with a competitive advantage. The same study also provided conditions to conclude that there is no optimal plant for the Brazilian sugar-energy sector that serves as a model for plants to follow, but rather that each plant has an optimal production point in relation to its costs.

Based on this information, this research seeks to generate a contribution to the sugar-energy sector, serving as a basis for other agro-industrial companies to study the possibility of unifying their units as a way of sustaining their business. Also important to cooperate in the social sphere, because, based on the results obtained, scholars will be able to use it to justify the unification of companies in the sugar-energy sector. The study is also relevant due to the power of this sector in the Brazilian economy. Furthermore, it will be able to demonstrate whether the group under study made the correct choice by opting for the unification of its agro-industrial plants.

---



---

Given this, the research proposal aimed to carry out a comparative study to understand the main impacts on the company's value after the unification of two agro-industrial plants belonging to the same business group in the sugar-energy sector.

## **2. STRATEGIC COST MANAGEMENT, COMPANY VALUE AND THE SUGARENERGY SECTOR**

According to Santos et al. (2019), it is necessary for managers in the sugar-energy sector to be aware of the costs involved in production, as they can be an important tool for the success of the business. In this way, monitoring and controlling costs is a crucial factor in decision-making, as well as for planning and evaluating business performance. The various types of rural activities can be controlled through their costs, and a detailed analysis of expenses and revenues for each business can be closely monitored to make more accurate decisions (SANTOS et al., 2019).

Get to know the behavior of costs, based on the company's level of activity, is an advantage for the company's management that can work with this information, providing them higher standards to predict how costs will behave in different situations within the company, so, being able to improve the planning and control of activities (Medeiros et al., 2005, Brito, 2023).

Therefore, when making more precise decisions, managers need relevant and accurate information. And what information is that? The costs arising from their activities. In this way, cost organization becomes an extremely important tool in the various activities within organizations.

Corroborating this understanding, studies related to the sugar-energy sector point out that, in a scenario demonstrated as heterogeneous among organizations, both in the agricultural and industrial areas, the biggest challenge for the sector is to increase the number of companies operating at a level of efficient operational financial management (RODRIGUES; BELON, 2018).

Carneiro et al. (2019), states that sugar-energy sector requires special attention in determining and controlling its production costs. The authors also highlight the importance of strategic cost management in this sector, as well as others, exposed to large competitors and susceptible to the action of competitors on a global level, as is the case with agricultural commodities.

Moura & Lima (2016) and Lima & Neves (2022), argue that understanding and classifying costs is important as an evaluation tool for an agro-industrial company in the long term, including in the sugarcane sector. Understanding strategic cost management in this context leads to the perception that competitiveness is increasingly fierce in the sector and closely related to improving productivity as well as reducing production costs and, in this way, prior and accurate knowledge of the value chain elements and cost determinants can be significant in the management process and obtaining competitive advantage (Santos, 2017, Lima et al 2023).



---

From this perspective, analyzing the cost structure according to (SNA, 2020), it is highlighted that most costs of the agricultural phase of the sugar-energy segment are fixed, come from maintenance, in the off-season, are carried out on equipment, mainly on harvesters.

Complementing this idea, PECEGE (2020) it is shown that in agricultural area, absorbing 71% of all costs of a plant, fixed costs represent 86% of the total. With this data, it is therefore necessary for companies to seek more efficient production to dilute fixed costs.

Still in this context, it is stated that the productivity and quality of the sugarcane field, play a fundamental role in diluting costs, especially in the sector where fixed costs are predominant. Therefore, increasing agricultural production is extremely important for reducing the average total cost through economies of scale (PECEGE, 2020).

Taking into account the corporate situation and market dynamics, Damodaran (2012) states that a solid investment should ensure that the investor only pays the asset for what it truly worth. In this scenario, the importance of "Valuation" arises, a word in English language to demonstrate the value of a company.

Healy and Bernard (2004) apud Mendonça (2020, p. 4) define Valuation as "the process of converting a projection into an estimate of the value of a company or a part of the company". The Valuation method is based on the use of competitive market prices to evaluate a cost or a possible benefit, and it is capable of determining the value of an investment opportunity for the company. The construction of Valuation is considered the starting point of all financial decisions (Berk et al., (2015); Vian et al (2017)).

Following this idea, the main motivations to evaluate a company are the purchases or sales of businesses, separately-run companies, assessment of managers' ability to generate wealth for shareholders, merger, spin-off and incorporation of companies, or liquidation of enterprises (Martins, 2001, Silva & Arantes (2024).

Damodaran (2012) and Lins et al. (2020) elucidate that the entire company valuation process, even based on mathematical models, is biased, considering the several stages of carrying out a Valuation, the evaluator's predictions about the future of the company, brings a subjective nature to the analysis.

In this context, Fernandez (2002) argues that the best method for valuing a company is Fluxo de Caixa Descontado - Discounted Cash Flow (DCF). In the same sense, Alves et al. (2013) state that this method should be considered in every company analysis, as it considers the future benefits that an investment may provide in terms of wealth aggregation.

However, the DCF method fails to identify uncertainties in the input data, without saying the probability and risk of variations in the projections made (Ugwuegbu, 2013, Dulci, 2018).

---



---

Macedo (2019), in his study, shows that through DCF it is possible to demonstrate a high level of understanding, as its method includes variables that can represent the company. Thus, it provides a more detailed analysis of the wealth generation through long term cash flow (MACEDO et al., 2019).

According to Taborda (2017), within fundamental analysis, there are various models with different methods to determine the fair value of a company. However, in the case of business Valuation, DCF is the most widespread method, as its complexity is more comprehensive and demonstrates more parameters of the company to quantify its value.

In the field of Corporate Finance literature, the DCF method is already considered an important tool by the leading researchers in the area, as it includes a range of technical procedures that are validated, appropriate, consistent, recognized, and approved for constructing the Valuation of a company (ASSAF NETO, 2020; JUCÁ, 2020a; 2020b; 2020c; LIMA, 2020; MARTELANC; PASIN; CAVALCANTE, 2005; MARTELANC; PASIN; PEREIRA, 2010). However, the quality of the Valuation is determined by the assumptions used in its construction. The use of high-quality assumptions will consequently result in a high-quality valuation, and the reverse is also true. In this context, the quality of the assumptions depends, therefore, on the researcher's ability to understand the business, comprehend it, and project it (ASSAF NETO, 2020; JUCÁ, 2020a; 2020b; 2020c; LIMA, 2020; MARTELANC; PASIN; CAVALCANTE, 2005; MARTELANC; PASIN; PEREIRA, 2010).

The DCF calculation applies to Mergers and Acquisitions operations in terms of calculating the value of individual companies and the value of combined companies, generating the synergies of this process (ASSAF NETO, 2020). This study draws a parallel between the merger and the unification of companies.

In the context of existing synergies, Assaf Neto (2020, p. 213) highlights:

1. Synergy gains through cuts in operational costs, system convergence, and increased efficiency in production, sales, and distribution activities, expectations of new revenues, rationalization of invested capital in the business, among other factors;
2. Reduction of operational risks through diversification of products, markets, customers, suppliers, etc.;
3. Reduction of the cost of capital by reducing diversifiable risk and adjustments in the capital structure;
4. Increase in market share, gaining greater bargaining power with suppliers, distributors, and customers;
5. Access to new distribution channels and new markets, serving a larger customer base;
6. Elimination of competitors from the market;
7. Reduction in learning time through the incorporation of knowledge maintained by other companies;
8. Tax benefits through the use of accumulated tax losses (tax credits that can be used), ICMS



---

and IPI credits, and better utilization of tax planning.

According to the literature on Corporate Finance, when synergies occur in the process of unifying two units, X and Y, for example, the value of the combined unit (X x Y) will certainly be greater than the sum of the values of the separate units X and Y (JUCÁ, 2020a; 2020b; 2020c; LIMA, 2020; ASSAF NETO, 2020).

However, according to Ogliari (2021), in DCF Valuation, it is necessary to determine assumptions about growth, investments, margins, etc. But in this context, there are potential risks inherent to each of these variables, which is the risk that a particular assumption may not occur, i.e., not materialize. The DCF method cannot identify uncertainties in the input data, nor does it address the probability and risk of variations in the projections made (Ugwuegbu, 2013; Dulci, 2018).

According to Fernandes (2005) and Silva & Sassi (2017), Simulação de Monte Carlo - Monte Carlo Simulation (SMC) is the most designated method for risk analysis, and was therefore chosen to be used throughout this study.

According to Souza (2004), SMC, is a simulation method that uses statistics and can be understood as a methodology, using a sequence of random numbers, assigning these values to a variable, in order to generate a simulation. This methodology allows the visualization of different scenarios in a mathematical model and enables to estimate the probability of their occurrence (Damodaran, 2012; Samis & Davis, 2014).

According to Samis & Davis (2014), this method can complement the DCF method by assigning more possibilities for analysis, being used to demonstrate the calculation probabilities of a Valuation depending on the random values of its input variables (Samis & Davis, 2014, Rodrigues de Amorim et al, 2024). The study methodology will be presented below.

### **3. METHODOLOGY**

The objective of the study was to understand the main impacts on the company's value after the unification of two agro-industrial plants belonging to the same business group in the sugar-energy sector. A characterization of the research is presented in Table 1.



**Table 1.** Summary of research characterization

<b>Nature</b>	Applied
<b>Approach</b>	Qualitative-quantitative
<b>Objective</b>	Predominantly exploratory
<b>Technical Procedure t</b>	Case study
<b>Data collection</b>	Interviews, field observation, and document consultation
<b>Data analysis</b>	Content analysis, discounted cash flow, and Monte Carlo simulation

**Source:** Elaborated by the author.

Thus, we sought through applied nature study, to seek for a solution to a specific problem and to propose a practical solution to achieve the objective. In this sense, data triangulation was used, which according to Gomes & Dias (2020, p.34) “presents itself as a strategy enabling dialogue between qualitative and quantitative approaches and points to the understanding of the phenomena studied through different prisms in result of methodological articulation and breaking of the hegemony of using a single method in research”.

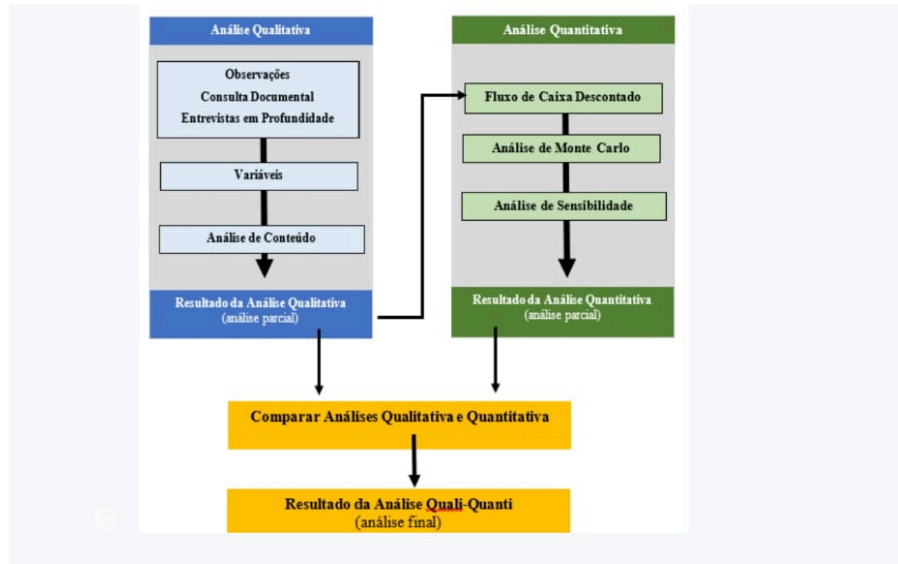
The qualitative stage was through a case study based on observation, being the main goal, to understand the motivations for the unification of agro-industrial units. The company in the sugar-energy sector operated 3 production units, being units 2 and 3 very close to each other and unit 3 was not presenting satisfactory results.

In this context, the Observation took place in 12 monthly meetings, 2 of which were management meetings of the company under study, with 2-hour duration each. Another 10 meetings took place with the presence of the project team, for 9 hours each. All meetings were attended by one of the authors of this work, and data collection consisted of in-depth interviews, document consultation and field observation. The analysis was premised on content analysis.

Regarding the quantitative stage, it was through secondary data extracted as well as the calculation of DCF with risk analysis through Monte Carlo Simulation.

Figure 1 aims, in a simple way, to present the methodology and demonstrate the flow of information to obtain the main result of the quali-quantitative study.

**Figure 1.** Quali-quantitative information flow



Source: Elaborated by the author

The results of the study will be presented below.

## 4. RESULTS

### 4.1 Results presentation

The fieldwork began with the Research Instrument - Observation, with the main objective of understanding the motivations for the unification of agro-industrial units. The company in the sugar-energy sector operated 3 production units, with units 2 and 3 being very close to each other. The observation took place over 12 monthly meetings. All the meetings were attended by one of the authors of this work.

It was possible to identify, in the first two meetings through observation, that the company had been presenting unsatisfactory operational and financial performance results for its shareholders and that, if things continued as they were, serious problems could arise when operating in the competitive agricultural commodity market.

The performance of each unit was monitored through individual and consolidated reports from each area, and, in this way, unit 3 presented certain inefficiencies and problems. However, the decision to unify the units was not made in these meetings. After the first two meetings, the company's Board of Directors appointed a project team to conduct a more in-depth analysis of the units' performance and requested proposals for solutions to the problems. The participants signed a confidentiality agreement (not to disclose the study to third parties) and, in case of information leakage, either internal or external, the employee would be penalized for breaching the agreement.



---

During the project team's meetings (10 meetings), it was possible to identify, through observation, the inefficiency of one of the three production units and, consequently, the high costs, mainly due to the higher percentage of fixed costs.

The perception of each professional regarding their specific area of activity was analyzed during the meetings. Acknowledgement that unit 3 had problems in its structure and processes, was unanimous and it was clearly evident at the end of the meeting duration. In order to confirm the information already identified in the Observation, an interview was conducted with the Unification Project Manager.

According to the interviewee, several discussions took place before Unification, however, the biggest motivation for carrying out the studies was the high cost of operations when considering unit 3 of the company isolated.

It became clear during the interview that productivity monitoring and cost performances were conducted on a regular basis by the company's management and Board. The main points highlighted by the interviewee were the low productivity of the sugarcane field, the reduced scale of sugarcane milling and the high costs of agricultural and industrial processes in unit 3, mainly caused by the non-dilution of fixed costs resulting from the reduced milling. All these points were enhanced by the location of this unit, located in a region where the production environment and climate are not favorable, in addition to its assets being quite outdated.

Still, according to the interviewee, the company had two units (unit 2 and unit 3) very close to each other, around 50 km distance. Unit 2 has a more recent plant with higher milling capacity, lower production costs compared to unit 3, and a possible expansion of the industrial park, where some assets from unit 3 can be used.

For the interviewee, the main goal of the project was to reduce costs and increase performance.

Before the unification, there was an initial study considering the possibility of expanding the milling capacity of unit 3. This study proved to be unfeasible and was discarded, mainly due to production constraints and freight costs for acquiring raw materials. Subsequently, the study with the possibility of unification entered the project's agenda.

The study showed good feasibility in unifying both units, basically without loss of full sugarcane milling capacity. To have this done, it would be necessary to transfer some assets between unit 3 and unit 2, in addition to all the sugarcane production. However, the approval of the project was not carried out smoothly. There was the company's employees' issue and, to be consider a city with approximately 5 thousand inhabitants in which the unit was located, in addition to the partners and raw material suppliers in the region. Through the interview it





---

it was clear that, in order to approve the project, all financial, environmental, tax, social and image risks were mapped and taken into consideration.

After completion of the project, the Board of Directors approved the discontinuation of unit 3 by increasing unit 2 capacity, which would have a milling capacity of 3.3 million tons of sugarcane per year, compared to the previous 2.5 million. So, the unification of the agrobusiness industries took place.

The perceptions of the agribusiness unification team will now be presented. It was possible to identify the research variables for calculating the DCF and SMC.

The interview with the CFO (Chief Financial Officer), responsible for the areas of Technology, Legal, and Procurement and Control, began with a general explanation about the company's situation before the unification and confirmed what the entire management team had already been monitoring: the production results, revenues, and expenses, and also that the deterioration of unit 3 compared to the other units was noticeable. Additionally, it was clarified that the company had been losing value as unit 3 worsened its negative results.

According to the interviewee, the main motivations for carrying out the unification were the proximity between units 2 and 3, the high costs in industrial production arising from the low grinding scale and the low productivity of the sugarcane fields, caused by the type of the ground in unit 3. It was also highlighted that the climate alone was not a determining factor in the unification decision. Surely, according to the interviewee, the more severe climate in the region only increased low agricultural production in less productive production environments.

Still according to the interviewee, lands in less productive production environments, as they are leased lands, would be returned to the owners at the end of the contract, and new lands would be acquired in more favorable environments.

When responding about the results of unit 2, the interviewee confirmed that it was a newer factory, with leaner maintenance operations, with twice the milling capacity compared to unit 3 and belonging to a region with more favorable production environments for agriculture. In the interviewee's opinion, bringing the entire operation to unit 2 made perfect sense.

The interviewee, when commenting on cost behavior, highlighted that companies in the sugar-energy sector have an absolute preponderance in fixed costs. Companies in this sector are capital intensive and all cost structuring is basically determined by their production capacity, which has a small structure flexibility during the year due to production fluctuations. According to the interviewee, the issue of fixed costs made the unification of agro-industries viable.



---

Corroborating this question, the interviewee said that the Contribution Margin study of the units could clearly demonstrate the situation of unit 3 compared to the other units and the deterioration of the company's value with the incorporation of its unsatisfactory results. Initially, the consideration of expanding the production capacity of unit 3 was studied, however, it did not demonstrate feasibility.

An interview was then carried out with the Industrial Manager, responsible for the production of sugar, ethanol and energy at units 2 and 3, who had an effective participation in all stages of the project, from its conception to execution.

The employee highlighted the complexity of the entire process, as it was a multidisciplinary project, which would impact all areas of the company, such as agricultural production, industrial production, maintenance, administrative areas, etc.

According to the interviewee, the biggest motivations for the unification of the units came from an analysis of productivity and costs, since unit 3 did not have an adequate production scale. Initially, the possibility of expanding this unit was studied, however, a satisfactory result was not demonstrated and unification became the most viable option to increase the company's value.

When asked about agricultural productivity, the interviewee explained that unit 3 was being impacted by the production environment in which the sugarcane fields grow, fields' location, and informed that a more detailed study of these environments was necessary to understand the situation of units 2 and 3. Low productivity, in addition to limiting the industrial scale, also increased the cost of sugarcane production, turning the cost of the final products sugar and ethanol unfeasible.

Furthermore, the climate in the region of units 2 and 3 still proved to be a relatively complex factor for sugarcane production. In recent years, climate change has impacted sugarcane production, however, it is not known for sure whether this less favorable climate will continue or whether it is just a cycle. In any case, according to the interviewee, the harsher climate combined with less favorable production environments intensifies the low productivity of the sugarcane field.

When asked about the results of unit 2, the Unit Manager reported that it was a modern factory, from the point of view of industrial technology, with an adequate production scale, with the possibility of milling 2.5 million tons per year of sugarcane, and turn costs, both agricultural and industrial, more competitive. Another relevant point was better ease of increasing agro-industrial scales in this unit, whether by contracting new land in a more favorable production environment or by increasing annual milling rate.

It is also noteworthy that the high share of fixed costs, characteristic of the sugar-energy sector, was a determining factor in the unification of the units.

---



---

In sequence of the study, an interview was carried out with the Cutting, Transport and Transshipment Manager, responsible for harvesting and transporting sugarcane and delivering it to the industrial park of all the company's units. He highlighted that daily monitoring was carried out in unit 3 of the productivity of the machines that harvest sugarcane related to the productivity of the sugarcane field and, consequently, the costs of operations related to its process. It was evident that all the good practices carried out in the units were implemented in unit 3, however, the sugarcane productivity factor had a direct impact on the results.

Still from this perspective, he highlighted that unit 3 had low agricultural productivity, relevant fixed costs, factor which increased the total cost of the processes, in addition to the fact that unit is located in a region with difficulty in operating field activities.

When asked about the region's climate, the interviewee highlighted that it is one of the items composing the agricultural production environments, in addition to the region's type of soil. He also highlighted that the more challenging climate enhances low productivity production environments.

In this context, he argued that in his area of operation, unit 2 demonstrated better results as sugarcane productivity is higher in the production environments in which it is located, providing a more fluid delivery of sugarcane in the industrial plant with higher milling capacity. So, fixed costs could be diluted and the unit could obtain higher margin.

In general, following interviews, it is important to highlight that one of the most mentioned points by the interviewees, was the communication of the project. Unanimously, the way the company conducted the unification communication process was highlighted as one of its strengths.

Therefore, an interview was carried out with the Human Resources Manager, responsible for communication and social aspects of the entire project. This interviewee mentioned that there was great concern with the local community.

When asked about the most relevant point for carrying out the unification of the units, even though the interviewee was not directly involved in the productivity areas, she mentioned that the company's profitability was being affected by the poor performance of unit 3 and that the closure of this unit and the absorption of activities by unit 2 could bring better results to the group, mainly due to the quality of the sugarcane and the lower costs in unit 2.

Regarding the use of labor, the interviewee mentioned that this was a premise for achieving success of the project. All employees have the opportunity to be employed in other units of the group and, for those who did not have or did not want to take this opportunity, the company provided consultancy services for the development of these professionals and for their relocation to companies in the region.

---



---

According to the Human Resources Manager, all risks were mapped in such a way that, during the unification period, the company would not experience any type of setback; namely, possible strikes, non-acceptance by current unions, robberies, etc. However, all of this was handled and no incidents occurred. In addition to these risks, possible increases in labor liabilities were also taken into consideration and continued to be addressed by the company.

For the interviewee, the project was very successful, being awarded with the Master Cana Award - Community 2021, assessed by an examining board where all possible social impacts were considered and mitigated through the company's efforts to carry out a process with the lowest possible impacts on the community.

With the completion of the interviews and subsequent Content Analysis of the material, it was possible to identify the variables for constructing the DCF and calculating the company's value.

The interviewees' perception of the main motivations for the unification of the units is focused on productivity and sugarcane costs, directly related to the amount of cane harvested. Regarding costs, it is largely driven by the high level of fixed costs characteristic of the sector.

Once we had the variables for the construction of the DCF and SMC, it was necessary, through document consultation, to identify the values to be used in the construction of both. To this end, the researcher delved into reports from the agricultural and industrial departments, as well as the audited financial statements of the company under study. Then, values of some variables were validated with the interviewed employees. Furthermore, more in-depth research was carried out on the variables used in the SMC. To do this, the researcher used the criteria reported below.

Regarding the Produtividade da Cana-de-Açúcar - Sugarcane Productivity variable, the consultation was carried out, taking into account, the last 10 years before unification in order to get a solid basis for the simulation. Furthermore, the expected number of Toneladas de Cana-de-Açúcar por Hectare - Tons of Sugarcane per Hectare (TCH) was analyzed for production environments in the region, always limited to the milling capacity of each unit. For cost variables, the consultation was based on the last 5 years prior to unification. This delimitation for costs is relevant as the company began calculating costs for processes in 2017, having no previous history.



**Table 2 shows the variables and values that were used in the SMC after constructing the DCF.**

**Table 2.** Variables and their ranges for the SMC

Variables	Simulated values		Simulated values
	Before unification		after unification
	Unit 2	Unit 3	Unit 2
Sugarcane productivity (TCH)	72 a 94	60 a 82	75 a 96
Harvest costs (R\$/ton sugarcane)	33,50 a 40,00	38,00 a 44,00	33,50 a 38,50
Industrial process costs (R\$/ton sugarcane)	13,90 a 15,70	23,35 a 29,30	11,70 a 13,90

**Source:** Elaborated by the author

Continuing the work and with the information obtained in the previous stages, the expected Fluxos de Caixa - Cash Flows of the company under study were developed. Calculations covered both situations, before and after the unification of the units, as defined in the purposes of the work.

All information for the construction of the DCF was extracted from interviews, observations and documentary consultations. It is important to highlight that they were validated by the company's employees and by the researcher, who is responsible for the company's Planning, Costs and Budget Department.

Fluxo de Caixa Livre - Free Cash Flow (FCF) projections were determined in currency with constant purchasing power. The base date for the assessments followed the Audited Financial Statements of March 31, 2021. Companies in the sugar-energy sector consider their calculation period from April to March and Income Tax and Social Contribution on Net Profit. They were designed in accordance with the legislation in force on the assessment base date.

The calculation started with the quantity of sugarcane available for milling in each of the future years. The prices for valuing sugar and ethanol revenue were obtained through market consultation using the NY Sugar screen nº11 of the New York Stock Exchange. For the exchange rate, the projection according to the Focus bulletin made available by Central Bank of Brazil. As for energy sales prices, a market history of the last 5 years before unification was considered.

Regarding the costs of each agricultural process (Soil Preparation, Planting, Sugarcane Plant Treatments, Sugarcane Treatments and Harvesting), each industrial process (Juice Extraction, Sugar Manufacturing, Fermentation and Distillation) and administrative



---

expenses, the statements used audited financial statements as basis. For the variable costs, the variations considered were dependent on the production of each process.

The investments considered in the projections before unification practically cover the replacement of assets and were based on the depreciation of machinery and equipment. Furthermore, it was considered the expansion of land leasing for sugarcane planting, to increase milling to its capacity, once unit 3 would still be in operation and its lands have lower productivity.

After unification, in addition to the items mentioned, the modernization and expansion of the industrial park of unit 2 was also included to absorb sugarcane from the most productive lands of unit 3. The value used was approximately R\$ 140 million, set by the unification project team.

To calculate working capital, it was used the company's average over the last 5 years before unification. The values were consulted in the company's audited financial statements.

The FCF projection occurred for a period of 10 years (2022-2031), however, this asset has an indefinite useful life. In this way, the perpetuity of FCF was used to calculate the value of the company from the eleventh year onwards, as demonstrated in the literature (Damodaran, 2012).

To calculate the present value, the rate used, contained the costs of debt and the cost of own capital, using the respective percentage of each of them in the company's capital structure. For this research, the Fluxo de Caixa Livre da Empresa - Firm's Free Cash Flow (FFCF) and, consequently, the Custo Médio Ponderado de Capital - Weighted Average Cost of Capital (WACC) were used as the discount rate.

The calculation of the cost of equity capital was carried out using a consultation of market indicators from the sugar-energy sector. The calculation of the cost of debt was carried out using the company's audited financial statements. The WACC was calculated according to the formula below:

$$WACC = \frac{E}{(D + E)} \times Cp + \frac{D}{D + E} \times Ct \times (1 - T)$$

Where:

E = Equity (equivalent to own capital);

D = Gross Debt (equivalent to debt);

Cp = Cost of equity capital;

Ct = Cost of debt;

T = Income Tax and Social Contribution on Net Profit rate.





The calculation of the cost of debt (Ct) reflects how much the company pays for the money it raises in the market, essentially the interest on its debts. The calculation of the cost of equity capital (Cp) is more complex, as the return required by the shareholder changes according to economic fluctuations and the company's own performance (CAMPOS, 2010).

The CAPM (Capital Asset Pricing Model) methodology was chosen for the calculation of the cost of equity capital, as it is the most recommended by various authors (MARTINS, 2001; DAMODARAM, 2012; COPELAND et al., 2000). The formula of the model is presented below:

$$\text{CAPM} = R_f + \beta \times (R_m - R_f) + \text{Country Risk Award}$$

Where:

$R_f$  = risk-free asset return rate;

$R_m$  = return offered by the market as a whole, represented by the market portfolio;

$\beta$  = beta coefficient, a measure of the asset's risk in relation to the systematic risk of the market portfolio;

Country Risk Award = the required return rate higher than what is obtained in a minimum-risk market.

The calculation of the cost of equity was performed using market indicators from the sugarenergy sector. The calculation of the cost of debt was carried out using the company's audited financial statements.

After weighting, the WACC resulted in a rate of 11.62% per year. And this rate was used to discount the FCF.

**In Table 3 you can observe the Company Value using the DCF and Perpetuity method.**

**Table 3. Value of the company before unit's unification (MM R\$):**

	Before unification	After unification
WACC	11,62%	11,62%
Net present value of the 10-year FCF (FDC)	662	783
Net present value of perpetuity	705	834
Company value	1.367	1.617

**Source:** Elaborated by the author

Comparing calculations, it can be perceived that the project brought, the company under study, an Value increase of approximately 18%. These calculations demonstrate that the impact on the Company's Value is present due to the operational and structural change that the company carried out, increasing its results and making it more competitive in the agricultural commodities sector. This was provided by the optimization of its sugarcane field through more productive areas and, consequently, by the reduction of costs, resulting from the improvement of processes and increased production.

The company made the correct decision when unifying its units because, according to interviews and calculations, this decision leaves the company more competitive and with new possibilities to grow.

After calculating the Company's Value using by the variables obtained in interviews and documentary consultations, the work sequence consisted of an additional analysis through the construction of SMC considering the most sensitive variables identified by the researcher.

Once the values related to the input variables for the analysis were obtained, the SMC was performed with 100,000 iterations, relating the triangular distribution, which is the continuous probability distribution that has a minimum value (a), a maximum value (b) and an average value (c). Therefore, the values of the input variables were defined for all years of the DCF, where the average was defined by the interviewees' technical knowledge.

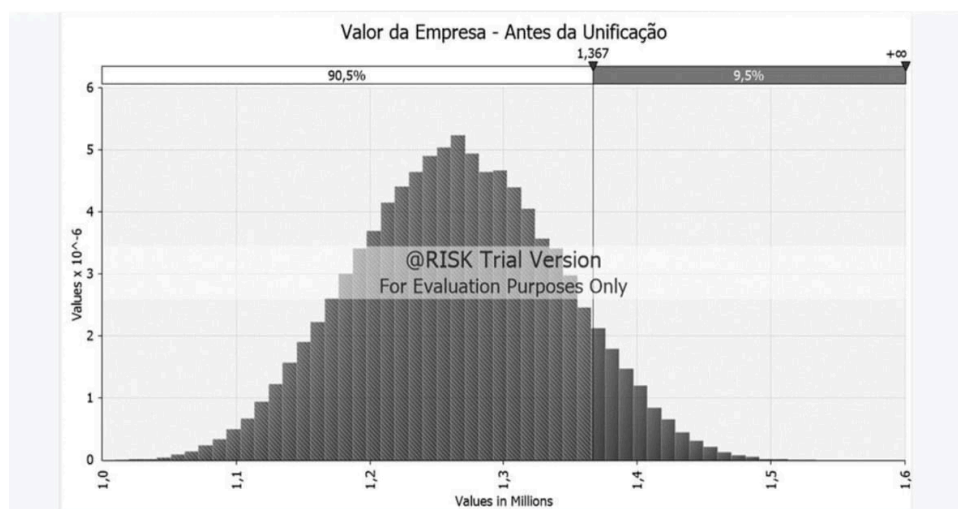
The simulation covered the status before and after the unification of the units, enabling to compare the results and compose the research conclusion.

The continuity of the analyses, shown in Figures 2 and 3, is based on the SMC, calculation of the Company's Value, using the sensitive input variables Sugarcane Productivity, Harvest Costs and Industrial Process Costs jointly.

In Figure 2 it is possible to identify the Company Value and the probability with which it was calculated at SMC before unification, that is, with the 3 agro-industrial units producing.

In Figure 2 it is possible to identify the Company Value and the probability with which it was calculated at SMC before unification, that is, with the 3 agro-industrial units producing.

**Figure 2.** SMC using the variables Sugarcane productivity, Harvest costs and Industrial process costs as input - before Unification





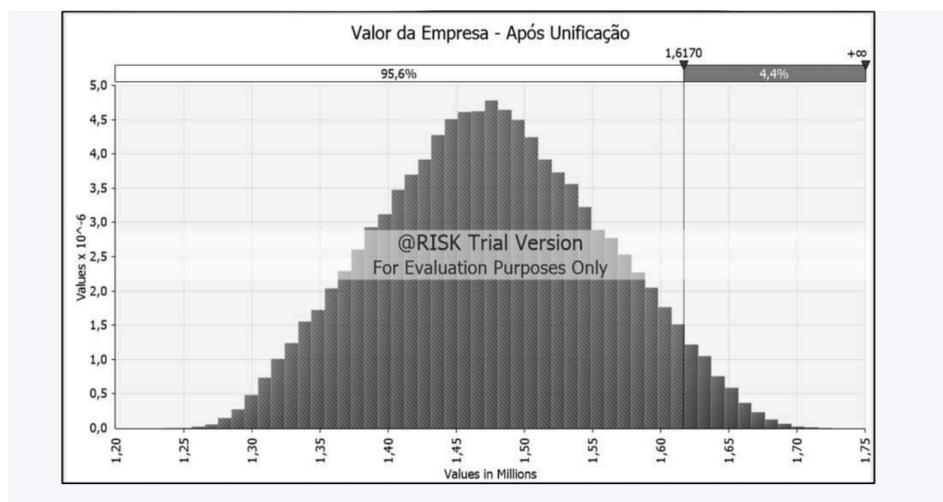


**Source:** Elaborated by the author, using @Risk 8.2 software

According to the Company Value calculated in Table 3, of MMR\$ 1,367, it is clear that when analyzing Figure 2, variables were used together for SMC, prove to be relevant to business, as 90.5% of the results indicated a Value of the Company smaller than this in the simulation. Another important point to highlight is that the simulation presented in Figure 2 does not demonstrate Company Values higher than the original calculation after unification, MMR\$ 1,617. Again, it can be understood that the unification decision was made assertively.

In Figure 2, it is possible to identify the Company Value and the probability with which it was calculated after unification, that is, with 2 agro-industrial units producing.

Based on the Company Value calculated in Table 3, MMR\$ 1,617, it is evident when analyzing Figure 3 that by using the variables together for SMC, prove to be relevant to the business, as 95.6% of the results indicated a lower Company Value than this in the simulation.



**Source:** : Elaborated by the author, using @Risk 8.2 software

Another important analysis lies on the fact of the simulation, presented in Figure 3, demonstrates Company Values lower than the original calculation before unification, MMR\$ 1,367 in only 23.0% of the iterations. This analysis also leads us to the assertive decision to unify the units.

From this point onwards, a Qual-Quanti analysis will be carried out comparing the interviews and calculations of Company Values with the aim of finding convergences and divergences. The calculation of the Company's Value before and after unification using the variables and indicators obtained in interviews and documentary consultations, demonstrates that the interviewees' perceptions were correct. Concentration of activities in unit 2, a newer, more modern plant located in the region, where agricultural production environments are more favorable, despite the need to invest in expanding milling.



Therefore, the discontinuity of a unit, initially, leads to a loss of value or a feeling of diminishment for the company. However, the entire project was built in such a way that the company would have an annual milling capacity very close to the situation before unification, the use of labor would be essential and the replacement of land in lowest production environments, would be basic premises. In this way, the interviewees' perception proved to be convergent with the Company Value calculations.

Even so, there were variables more sensitive to the business and could modify the Company Value results. With the Content Analysis of the interviews, it was possible to identify it and through SMC it was possible to understand how much they would impact the business.

According to the interviews, the most sensitive variable for the project is the Sugarcane Productivity which, consequently, defines the quantity of sugarcane to be processed in the industrial units. In this way, SMC was able to corroborate the interviews and demonstrate that the Company's Value can be greatly impacted by this variable, however, the impact would be greater in the before the unification status. Another important analysis converging to the interviews is SMC after unification, where it was demonstrated that the Company's Value is always higher than that originally calculated before unification.

Costs were also frequently mentioned in the interviews, mainly those linked to the amount of processed sugarcane. As the sector has a preponderant share of fixed costs, the quantity produced is important for scale economies.

Therefore, in general, interviews, calculation of Company Value and the analyzes obtained by the SMC show significant convergence. The decision to unify agro-industries, with changes in processes and concentration of operations, was made assertively.

## **5. FINAL CONSIDERATIONS**

The researched topic proved to be relevant and is justified in the studied context as it evaluates the main impacts on the Company's Value after the unification of two agro-industrial plants from the same business group in the sugar-energy sector. The support provided by the literature review was important to highlight the relevance of the topic, both in academic and business contexts, using a real case through a scientific study, applying knowledge in cost management, productivity increase, and improved results. Furthermore, techniques from the Company Valuation methodology were used, including DCF and SMC for risk analysis.

Regarding the objective, which proposed conducting a comparative study to assess the main impacts on the Company's Value after the unification of two agro-industrial plants from the same business group in the sugar-energy sector, generating the following specific objectives:



a) identify and select indicators and their variables necessary and sufficient for comparing the value of companies in the sugar-energy sector; b) collect data on the variables and calculate the Company's Value before and after the unification; c) compare and analyze the Company's Value in the sugar-energy sector before and after the unification, the methods used to achieve these objectives were satisfactory and pertinent.

The interviews proved to be important for the process of constructing the results, as the knowledge and perceptions of the interviewees provided relevant insights, both regarding the motivations for the unification and for defining the calculations, comparisons, and risk simulations involving the business.

The transformation of perceptions into variables and subsequent measurement made it possible to calculate the impact generated by changes in processes, asset structure, route alterations, and maximization of results through productivity and fixed cost dilution. It was possible to calculate the Company's Value using the DCF method and compare it before and after the unification, in addition to identifying that the company made the right decision by unifying its units.

Further adding value to the research, sensitivity analyses were built using SMC with the most significant variables for the business, obtained from the Content Analysis of the interviews. Once again, it was possible to understand the impacts generated in the company and demonstrate that the decision was accurate in unifying the units. In all the simulations built, the possibility of the Company's Value being higher after the unification was consistently more frequent.

Consolidating the research results through the intersection of the interviews with the Company Value calculations and SMC, the convergence of information and perceptions was evident. It was possible to prove through the calculations that the interviewees were correct when pointing to sugarcane productivity as the main issue in the discontinued unit, which consequently led to higher costs.

In conclusion, after the unification, the company experienced an impact on its Value, which increased by 18% compared to before the unification. With the unification decision, it was possible to streamline processes, reduce costs, and modernize some industrial assets in Unit 2. Additionally, as seen in the SMC, the company became less vulnerable regarding sugarcane productivity, as its value remained higher in 67% of the simulations compared to the situation before the unification.

When the analysis is made from the perspective of costs directly linked to the amount of sugarcane processed (harvesting and industrial process costs), the unification decision proves even more accurate, as in 100% of the simulations, the Company's Value was higher compared to the value before the unification.



---

By rigorously applying the methodology, it is understood that the proposed objectives were achieved, with a practical and applied case observed, which is the objective of this professional master's program. By combining theory and practice, it is possible to share empirical results, contributing to the company under study by providing a new perspective on the unification of its units, as well as the creation of a semi-structured framework that can serve as a basis for similar projects in other companies.

One limitation of this research was the inability to use data from the 2021-22 harvest, the first year after the unification of the units. This occurred because the productivity of the sugarcane fields was heavily impacted by climatic effects during the period (drought and frost) that are not recurring. Thus, historical data were used as a solution.

Another limitation for the study was the absence of an interview with an employee who was part of the Unification Project team. At the time of the project, he was the Manager of Relationship with Partners/Suppliers, but he left the company, and contact could not be made. However, other employees were interviewed who could support the results.

A final limitation relates to the fact that the WACC was not recalculated after the unification of the units. The same value was used for the calculations.

For future research involving Company Valuation construction, a suggestion would be to use other Valuation techniques such as Multiples or Asset-Based Models, as this would allow comparisons between models. The same applies to risk analyses; it would be interesting to use other techniques such as Decision Trees or Real Options Theory to gain other perspectives.

## 6. REFERENCES

Albarez, T., Bonizio, R. C., & Ribeiro, E. M. S. (2008). Uma análise da estrutura de custos do setor sucroalcooleiro brasileiro. *Custos e Agronegócio*, 4(1), 79-102.

Alves, L., Rezende, C. & Ribeiro, K. (2013). Comparativo de métodos de valuation: análise do caso Hering S/A. Encontro Nacional De Engenharia De Produção, 33, 1-16. XXXIII ENCONTRO NACIONAL DE ENGENHARIA DE PRODUÇÃO A Gestão dos Processos de Produção e as Parcerias Globais para o Desenvolvimento Sustentável dos Sistemas Produtivos Salvador, BA, Brasil, 08 a 11 de outubro de 2013

Amorim, F. R. de, Solfa, F. D. G., & Queiroz, T. R. (2024). Relação custo-lucro e produtividade nas práticas culturais da cana-de-açúcar. *Revista Gestão & Tecnologia*, 24(1), 215-237. <https://doi.org/10.20397/2177-6652/2024.v24i1.2361>



---

Assaf Neto. A. (2020). Valuation: métricas de valor e avaliação de empresas. 3ª edição. São Paulo: Atlas. 294 p. Edição customizada.

Berk, J., Demarzo, P. & Harford, J. (2019). Fundamentals of corporate finance. 4th Global Edition, Pearson.

Brito, M. T. S. (2023). Gestão de custos interorganizacionais nos relacionamentos entre produtores e usina sucroenergética. 2023. 126 f. Dissertação (Mestrado em Ciências Contábeis) - Universidade Federal de Uberlândia, Uberlândia,. DOI <http://doi.org/10.14393/ufu.di.2023.171>

Carneiro, D. M., Duarte, S. L. & Da Costa, S. A. (2019). Cost drivers of brazilian soybean production. Custos e @gronegocio on line, 15[1], 43-66. <http://www.custoseagronegocioonline.com.br/eng/fifthy.html>

Correa S. F et al. (2009). Análise das tipologias de estratégias de crescimento. SEGeT – Simpósio de Excelência em Gestão e Tecnologia, 1-13. <http://www.aedb.br/seget/artigos2009.php?pag=70>.

Damodaran, A. (2012). Investment valuation: tools and techniques for determining the value of any asset. 3rd Edition, John Wiley and Sons.

Dulci, L. B. (2018). Transações globais de terra e trabalho: O caso do setor sucroalcooleiro brasileiro no século XXI. In: Encontro Anual da Anpocs, 42, 2018, Caxambu. Anais... Caxambu: Associação Nacional de Pós-Graduação e Pesquisa em Ciências Sociais, ISSN 2177-3092

Esberard, R. R., Chaim, R.V. & Turolla, F.A. (2009). Custos de produção como diferencial estratégico: o caso do setor sucroalcooleiro. Revista Administração em Diálogo, 2[13], 73-90. <https://doi.org/10.20946/rad.v1i2.2728>

Façanha, S. L. O. (2012). Aquisições, fusões e alianças estratégicas na cadeia sucroenergética Brasileira [Tese de doutorado]. Universidade de São Paulo.

Fernandez, P. (2002). Valuation methods and shareholder value creation. Academic Press.

Figueira, S. R. F., Belik, W. & Vicente A. K. (2014). Escala e competição na agroindústria canavieira no estado de São Paulo [Apresentação de poster]. Anais do 52º Congresso heterogeneidade e suas Implicações no Rural Brasileiro. SOBER - Sociedade Brasileira de Economia, Administração e Sociologia Rural. Goiânia – GO.

Food and Agriculture Organization. OECD-FAO Agricultural Outlook 2019-2028. (2019). [https://doi.org/10.1787/agr\\_outlook-2019-en](https://doi.org/10.1787/agr_outlook-2019-en)





---

Gomes, E., & Dias, L. O (2020). A triangulação enquanto estratégia de diálogo em pesquisa científica. *Comunicação & Sociedade*, São Bernardo do Campo, 42(1), 31-51. <http://repositorio.bc.ufg.br/handle/ri/21088>

Jucá, M. N. (2020a). Avaliação por fluxo de caixa descontado. Material didático de apoio. São Paulo: Saint Paul. 16 p.

Lima, F. G. (2020). Métricas de valor I, II e III. Material didático de apoio. São Paulo: PECEGE/USP, 2020.

Lima, F. G., Neto, A. A., Silva, H. J. T., & Gatsios, R. C. (2023). Build Up para o custo de capital próprio do setor sucroenergético brasileiro. *Revista De Gestão E Secretariado*, 14(1), 226-246. <https://doi.org/10.7769/gesec.v14i1.1509>

Lima, J.T., & Neves, F. (2022). A dinâmica sistêmica da internalização da sustentabilidade: estudo de caso em uma usina do setor sucroenergético. *Sociologias*, v. 23(58), 238-267, <https://doi.org/10.1590/15174522-102487>

Lins, L. N., Loureiro, S. C. L., & Santos, D. G. (2020). Análise dos resultados da logística reversa no setor sucroalcooleiro: um estudo de caso em uma usina do estado de Alagoas, Brasil. *Diversitas Journal*, 5(1), 341-350. <https://doi.org/10.17648/diversitas-journal-v5i1-898>

Macedo, G. L.; Souza, G. P.; Fernandes, P. H. L.; Flves, A. L. C. (2019). Valuation: a origem e os métodos de avaliação de empresas, com ênfase no modelo de múltiplos. *Diálogos em contabilidade : teoria e prática*, v. 7, n. 1, p. 1-18.

Martelanc, R.; Pasin, R.; Cavalcante, F. (2005). Avaliação de empresas: um guia para fusões e aquisições e gestão de valor. São Paulo: Pearson Prentice Hall, 2005. 284 p.

Martelanc, R.; Pasin, R.; Pereira, F. (2010). Avaliação de empresa: um guia para fusões e aquisições e private equity. São Paulo: Pearson Prentice Hall, 2010. 322 p.

Martins, E. (2001). Avaliação de empresa: da mensuração contábil à econômica. Atlas.

Medeiros, O. R.; Costa, P. S. & Silva. C. A. T. (2005). Testes empíricos sobre o comportamento assimétrico dos custos nas empresas brasileiras. *Revista Contabilidade & Finanças*, 16[38], 47-56. <https://doi.org/10.1590/S1519-70772005000200005>

Mendonça, G. L. (2020). Métodos de valuation no cálculo do valor das ações da Vale S/A. Trabalho de Conclusão de Curso (Graduação em Ciências Contábeis) - Universidade Federal de Uberlândia, Uberlândia. Disponível em: <https://repositorio.ufu.br/bitstream/123456789/30664/4/M%c3%a9todosDeValuation.pdf>

---



---

. Acesso em 24 out 2021.

Moura, M. F., & Lima, N. C. (2016). Gestão de custos interorganizacionais para o Gerenciamento dos custos totais: estudo de caso em uma usina de cana-de-açúcar na região do triângulo mineiro. *Revista Evidenciação Contábil & Finanças*, 4(1), 65-83. <http://dx.doi.org/10.18405/recfin20160105>

Ogliari, A. B. (2021). Análise e comparação entre os modelos de valuation tradicionais e o modelo de fluxo de caixa descontado com simulação de Monte Carlo na avaliação de uma empresa de fundição brasileira. Trabalho de conclusão de curso (Bacharelado em Engenharia de Produção Mecânica) – Centro Tecnológico, Universidade Federal de Santa Catarina, Florianópolis, 2021. Disponível em: <https://repositorio.ufsc.br/handle/123456789/223362>. Acesso em: 04 mar. 2022.

Rodrigues, A. D. P.; Belon, J. G. D. O. (2018). Desafios da rentabilidade. *Agroanalysis*, v. 38, n. 5, p. 31-32.

Samis, M., & Davis, G. A. (2014). Using Monte Carlo simulation with DCF and real options risk pricing techniques to analyse a mine financing proposal. *International Journal of Financial Engineering and Risk Management*, Olney, 1(3), 264-281. <https://doi.org/10.1504/IJFERM.2014.058765>

Santos, I. O. (2017). Avaliação da eficiência na produção de arroz no Brasil: uma aplicação da análise envoltória de dados. Universidade Federal de Uberlândia, 11(1), 22-47. <https://doi.org/10.55028/don.v11i1.14437>

Santos D. L. J. S. et al. (2019). Análise comparativa dos custos de produção da cana-de-açúcar entre as principais cidades produtoras do Brasil, XXVI Congresso Brasileiro de Custos – Curitiba, PR, Brasil, 11 a 13 de novembro de 2019.

Silva, C. P. & Arantes, F. P. (2024). Procedimento operacional padrão no setor de recepção e preparo da cana de açúcar de uma empresa sucroalcooleira. *Revista Produção Online*, 23(4), 5123. <https://doi.org/10.14488/1676-1901.v23i4.5123>

Silva, P. C., & Sassi, R. J. (2017). Simulação de Monte Carlo para construção de gráficos de controle no processo de carregamento de etanol no setor sucroalcooleiro. *Exacta*, 15(3), 369-381. <https://doi.org/10.5585/exactaep.v15n3.6481>

Souza, M. C. M. (2004). Quantificação das incertezas na avaliação de projetos: o modelo utilizado na Agência de Fomento do Estado da Bahia [Dissertação de mestrado]. Universidade Federal de Santa Catarina.



---

Taborda, R. R. (2017) Avaliação da empresa Fibria S. A. através do método de fluxo de caixa descontado (valu-ation) . 2017. 48f. Monografia (Graduação) - Curso de Administração de Empresas. Universidade Federal do Rio Grande do Sul, Porto Alegre.

Ugwuegbu, C. (2013). Segilola gold mine valuation using Monte Carlo simulation approach. Mineral Economics, Berlim, 26, 39-46. <https://doi.org/10.1007/s13563-013-0030-8>

Vian, C. E. F.; Rodrigues, L.; Silva, H. J. T. (2018). Evolution in Public Policies Designed to Develop the Sugar-Energy Industry in Brazil. In: CHANDEL, A.; SILVEIRA, M. H. L.(Eds.).

Advances in Sugarcane Biorefinery. Technologies, Commercialization, Policy Issues and Paradigm Shift for Bioethanol and By-Products. 1. ed. Elsevier. p. 279-306 <https://doi.org/10.1016/B978-0-12-804534-3.00014-8>

## WEB.REFERENCES

Centro de Estudos Avançados em Economia Aplicada (2021). PIB do Agronegócio brasileiro <<https://cepea.esalq.usp.br/br/pib-do-agronegocio-brasileiro.aspx>>

Fernandes, C.A. (2005). Gerenciamento de riscos em projetos: como usar o Microsoft Excel para realizar a simulação de Monte Carlo. 1-6. [http://www.bbbrothers.com.br/files/pdfs/artigos/simul\\_monte\\_carlo.pdf](http://www.bbbrothers.com.br/files/pdfs/artigos/simul_monte_carlo.pdf).

Programa de Educação Continuada em Economia e Gestão de Empresas. (2020). Custos de produção de cana-de-açúcar, açúcar, etanol e bioeletricidade na região centro-sul do Brasil: fechamento da safra 2019/20. <<https://goo.gl/gfGevB>>.

Sociedade Nacional De Agricultura. (2020). Alta de custos afeta resultados das usinas. <https://www.sna.agr.br/alta-de-custos-afeta-resultados-das-usinas>.

União Nacional da Bioenergia. (2020). Produção de açúcar do Brasil atingirá recorde de 41 mi t em 2020/21, prevê Job. <<https://www.udop.com.br/noticia/2020/04/27/producao-de-acucar-do-brasil-atingira-recorde-de-41-mi-t-em-2020-21-preve-job.html>>.

Artigo submetido ao SBIJournal em 10/06/2024.

1a rodada de avaliação concluída em 03/07/2024.

2a rodada de avaliação concluída em 09/01/2025.

Aprovado para publicação em 29/01/2025.

---