

**UNIVERSIDADE ESTADUAL DO OESTE DO PARANÁ
PROGRAMA DE PÓS-GRADUAÇÃO EM ADMINISTRAÇÃO
MESTRADO PROFISSIONAL**

**WESTERN PARANÁ STATE UNIVERSITY
PROFESSIONAL MASTER'S IN ADMINISTRATION**

Estratégias de uma indústria diante do desafio da mudança de regime tributário: um estudo de caso

Strategies of an industry facing the challenge of changing the tax regime: a case study

[TRADUÇÃO INGLESA]

LILIANE DA SILVA CASTANHETTI

**CASCAVEL/PR
2022**

Liliane da Silva Castanhetti

Estratégias de uma indústria diante do desafio da mudança de regime tributário: um estudo de caso

Strategies of an industry facing the challenge of changing the tax regime: a case study

[TRADUÇÃO INGLESA]

Dissertation presented in partial fulfilment of the requirements for the degree of **Master of Science in Administration** in the Department of Administration, Western Paraná State University. Dissertation Supervisor: Dr. Ronaldo Bulhões

Dissertação apresentada ao Programa de Pós-Graduação em Administração (PPGAdm) – Mestrado Profissional da Universidade Estadual do Oeste do Paraná, como requisito parcial para obtenção do grau de **Mestre em Administração**. Orientador (a): Dr. Ronaldo Bulhões

**CASCADEL/PR
2022**

International Cataloging-in-Publication Data
UNIOESTE Library System

Castanhetti, Liliane da Silva.

Strategies of an industry facing the challenge of changing the tax regime: a case study/ Liliane da Silva Castanhetti; supervisor: Ronaldo Bulhões; [Translation of Henrique Farias]. 2022.
70 f.

Dissertation (Master's of Degree – Campus of Cascavel) – Western Paraná State University, Center for Applied Social Sciences, Graduate Program in Administration, 2022

[English version of: Estratégias de indústria diante do desafio da mudança de regime tributário: um estudo de caso]

1. Industry. 2. Tax planning. 3. Simple National. 4. Presumed profit
5. Actual Profit. I. Bulhões, Ronaldo. II. Farias, Henrique. III. Title.



Universidade Estadual do Oeste do Paraná

Campus de Cascavel CNPJ 78680337/0002-65
Rua Universitária, 2069 - Jardim Universitário - Cx. P. 000711 - CEP 85819-110
Fone:(45) 3220-3000 - Fax:(45) 3324-4566 - Cascavel - Paraná



LILIANE DA SILVA CASTANHETTI

Estratégias de uma indústria diante do desafio da mudança de regime tributário: um estudo de caso

Dissertação apresentada ao Programa de Pós-Graduação em Administração em cumprimento parcial aos requisitos para obtenção do título de Mestra em Administração, área de concentração Competitividade e Sustentabilidade, linha de pesquisa Estratégia e Competitividade, APROVADO(A) pela seguinte banca examinadora:

DocuSigned by:

Ronaldo Bulhões (P)

164471ECD33641B

Orientador(a) - Ronaldo Bulhões

Universidade Estadual do Oeste do Paraná (UNIOESTE)

Cláudio Antonio Rojo

Universidade Estadual do Oeste do Paraná (UNIOESTE)

Alexandre Florindo Alves

Universidade Estadual de Maringá (UEM)

Edison Luiz Leismann

Faculdade Assis Gurgacz (FAG)

Cascavel, 13 de julho de 2022

RESUMO

CASTANHETTI, Liliane da Silva (2022). Estratégias de uma indústria diante do desafio da mudança de regime tributário: um estudo de caso. (Dissertação de Mestrado). Programa de Pós-Graduação em Administração (PPGAdm) – Universidade Estadual do Oeste do Paraná, Cascavel - PR, 2022.

O objetivo deste trabalho foi apresentar e analisar alternativas e estratégias para o equilíbrio financeiro da Indústria Alpha diante de uma mudança de regime tributário. A empresa passou pelo processo de desenquadramento do Simples Nacional, tornando-se necessário eleger entre os regimes tributários do Lucro Real ou Lucro Presumido. A sua metodologia caracteriza-se como de natureza aplicada e quantitativa com a ferramenta Simulação de Monte Carlo, utilizando o software @Risk, além da análise horizontal e vertical da Receita Total, custos, despesas e lucro líquido do período. Ademais, faz uso de uma abordagem descritiva, no que se refere ao seu objetivo; ademais, usa arquivo bibliográfico e documental quanto ao procedimento de coleta de dados. No que se refere, ainda, à coleta de dados, a Indústria Alpha disponibilizou o Demonstrativo de Resultados (DRE) dos 60 meses dentro do Regime do Simples Nacional. Foi efetuada a atualização dos dados da indústria de acordo com a inflação para valores de Janeiro de 2022 pelo Índice de Preços ao Produtor Amplo– IPA-M. Os resultados da simulação dos regimes tributários apontaram que o Lucro Real é o mais indicado para a empresa estudada. A proposta de intervenção é a adoção do regime tributário indicado e estratégias para o aumento do faturamento com marketing, expansão de mercado e diversificação de produtos. Ademais, foram sugeridos estudos na área fiscal, no controle de custos e melhorias na mão de obra, tecnologia e processos. Para uma análise mais detalhada, podem ser usadas ferramentas estratégicas, como SWOT, Canvas e Matriz BCG.

Palavras-chave: Indústria, Planejamento Tributário, Simples Nacional, Lucro Presumido, Lucro Real.

ABSTRACT

CASTANHETTI, Liliane da Silva (2022). Strategies of an industry facing the challenge of changing the tax regime: a case study (Dissertation). Graduate Program in Administration (PPGAdm) –Western Paraná State University, Cascavel – PR, Brazil, 2022.

The objective of this work was to present and analyze alternatives and strategies for the financial balance of the Alpha Industry in the face of a change in the tax regime. The company went through the process of disqualification from *Simple Nacional*, making it necessary to choose between the tax regimes of Actual Profit or Presumed Profit. Its methodology is characterized as applied and quantitative in nature with the Monte Carlo Simulation tool, using the @Risk software, in addition to the horizontal and vertical analysis of Total Revenue, costs, expenses and net income for the period. Furthermore, it makes use of a descriptive approach, with regard to its objective; in addition, it uses bibliographic and documental files regarding the data collection procedure. Also with regard to data collection, Alpha Industry made available the Income Statement (DRE) for the 60 months within the *Simple Nacional* regime. The industry data was updated according to inflation for January 2022 values by the Broad Producer Price Index – IPA-M. The results of the simulation of the tax regimes indicated that the Real Profit is the most suitable for the company studied. The intervention proposal is the adoption of the indicated tax regime and strategies to increase revenue with marketing, market expansion and product diversification. In addition, studies were suggested in the fiscal area, in cost control and improvements in labor, technology and processes. For a more detailed analysis, strategic tools such as SWOT, Canvas, and BCG Matrix can be used.

Keywords: Industry, Tax Planning, Simple National, Presumed Profit, Actual Profit.

LIST OF FIGURES

Figure 1 - Size of the Brazilian industries	16
Figure 2 - Size of the Brazilian Flat and Safety Glass Manufacturing Industries	17
Figure 3 - Alpha Industry Organization Chart.....	31
Figure 4 - Productive chain of the glass sector.....	32
Figure 5 - Flat and safety glass manufacturing industries in Brazil	33
Figure 6 - Flat and safety glass manufacturing industries in the South.....	34
Figure 7 - Map of the distribution of flat and safety glass manufacturing industries by municipality in Paraná.....	36
Figure 8 - Productivity in the glass processing industry (m ² /employee/month)	38
Figure 9 - Glass Sector Perspectives	39
Figure 10 - Total Revenue for the Period* - Real and Nominal Values	41
Figure 11 - 60-month costs* - Real values	42
Figure 12 - 60 months expenses* - Real values	43
Figure 13 - Net Profit for 60 months*	43
Figure 14 - Total Revenue - Horizontal Analysis.....	44
Figure 15 - Costs - Horizontal Analysis	45
Figure 16 - Total Operational Expenses - Horizontal Analysis.....	46
Figure 17 - Personnel Expenses - Horizontal Analysis	46
Figure 18 - Administrative Expenses - Horizontal Analysis.....	46
Figure 19 - Vehicle Expenses - Horizontal Analysis	47
Figure 20 - Transportation Expenses - Horizontal Analysis	47
Figure 21 - Furniture and Equipment Expenses - Horizontal Analysis.....	47
Figure 22 - Investments - Horizontal Analysis.....	48
Figure 23 - Costs in relation to Total Revenue - Vertical Analysis	48
Figure 24 - Expenses in relation to Total Revenue - Vertical Analysis	49
Figure 25 - Simulation of Presumed Profit.....	51
Figure 26 - Simulation of Actual Profit.....	52
Figure 27 – Intervention Proposal Tree	54

LIST OF TABLES

Table 1 - Classification of Micro and Small Enterprises (MSEs) based on Annual Gross Revenue	15
Table 2 - Taxes and Contributions for the Presumed Profit Regime	25
Table 3 - Taxes and Contributions for the Actual Profit Regime.....	25
Table 4 - Variables for the Actual Profit simulation	26
Table 5 - Variables for the Simulation of the Presumed Profit	28
Table 6 - Glass Industry Classifications	32
Table 7 - Flat and safety glass manufacturing industries by municipality in Paraná	35
Table 8 - Number of people employed in the sector - Brazil	36
Table 9 - Production and sales of products in the domestic industrial sector and the Flat and Safety Glass Manufacturing sector	37

LIST OF ABBREVIATIONS AND ACRONYMS

ABDI	Brazilian Agency for Industrial Development
ABRAVIDRO	Brazilian Association of the Flat Glass Distributors and Processors
BCG	Boston Consulting Group
CEO	Chief Executive Officer
CNAE	National Classification of Economic Activities
COFINS	Contribution for Social Security Financing
CSLL	Social Contribution on Net Profit
DRE	Income Statement
SC	Small Company
FGV	Fundação Getúlio Vargas
IBGE	Brazilian Institute of Geography and Statistics
ICMS	Tax on Circulation of Goods and Services
INSS	Brazilian Social Security Institute
IPA-M	Broad Producer Price Index - Market
IPI	Tax on Industrialized Products
IRPJ	Corporate Income Tax
ISS	Service Tax
LTD	Private Limited Company
ME	Microenterprise
MEI	Individual Microentrepreneur
MSE	Micro and Small Business
MCN	MERCOSUR Common Nomenclature
GDP	Gross Domestic Product
PIS	Social Integration Program
RAIS	Annual List of Social Information
HR	Human Resources
SEBRAE	Brazilian Micro and Small Business Support Service
SWOT	Strengths, Weaknesses, Opportunities, Threats
TLP	Long-Term Interest Rate

TABLE OF CONTENTS

1	INTRODUCTION.....	12
1.1	RESEARCH PROBLEM.....	13
1.1.1	Research Question.....	13
1.2	OBJECTIVES	14
1.2.1	General	14
1.2.2	Specific.....	14
1.3	PRODUCTION JUSTIFICATION AND CONTRIBUTION	14
1.4	DISSERTATION STRUCTURE.....	18
2	THEORETICAL AND PRACTICAL REFERENCES.....	19
2.1	TAX PLANNING	19
2.2	TAX REGIMES FOR THE INDUSTRIAL SECTOR IN BRAZIL	21
2.3	MONTE CARLO SIMULATION	22
3	PRODUCTION RESEARCH METHOD AND TECHNIQUES.....	24
3.1	RESEARCH DESIGN	24
3.2	DATA COLLECTION.....	24
3.3	DATA ANALYSIS PROCEDURES	24
3.4	LIMITATIONS OF RESEARCH METHODS AND TECHNIQUES	29
4	PROJECT CONTEXT	30
4.1	DESCRIPTION OF ALPHA INDUSTRY	30
4.2	THE ALPHA INDUSTRY'S NATIONAL MARKET	31
5	ANALYSIS AND INTERPRETATION OF RESULTS AND INTERVENTION PROPOSAL	41
5.1	ANALYSIS OF THE STATEMENTS OF INCOME - DRE.....	41
5.2	SIMULATION OF THE TAX REGIMES WITH MONTE CARLO SIMULATION ..	50
5.3	INTERVENTION PROPOSAL: STRATEGIES AND ALTERNATIVES FOR THE FINANCIAL BALANCE IN FACE OF THE CHANGE IN THE TAX REGIME	53

6	CONCLUSION.....	57
	REFERENCES	59
	APPENDIX A – RESULTS OF THE PRESUMED PROFIT SIMULATION.....	63
	APPENDIX B – RESULTS OF THE ACTUAL PROFIT SIMULATION	67

1 INTRODUCTION

One of the main bottlenecks of the Brazilian economy is the tax system, considered complex, costly, and harmful to market competitiveness. Among the existing problems is the high degree of incidence of indirect taxes due to the volume and ease of collection, which, despite equally burdening all consumers, hurts lower income families. Moreover, taxation on income and wealth promotes fiscal and income inequality, presenting distortions, such as the inefficiency of wealth taxes, and the low targeting power of income tax on individuals (Afonso & Castro, 2012).

The tax systems of other countries also present peculiarities, but the Brazilian one stands out for the amount collected, which is higher than that of other developing countries (even of advanced economies in some cases) and for its low quality due to distortions. Moreover, Brazilian taxation is marked by strong decentralization, besides being an exceptional case of a country that assigned the broadest value-added tax to subnational competence, which caused the fiscal war between states (Afonso *et al.*, 2013).

Thus, Brazilian companies face a complex, bureaucratic tax legislation that suffers from constant changes in laws and administrative acts. The choice of tax regime is determinant for the company's finances since double incidence of some taxes can occur when it is not allowed to use them as credit, as is the case of PIS (Social Integration Program)/COFINS (Contribution for Social Security Financing) (Higuchi, 2017).

Tax administration has become indispensable for the survival of Brazilian companies. Regardless of whether a company is small, medium or large, it is necessary that it has a tax planning. Considering the high costs of lawsuits, it is of utmost importance the effort to plan the path to be taken to avoid inconveniences (Costa & Alves, 2017).

The transformation industry is one of the sectors responsible for the largest part of the country's tax collection and leadership in the generation of direct and indirect jobs. Because of this, the costs of industrialized products become high, making it difficult to compete with international products. Furthermore, economic instability and the high tax burden are one of the main factors for the closure or evasion of industries in the country. Therefore, tax planning plays an important role in the industries in their search for reducing the payment of taxes in a legal way (Correia & Diógenes, 2019).

1.1 RESEARCH PROBLEM

Given the complexity of Brazilian tax legislation, companies seek financial viability alternatives to the challenges generated by the need to change tax regime, in order to remain competitive in the market. This is the case of Alpha Industry (fictitious name of the industry under study due to a request for confidentiality of its data). The company is in the sublimit of *Simples Nacional* (National Simple tax) and must choose between the regime of Actual Profit or Presumed Profit. Alpha will have to choose the most favorable regime and analyze financial viability strategies in face of the increase in the tax burden. The possible strategies are in the production management field (such as cost reduction), in the tax planning field (such as the choice of the most favorable tax regime and the search for tax benefits), and commercial and financial strategies to increase sales and balance the company's finances.

Many companies use the traditional economic model, that is, they consider deterministic models in their decision making processes. However, these are not one of the most adequate instruments when working in environments of uncertainty. Probabilistic models are the ones that best fit reality, since they consider the uncertainty factor and the relationships between variables. Monte Carlo simulation is an important method used in models involving probabilistic events (Corrar, 1993). The simulation has already been used in the investment decision-making process in a company in the salt industry (Ribeiro *et al.*, 2016), for risk analysis in a project of a new beef industrialization plant (Molina, 2017), in order to assess market risk in the poultry industry due to fluctuations in the price of live poultry (Purwaningsih *et al.*, 2017), in a distribution network project under demand uncertainty in the pharmaceutical industry (Izadi & Kimiagari, 2014), among others. However, no works were found using Monte Carlo simulation in industry with respect to tax planning.

Considering tax planning something essential in industries and the Monte Carlo simulation method a tool to help decision making, the problem of this study consists in finding out the limits and probabilities of tax administration under different tax regimes, considering the history of revenues and expenses of an industry, based on Monte Carlo Simulation.

1.1.1 Research Question

What are the best competitive strategies that can be adopted by Alpha Industry to face the challenges of a change in the tax regime?

1.2 OBJECTIVES

1.2.1 General

To analyze Alpha Industry's strategies facing the challenge of the change of tax regime.

1.2.2 Specific

- a) Describe the characterization of Alpha Industry and the national market in which it operates.
- b) To analyze with descriptive statistics the data collected from the Income Statements (DRE) of the company of 60 months within the *Simples Nacional* regime.
- c) To identify and analyze which tax regime can make Alpha Industry more competitive and more profitable through Monte Carlo Simulation.
- d) To present an intervention proposal for Alpha Industry pointing out strategies and alternatives to help the financial balance and the expansion process of the industry in face of the change in the tax regime.

1.3 PRODUCTION JUSTIFICATION AND CONTRIBUTION

The bureaucracy and the Brazilian tax legislation are one of the main obstacles to the growth of the national industry. Industries that are Micro and Small Enterprises (MSE) generally operate under the *Simples Nacional* tax regime, a simplified tax treatment. However, in the expansion process of an industry, it is faced with a dilemma regarding the increase in revenues; therefore, it must change its tax regime and choose between Actual Profit and Presumed Profit. Besides the change in the collection of taxes, mainly ICMS (Tax on Circulation of Goods and Services) and IPI (Tax on Industrialized Products), the company faces the increase in the tax burden and the impact of this on the price of its product; consequently, there is an influence on its sales.

To elucidate what MSEs are, Table 1 presents the differences between the classifications according to their Gross Revenue and their classification in the *Simples Nacional* regime:

Table 1 - Classification of Micro and Small Enterprises (MSEs) based on Annual Gross Revenue

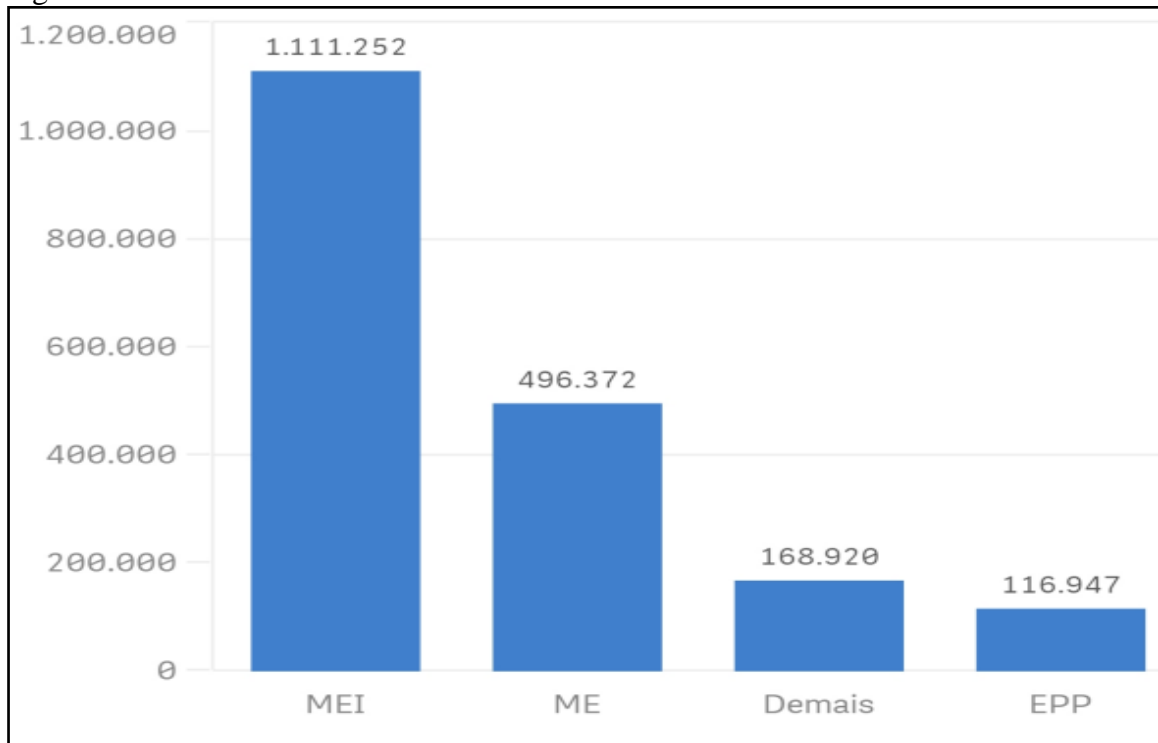
Classification	Gross Revenue	Fitting into <i>Simple Nacional</i>
Microenterprise (ME)	Equal to or less than R\$360,000.00	Revenue earned by an entrepreneurial company, a simple company, a limited liability individual company, and the entrepreneur, duly registered with the competent bodies.
Small Company (SC)	Above R\$360,000.00 and equal to or less than R\$4,800,000.00	The small business company will not lose its classification if it obtains additional export revenues up to the limit of R\$4,800,000.00.
Individual Micro Entrepreneur (MEI)	Equal to or less than R\$81,000.00	A person who is self-employed and legalizes as a small businessperson opting for <i>Simple Nacional</i> . The micro entrepreneur can have only one employee and cannot be a partner or owner of another company.

Source: Brazilian Micro and Small Business Support Service – SEBRAE (2021).

MSEs are responsible for contributing significantly to the country's output, employment, and income. They represent more than 90% of the enterprises and account for about 30% of GDP and approximately 50% of the jobs in the country (Brazilian Agency for Industrial Development [ABDI], 2021).

In terms of the domestic industry, Figure 1 shows the number of industries, in each size, by October 2021:

Figure 1 - Size of the Brazilian industries

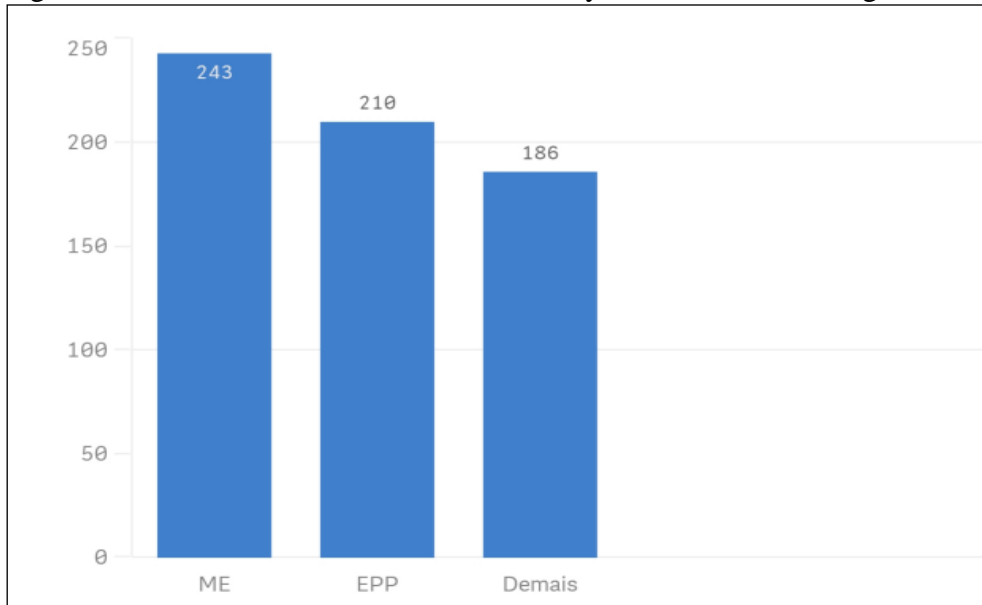


Source: Data SEBRAE Indexes (2021).

According to Figure 1, it can be observed that the Brazilian industries are mostly Individual Micro Entrepreneurs (MEI), representing 58.7%. Regarding the industries that are Microenterprises (ME), they are approximately 26.2%. Next, the industries that fit into the other sizes account for 8.9%. Finally, there are the industries that are Small Company (SC) with approximately 6.1%.

The industry under study belongs to CNAE (National Classification of Economic Activities) 23.11-7-00 - Manufacture of flat and safety glass. Figure 2 presents the size of the national industries that belong to and perform this economic activity:

Figure 2 - Size of the Brazilian Flat and Safety Glass Manufacturing Industries



Source: Data SEBRAE Indexes (2021).

As shown in Figure 2, most of the Brazilian industries in this segment are MEs, representing about 38%. In the sequence, there are the industries that are SC, with approximately 33%, and the industries that belong to the other sizes have about 29%.

Alpha Industry is a SC, so it is included in the 33% of industries in the segment. Although a significant part of the market is ME, about 62% of the segment is formed by SC companies that are in the *Simples Nacional* but that may be close to leaving this regime, and by industries that belong to the other sizes, which are in the Presumed Profit or Actual Profit. Therefore, most of Alpha Industry's competition is made up of companies of equal or greater size. This demonstrates the importance of strategic planning so that the company under study can remain in the market and grow to be relevant in the segment.

The tax regime must be considered a key point in the strategic planning for growth of Alpha Industry since the industrial sector has the highest tax burden in the country and is hindered by the tax collection structure, which represents an obstacle to its growth. The industrial sector is responsible for 20.9% of the national GDP, but accounts for 33% of federal tax collection. While the national average among legal entities is 25.2% of GDP, the manufacturing industry assumes a tax burden of 46.2% (*Portal da Indústria*, 2020).

Given this scenario, in addition to helping the company studied in its decision-making process, another contribution of this work aims to present the alternative of using the probabilistic Monte Carlo Simulation method as a tool to assist in tax planning because it considers the uncertainty factor and the relationships between the variables for decision making.

In addition, this paper seeks to present alternatives to assist the financial balance when facing a change in the tax regime, which brings short and long term challenges for companies. Through theoretical research and the practical example of a case study, this work serves as a model for researchers and organizations that are going through such a challenge.

1.4 DISSERTATION STRUCTURE

This dissertation was structured in six chapters. The first chapter is composed of the introduction, contextualizing the theme of the study. Subsequently, the description of the research problem is carried out, followed by the research question, the general and specific objectives, and the justification and contribution of the production. Finally, the present structure of the dissertation is presented.

The second chapter presents the theoretical framework that supports this research as from the preparation of three topics. The first topic addresses the importance of tax planning and examples of national and international work on the subject. The topic about the tax regimes for the industrial sector in Brazil deals with the beginning of the national tax system and the existing tax regimes in the country for the industrial sector. The third topic presents the Monte Carlo Simulation method, as well as the national and international studies that have applied this methodology.

The third chapter exposes the method and techniques that were used to prepare the research by demonstrating the research design and the way in which data collection was carried out, followed by the data analysis procedures. Finally, the chapter presents the limitations of the research methods and techniques applied in this study.

The fourth chapter addresses the project's context, describing Alpha Industry and analyzing the national market in which it is inserted. The fifth chapter is composed of the analysis and interpretation of the results, performing the analysis of the Income Statements - DRE - provided by the company of the 60 months within the *Simple Nacional* regime. After that, the simulation of the tax regimes with Monte Carlo Simulation is performed, using the @Risk software. Finally, an intervention proposal is presented in which strategies and alternatives are presented for financial equilibrium when faced with a change in the tax regime.

The sixth chapter contains the conclusions of the study and, consequently, the bibliographical references.

2 THEORETICAL AND PRACTICAL REFERENCES

This chapter presents the theoretical and practical references that support this work. First, the importance of tax planning in companies is presented, as well as recent national and international work in this area. Next, the tax regimes that can be adopted by industries in Brazil are shown. Finally, the Monte Carlo Simulation method and recent studies that have used this methodology are presented.

2.1 TAX PLANNING

Porter (2004/1947) presented generic strategic approaches for a firm to outperform its competitors, among which is total cost leadership. To achieve leadership, the firm needs to focus on strategies to reduce its costs. A low cost position can provide competitive advantages, such as above-average returns in its market, for example. Cost reduction strategies include investing in more efficient machinery and equipment, minimizing advertising costs, and carefully controlling overhead costs and expenses such as taxes and fees, among others.

Tax planning can be characterized as a study previously conducted in order to analyze the legal and economic effects, seeking the least costly legal alternatives for the organization. Such planning is considered to be of a preventive nature, that is, the reduction of the tax burden is produced legally occurs before the taxable event, also called tax avoidance. Planning done incorrectly can lead to tax evasion, that is, a reduction in the tax burden illegally, which is classified as a tax evasion crime (Fabretti, 2017).

Considering that the tax burden is a relevant factor in the composition of a company's costs, tax planning is of paramount importance for the efficiency of its organization (Vello & Martinez, 2014). In Brazil, there is a high tax burden, which burdens companies. Because of this, entrepreneurs seek alternatives to reduce these costs through studies and analysis of accounting information, aiming at the legal alternatives for such (Marcello *et al.*, 2013).

Among the applied works on tax planning, there is a study conducted in a wholesale company in Western Paraná, considering the changes of Decree No. 442 of 2015, to verify what the immediate impact on the tax burden of this organization. It was possible to verify that this decree of Paraná increased the incidence of taxes in the company, even though the regime of *Simples Nacional* remains the best option (Sontag *et al.*, 2015).

There is a case study applied to a cargo transportation company, located in the north of the state of Paraná, analyzing the tax planning on the employer's social security contribution. Through comparisons, it was verified that the company correctly opted for the payroll exemption, reducing its expenditure with this tax (Pulcinelli *et al.*, 2020).

In another case, a study on strategic tax planning was conducted at a commercial company in the retail industry in the Recôncavo da Bahia. In this study, it was found the relevance of consulting experts on finance and taxes for this type of planning, which indicated the *Simples Nacional* regime as being the least costly for the company in that fiscal year (Fonseca *et al.*, 2017).

Presenting corporate reorganization as a form of tax planning, there is a case study applied to an agribusiness in the state of Rio Grande do Sul, based on laws and regulations. It was found that a split caused a reduction in tax charges and a consequent increase in revenue for the company, because of the possibilities of using tax credits for the PIS and COFINS, exemptions, reduced rates, and simplified forms of taxation (Vey & Bornia, 2010).

In the international scenario, there was a study conducted with Irish firms, which showed that the tax planning of these firms in the scenario studied exhibited strategic reactions, that is, the firms responded to their competitors' tax planning changes by changing their own tax planning in the same direction. Among the purposes of these changes was concern about the emergence of more aggressive taxes than industry competitors (Armstrong *et al.*, 2019).

A study conducted with a sample of 11,537 observations from U.S. companies in fiscal year 1997-2013 investigated whether there was an association between CEO age and corporate tax planning. The result was that CEO age was positively related to cash and effective tax rates; furthermore, negatively related to the permanent accounting tax gap, suggesting that older CEOs are less likely to take steps to reduce their tax burden (James, 2020).

Another US study was conducted with observations between the years 2003 to 2016, which analyzed analyst annual profit forecast data for the fiscal year, keeping only the most recent analyst forecast issued before the earnings announcement date in order to investigate whether tax planning is associated with the accuracy of analyst forecasts. The result found was that the increased complexity of the firm, due to increased tax planning, makes tax profits and expenses more difficult to forecast and that analysts do not adjust adequately for these effects. Thus, when deciding to engage in tax planning, firms appear to make trade-offs between potential tax savings, negative effects on profit properties, and analyst forecasts (Francis *et al.*, 2019).

There is an article conducted in Ukraine whose goal was the dissemination of theoretical and methodological principles of tax planning and tax optimization in Ukrainian companies to ensure effective planning of their activities. The article dealt with the possibilities of tax planning optimization in the conditions of increasing tax pressure on paying companies, which induces them to tax evasion. The use of possible legal methods by companies to minimize taxes allows them to cope with these financial difficulties. Tax optimization is one of the most important tasks in financial management, which reduces the amount of tax liability due to the full use of the benefits provided by law, tax breaks, and other legal benefits. The main difference between tax optimization and tax avoidance is the use by taxpayers of ways allowed or not prohibited by legislation to reduce the number of tax payments without violating the legislation (Lagodienko *et al.*, 2019).

2.2 TAX REGIMES FOR THE INDUSTRIAL SECTOR IN BRAZIL

The history of taxation is associated with the history of states as an organized society. The roots of Brazilian tax law were influenced by the Portuguese rules that governed at the time of the discovery. With the advent of the 1946 Constitution, the cycle of formation of a proper tax system in Brazil began. With the advent of Constitutional Amendment No. 18 of 1965, there was a profound tax reform in the country, born under the responsibility of the Reform Commission of the Ministry of Finance, considered by many jurists the broadest and most profound tax reform ever made in the history of the Brazilian constitution, establishing an integrated national tax system. Despite advances with the enactment of the Constitution of the Federative Republic of Brazil (CRFB) in 1988, the national tax system has been the target of criticism since its creation due to its complexity and inefficiency, currently reflected in very high costs, high burden, and immeasurable insecurity (Machado & Balthazar, 2017).

According to Law 9,430/1996, in Brazil, there are four types of tax regimes: Actual Profit, Presumed Profit, Arbitrated Profit, and the *Simple Nacional*, the latter having been implemented by Complementary Law No. 123, of December 14, 2006.

In the Actual Profit, taxation is levied on the profit ascertained in the fiscal year, making the fiscal bookkeeping more rigid with the purpose of obtaining the company's actual profit. This tax regime aims to measure the Corporate Income Tax (IRPJ), Social Contribution on Net Profit (CSLL), and PIS/COFINS, the latter having higher rates as it allows credit on entries. ISS and/or ICMS taxation depends on the company's activity (Law 9,430, 1996; Souza *et al.*, 2015).

In the Presumed Profit regime, taxation is based on a presumption percentage, according to the legislation. As the Actual Profit regime, it aims to measure the IRPJ and CSLL. PIS/COFINS has a reduced rate because it does not allow credit for this tax on inputs. ISS and/or ICMS also depend on the activity performed (Law 9430/1996; Souza *et al.*, 2015).

The Arbitrated Profit is a tax regime used only in exceptional cases, and may be imposed by the tax authorities or by voluntary choice of the company. This occurs when the company cannot adapt to the *Simples Nacional*, Presumed Profit, or Actual Profit regimes, due to incorrect calculation because of loss, theft, or deterioration of documents, fraud, among others. The calculation occurs quarterly, and the arbitrated profit is calculated by applying percentages on gross revenue or, when this is unknown, it is calculated by applying coefficients on bases established by the tax authorities (Law 9,430/1996; Souza *et al.*, 2015).

Simples Nacional consists of a tax regime in which there is the unification of taxes in a single guide for ME with annual gross revenue equal to or less than R\$360,000.00 and SC with annual gross revenue greater than R\$360,000.00 and equal to or less than R\$4,800,000.00. However, there is the sublimit of *Simples Nacional*, in which companies that invoice more than R\$3,600,000.00, in the last 12 months, must pay the ISS and ICMS as non-optizers in separate forms (Law n. 123, 2006; *Simples Nacional*, 2021).

There are studies about tax planning in industries, such as the one by Duarte *et al.* (2017), which was applied in a medium-sized food industry, in which it was found that the non-cumulative system Actual Profit was the most appropriate tax regime. A case study was also conducted in an industry of the plastics industry, in which the real profit by estimate and the real profit by suspension, as well as the reduction was the less onerous tax regime (Bisolo & Baggio, 2012).

The tax rates corresponding to each tax regime are presented in the methodology.

2.3 MONTE CARLO SIMULATION

The Monte Carlo simulation method emerged during World War II in the construction of atomic bombs, so the name is a reference to the games of chance popular in the town of Monte Carlo, Monaco, for using raffles, dice, and roulette in the casinos. This simulation is the application of random numbers and probabilistic analysis to solve problems (Metropolis & Ulam, 1949).

The Monte Carlo Simulation is based on the generation of random numbers from a given distribution, allowing the creation of various scenarios for measuring market risks (Souza *et al.*,

2017). In the area of finance, the first published work was that of Hertz (1964), who demonstrated Monte Carlo simulation in project analysis to measure the risks inherent in each variable.

Among the recent international works, there is a case study that applied Monte Carlo Simulation for the investment analysis of new joint electric and thermal power plant (Maric & Grozdic, 2016). In the work, applied to an iron mine in China, the authors used the Monte Carlo method to aid decision making in the investment strategy combined with mining and dressing grades from a system engineering perspective (He *et al.*, 2019).

Monte Carlo simulation has also been used to quantify the financial risks of commercializing bio-based technologies to analyze the substitution of petroleum-based chemicals by basic chemicals produced from renewable raw materials in agribusinesses (Dheskali *et al.*, 2020). Furthermore, simulation was applied to the formation of a stock portfolio based on the historical daily rate of return of 18 industries in China (Zhao, 2021).

Among the national works, there is an article that conducted a financial feasibility analysis of an investment in a company in the salt industry, which used the Monte Carlo Simulation for risk analysis in various scenarios from the Net Present Value - NPV (Ribeiro *et al.*, 2016). Another study that also used the simulation aimed to evaluate Ambev through the discounted cash flow method, including the uncertainty of the cost of capital calculation (Silva *et al.*, 2019).

The simulation was also applied to develop a model to evaluate the economic and financial feasibility for the implementation of civil construction waste recycling plants (Gularte *et al.*, 2020). Similarly, it was used to estimate the economic feasibility and financial risk of an investment project in crop-livestock integration for the production of beef cattle in São Carlos - SP (Vinholis *et al.*, 2021).

3 PRODUCTION RESEARCH METHOD AND TECHNIQUES

This chapter presents the methodological procedures adopted to conduct this research, the form of data collection and the analyses. Thus, the structure of this chapter is divided into research design, data collection procedures, data analysis procedures, and limitations of the established methods and techniques.

3.1 RESEARCH DESIGN

This work is a single case study, in which the researcher aims to understand a singular case and does not seek the affirmation or confirmation of theories, but simply the case itself (Stake, 2005). The study is of an applied and quantitative nature, using the modeling and simulation method. Furthermore, it makes use of a descriptive approach, with regard to its objective, as well as bibliographical and documental, as to the data collection procedure.

3.2 DATA COLLECTION

Regarding data collection, Alpha Industry will make available the DRE of the 60 months within the *Simple Nacional* regime. The industry's data will be updated according to the inflation for 2022 values by the Broad Producer Price Index (IPA-M) because this index measures price variations of agricultural and industrial products in inter-business transactions, i.e., in the commercialization stages prior to final consumption. The calculation of the IPA-M price variation is carried out between the 21st day of the previous month and the 20th day of the reference month (Fundação Getúlio Vargas [FGV], 2022). This updating of the values to the present date aims to generate information as correctly as possible, obtaining a real view of the company's data.

3.3 DATA ANALYSIS PROCEDURES

The realization of the descriptive statistics of the DREs of the 60 months within the *Simple Nacional* regime, after updating the data for January 2022 with the IPA-M, happens through the vertical analysis, calculating the percentage of each of the expenses, revenues or costs in relation to the gross revenue. Furthermore, the horizontal analysis is performed,

comparing the values of an account or group of accounts with the previous month's fiscal year, in addition to verifying the increases or decreases of each of the accounts over the months (Assaf Neto, 2020).

Thus, the behavior of the Total Revenue, costs, expenses and net income over 60 months is analyzed by line graphs, with the values updated for January 2022 with IPA-M. Furthermore, the values obtained based on the horizontal and vertical analysis in the period are also verified by means of line graphs.

The simulation of the tax regimes is based on the calculation of taxes and contributions, as shown in Tables 2 and 3:

Table 2 - Taxes and Contributions for the Presumed Profit Regime

Tax or Contribution	Rate	Basis of calculation
IRPJ - Corporate Income Tax	15%	Calculation basis of 8% of Gross Revenue
Additional IRPJ (the portion of profit above R\$20,000.00)	10%	
CSLL - Social Contribution on Net Income	9%	Calculation basis of 12% of Gross Revenue
PIS – Social Integration Program	0.65%	Gross Revenue
COFINS - Social Security Contribution	3%	Gross Revenue
Social Security Charges - INSS - Employer, FGTS	36.30%	Payroll
Social Charges - INSS on withdrawal	20%	<i>Pro-labore</i>

Source: Ministry of Economy - Receita Federal (2021).

Table 3 - Taxes and Contributions for the Actual Profit Regime

Tax or Contribution	Rate	Basis of calculation
IRPJ - Corporate Income Tax	15%	Net Profit
Additional IRPJ (the portion of profit above R\$20,000.00)	10%	Net Profit
CSLL - Social Contribution on Net Income	9%	Net Profit
PIS – Social Integration Program	1.65%	Gross Revenue
COFINS - Social Security Contribution	7.60%	Gross Revenue
Social Security Charges - INSS - Employer, FGTS	36.30%	Payroll
Social Charges - INSS on withdrawal	20%	<i>Pro-labore</i>

Source: Ministry of Economy - Receita Federal (2021).

The simulation of the Actual Profit tax regime was performed with data updated by IPA-M, measured according to Table 4:

Table 4 - Variables for the Actual Profit simulation

Variables for the Actual Profit simulation			
Description	Distribution	Data	Variable type
Gross Revenue adjusted for deductions and rebates	Normal	Mean and SD	Input
ICMS 18%	Normal	Mean and SD	Input
IPI 9.75% (MNC 7007.11.and 7007.21.00)	Normal	Mean and SD	Input
PIS 1.65%	Normal	Mean and SD	Input
COFINS 7.6%	Normal	Mean and SD	Input
Variable Costs - Production Inputs (PIS/COFINS Credit)	Triang	Maximum, mean, and minimum	Input
Fixed Cost - Direct labor (production payroll)	Triang	Maximum, mean, and minimum	Input
Social Security charges - INSS - Employer, FGTS (36.30%)	Triang	Maximum, mean, and minimum	Input
Expenses with payroll - administrative, commercial, and directorship	Normal	Mean and SD	Input
Social Security charges - INSS - Employer, FGTS (36.30%) on payroll - administrative, commercial, and executive management	Normal	Mean and SD	Input
Other employee expenses (food, transportation, others)	Normal	Mean and SD	Input
Administrative Expenses	Uniform	Mean	Input
Rental Expenses (PIS/COFINS Credit)	Uniform	Mean	Input
Depreciation (PIS/COFINS Credit)	Uniform	Mean	Input
Expenses with furniture and equipment (PIS/COFINS credit)	Uniform	Mean	Input
Vehicle and transportation expenses	Uniform	Mean	Input
<i>Pro-labore</i>	Uniform	Mean	Input
INSS on <i>pro-labore</i> withdrawal (20%)	Uniform	Mean	Input
Other non-operational revenues	Uniform	Mean	Input
Other non-operational expenses	Uniform	Mean	Input
Shareholder Remuneration - Interest on Equity - Calculation Basis: Net Worth * 0.5683% per month - TLP	Uniform	Mean	Input
Results before IRPJ and CSLL		Measured by inputs	Output
IRPJ		Calculation basis: Results before IRPJ and CSLL	Output
CSLL		Calculation basis: Results before IRPJ and CSLL	Output
Net Profit		Results before IRPJ and CSLL with deduction of IRPJ and CSLL	Output

Source: Elaborated by the author (2022).

According to Table 4, the adjusted Gross Revenue is used, with deductions for returns and sales rebates. The ICMS rates of 18% and IPI of 9.75% are according to the activity of Alpha Glass Industry CNAE 23.11-7-00 - Manufacture of flat and safety glass and the MNC 7007.11.00 and 7007.21.00 of its products (Decree No. 7,871/2017; Decree No. 10,979). The PIS/COFINS rates are according to Table 3 and both taxes are non-cumulative, that is, it is possible to use credits. The calculation base of the PIS and COFINS variables used the credits of the variables mentioned in Table 4, since the goods acquired for resale are considered, for credit purposes, with the purchase of inputs for the production process, rents, the value of electricity, depreciation charges for machinery, equipment, and amortization of improvements, with the name of Sum for PIS/COFINS credit (Law No. 10,865, 2004).

To determine the results, in relation to the variable costs, considering that their variability is according to sales, the percentage of monthly variable costs was calculated, according to Equation 1:

$$PCV = \frac{CV_a}{RB_a} * 100 \quad (1)$$

Where:

PCV: Percentage of monthly variable cost;

CVa: Total Monthly Variable Cost;

RBa: Monthly Gross Revenue after deduction of sales rebates.

The percentages measured by Equation 1 were used to calculate the variable costs inserted in the simulation. As for the amounts directed to the two partners, the *pro-labore* corresponding to a minimum wage and the Interest on Equity was used, in which its calculation basis was the value of the Net Equity taken from the last Balance Sheet of the company, applied to the current TLP - Long Term Rate of 0.5683% per month (Receita Federal, 2022). The distributions assigned for each variable were chosen for the best fit to Alpha Industry's data; for the application of this methodology in other companies, data analysis is required to elect the most appropriate distribution. The variable type refers to the way the variable is entered into the @Risk software for the simulation.

The simulation of the Presumed Profit tax regime was performed with data updated by IPA-M, measured according to Table 5:

Table 5 - Variables for the Simulation of the Presumed Profit

Variables for the Simulation of the Presumed Profit			
Description	Distribution	Data	Variable
Gross Revenue adjusted for deductions and rebates	Normal	Mean and SD	Input
ICMS 18%	Normal	Mean and SD	Input
IPI 9.75% (MNC 7007.11.00 and 7007.21.00)	Normal	Mean and SD	Input
PIS 1.65%	Normal	Mean and SD	Input
COFINS 7.6%	Normal	Mean and SD	Input
Variable costs - Inputs for production	Triang	Maximum, mean, and minimum	Input
Fixed Cost - Direct labor (production payroll)	Triang	Maximum, mean, and minimum	Input
Social Security charges - INSS - Employer, FGTS (36.30%)	Triang	Maximum, mean, and minimum	Input
Expenses with payroll - administrative, commercial, and directorship	Normal	Mean and SD	Input
Social Security charges - INSS - Employer, FGTS (36.30%) on payroll - administrative, commercial and executive management	Normal	Mean and SD	Input
Other employee expenses (food, transportation, others)	Normal	Mean and SD	Input
Administrative Expenses	Uniform	Mean	Input
Rental Expenses	Uniform	Mean	Input
Depreciation	Uniform	Mean	Input
Expenses with furniture and equipment	Uniform	Mean	Input
Vehicle and transportation expenses	Uniform	Mean	Input
<i>Pro-labore</i>	Uniform	Mean	Input
INSS on <i>Pro-labore</i> withdrawal (20%)	Uniform	Mean	Input
Other non-operational revenues	Uniform	Mean	Input
Other non-operational expenses	Uniform	Mean	Input
Results before IRPJ and CSLL		Measured by inputs	Output
IRPJ		Calculation basis: Presumed on Gross Revenue	Output
CSLL		Calculation basis: Presumed on Gross Revenue	Output
Net Profit		Results before IRPJ and CSLL with deduction of IRPJ and CSLL	Output

Source: Elaborated by the author (2022).

According to Table 5, the ICMS and IPI were measured with the same rates used in Table 4, according to the activity and products sold. Under the Presumed Profit tax regime, PIS and COFINS are cumulative, i.e. it is not possible to use credits. In this case, the fixed rates of 0.65% for PIS and 3% for COFINS were used, having the adjusted Gross Revenue as the

calculation basis. The variable costs were also calculated according to the percentages calculated in Equation 1. In relation to the amounts directed to the two partners, in the Presumed Profit, it is not possible to use the Interest on Equity, therefore, the amounts of withdrawals made by the partners during the 60 months were used to measure the *pro-labore* of the simulation.

As with the variable data for the Actual Profit simulation, the distributions assigned to each variable were chosen to best fit the data for the company studied. The variable type refers to the way the variable is entered into the @Risk software for the simulation.

The Monte Carlo Simulation was performed in the @Risk software in order to size and analyze the limits and probabilities of tax administration under the Presumed Profit and Actual Profit tax regimes, using 10,000 simulations. The calculation of the tax regimes was done on the Competence Regime, i.e., using the amounts accounted for in the month in which the taxable event occurred (Accounting Pronouncements Committee, 2019).

Based on the limits and probabilities provided by the Monte Carlo Simulation, the simulated data of adjusted Gross Revenue, Fixed Costs, Variable Costs, PIS, COFINS, Income before Corporate Income Tax and Social Contribution on Net Income, Corporate Income Tax, Social Contribution on Net Income, and Net Income for the year were analyzed using line graphs. Based on this analysis, it was verified which tax regime can make Alpha Industry more competitive and achieve greater profitability. Subsequently, strategies and alternatives were presented to help the financial balance and the expansion process of Alpha glass industry when faced with the change in the tax regime. Finally, an intervention proposal was presented for the company studied.

3.4 LIMITATIONS OF RESEARCH METHODS AND TECHNIQUES

The limitations of this work are that it is a study applied to a specific company. Therefore, the results derived from the simulations are limited to the company studied. However, the method can be replicated in other organizations. Furthermore, the tax calculation was performed in a more simplified way in order to demonstrate how we can use this tool. The tax simulation requires a more thorough analysis of all accounting information, since PIS and COFINS credits can make the difference, for example.

4 PROJECT CONTEXT

This chapter discusses the context of the project, describing the Alpha Industry and analyzing the national glass market in which the company is inserted.

4.1 DESCRIPTION OF ALPHA INDUSTRY

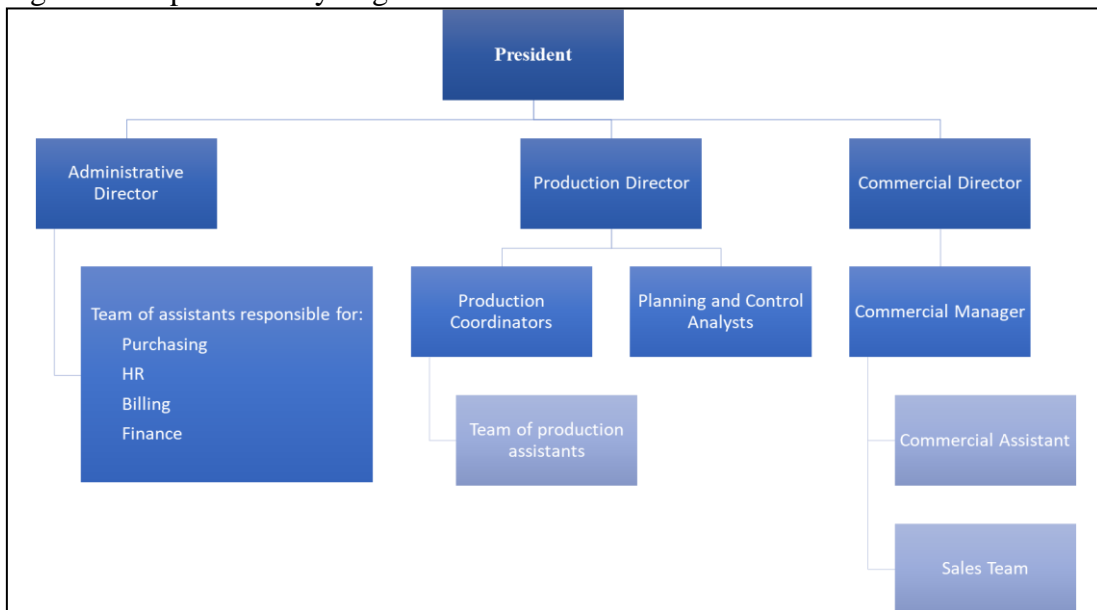
The company object of study is Alpha Glass Industry, founded in 2014 in the state of Paraná. The organization aims to operate in the market of curved and flat glass for heavy machinery, agricultural machinery, and custom projects. The company sells wholesale and retail to all of Brazil, through internal service by phone and internet. It currently has a portfolio of more than 5 thousand customers, supplying its products for replacement parts to dealers and auto parts resellers, besides serving end consumers, such as earth-moving companies, construction companies, and farms, among others. Furthermore, it carries out customized projects for the civil construction and automotive areas.

Regarding its manufacturing process, Alpha Industry purchases the glass plates in three colors - green, smoked, and clear - and performs the industrialization process, that is, the product goes through the cutting process and, later, it is destined to lamination, tempering, or application of film (pellicle) and paint, if necessary. The glass can be flat or curved, according to the standard of the machine or the project requested.

The legal nature of the company is limited liability company (LTD) and its size is that of a SC. Regarding billing, it has annual gross revenue of approximately 4 million reais, in the sublimit of the *Simples Nacional* tax regime.

Regarding employees, Figure 3 presents the company's organization chart:

Figure 3 - Alpha Industry Organization Chart



Source: Elaborated by the author (2021).

The company currently has 60 employees, with the two partners in the presidency, three directors - commercial, administrative and production. The administrative director has a team of four administrative assistants, each responsible for one function - purchasing, human resources, invoicing and finance. The production director has the support of three production coordinators, two control and planning analysts, besides a team of thirty-six production assistants. The commercial director is supported by a commercial manager, a commercial assistant, and a team of eight salespeople.

4.2 THE ALPHA INDUSTRY'S NATIONAL MARKET

The glass industry can be classified into four major areas, as shown in Table 6:

Table 6 - Glass Industry Classifications

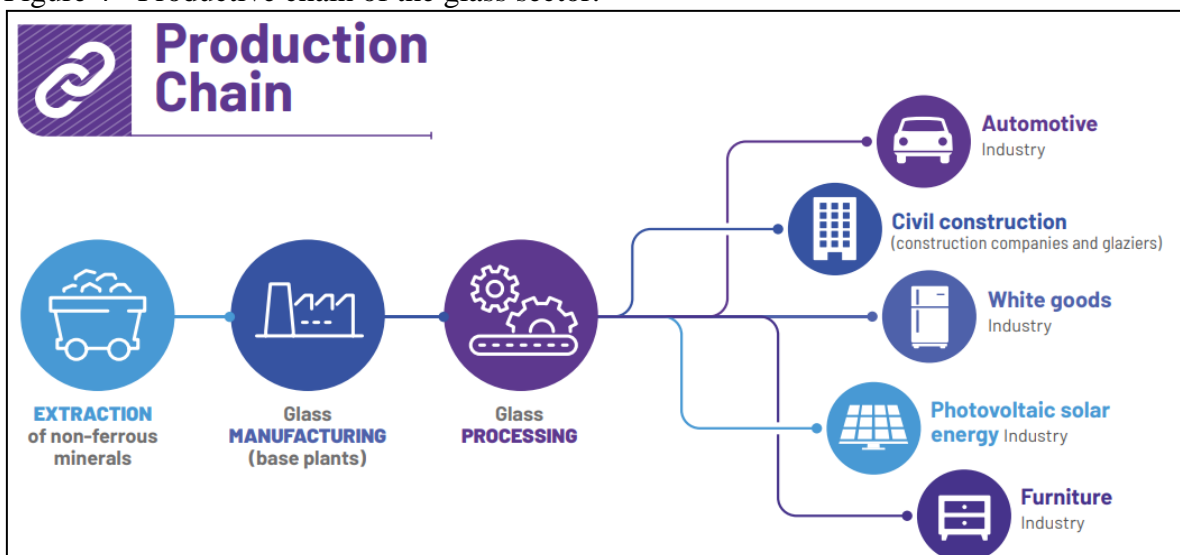
Classification	Description
Flat glass	Glass manufactured in sheets, intended for application in the construction, automotive, furniture, and decoration industries.
Special or technical glass	Glass for use in various industrial segments, such as the construction industry, pharmaceutical industry, food industry, automotive industry, textile industry, etc.
Packaging glass	Glass used in the beverage, food, pharmaceutical and cosmetics industries.
Household glassware	Glass used in utensils such as tableware, glasses, cups, vases, and decorative objects in general.

Source: Leite *et al.* (2010).

Alpha Industry buys the flat glass sheets, according to the first large area presented, and performs the industrialization process that results in technical glass, that is, glass intended for use in heavy machinery, agricultural machinery, the automotive sector, and civil construction, the second area shown in Table 6.

The production chain of the glass sector can be summarized as shown in Figure 4:

Figure 4 - Productive chain of the glass sector.



Source: Brazilian Association of the Flat Glass Distributors and Processors [Abravidro] (2021).

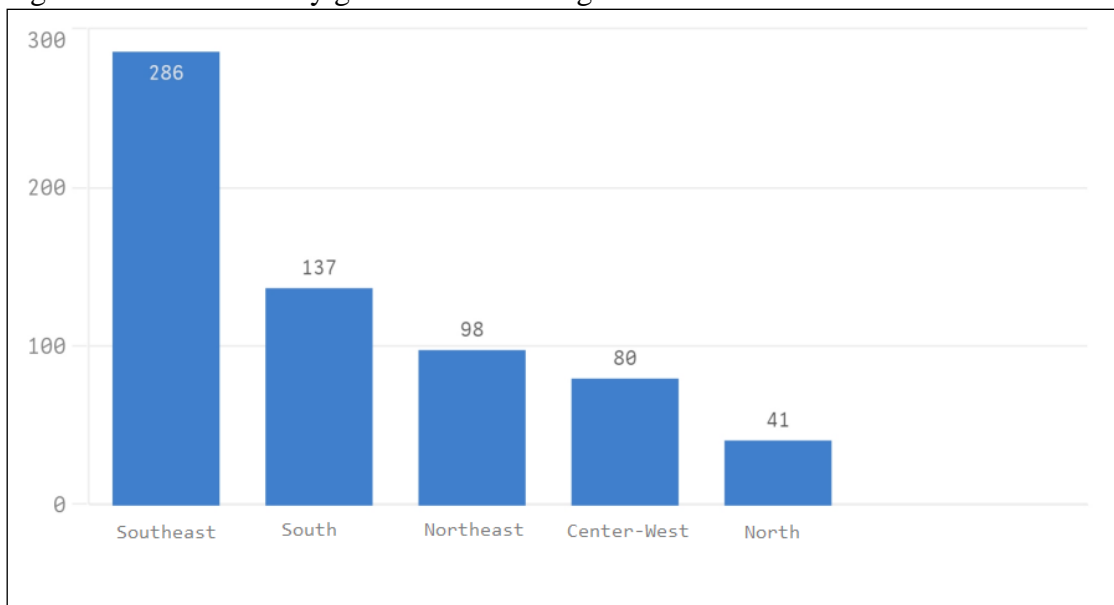
According to Figure 4, the first stage is the extraction of minerals that are part of the composition of glass, which are then sent to the base plants for the manufacturing process of

glass sheets, which can be float or printed flat glass. These products are destined for the transformed glass market; among the types of glass offered are: mirror, laminated, tempered, insulated, reflective, low emissive, and self-cleaning. Such glass can be transformed in the five main markets: photovoltaic solar energy sector, white goods industry, furniture industry, automotive industry, and civil construction (Abravidro, 2021; Freire, 2016).

As for the supplier market of Alpha Industry, there are four groups that dominate the world glass market: AGC and NSG, both from Japan; Saint-Gobain, from France; Guardian, from the United States. Europe, North America, and China are responsible for about 70% of the world demand. In Brazil, this market is composed of six major companies: Cebrace, Guardian, AGC, Vivix, Saint Gobain Glass, and UBV (Freire, 2016). Of these national suppliers, two are partners of Alpha Industry.

Alpha's main economic activity is CNAE 23.11-7-00 - Manufacture of flat and safety glass. In the national scenario, Figure 5 shows the number of industries that have the same economic activity per region of the country:

Figure 5 - Flat and safety glass manufacturing industries in Brazil



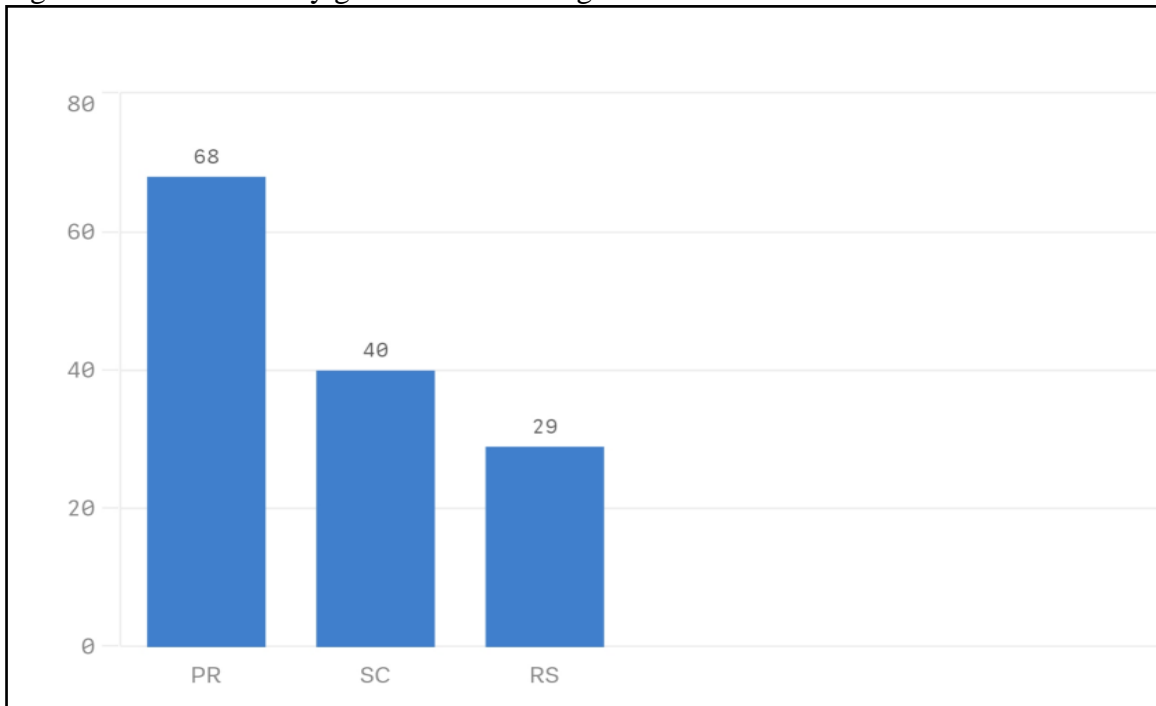
Source: Brazilian Micro and Small Business Support Service – SEBRAE (2021).

According to Figure 5, there are currently 642 flat and safety glass manufacturing industries in the country. Of this total, the Southeast region stands out with approximately 44.5% (286 units) of the companies. In the sequence is the South region with approximately 21.3% (137 units) of the industries in the sector, the region in which industry Alpha is located.

The Northeast, Midwest, and North regions have about 15.2% (98 units), 12.5% (80 units), and 6.5% (41 units), respectively.

Figure 6 presents the number of companies in the sector located in each state of the southern region of the country:

Figure 6 - Flat and safety glass manufacturing industries in the South



Source: Brazilian Micro and Small Business Support Service – SEBRAE (2021). Note: In the figure, PR is Paraná, SC is Santa Catarina, and RS is Rio Grande do Sul.

According to Figure 6, the state of Paraná, where Alpha Industry is located, stands out in number of companies in the sector, with approximately 49.5% (68 units) of the industries of this economic activity. Next is Santa Catarina, with 29% (40 units) and, finally, the state of Rio Grande do Sul with about 21.5% (29 units).

To analyze the sector's market in Paraná, Table 7 presents the number of industries of this economic activity per municipality in Paraná:

Table 7 - Flat and safety glass manufacturing industries by municipality in Paraná

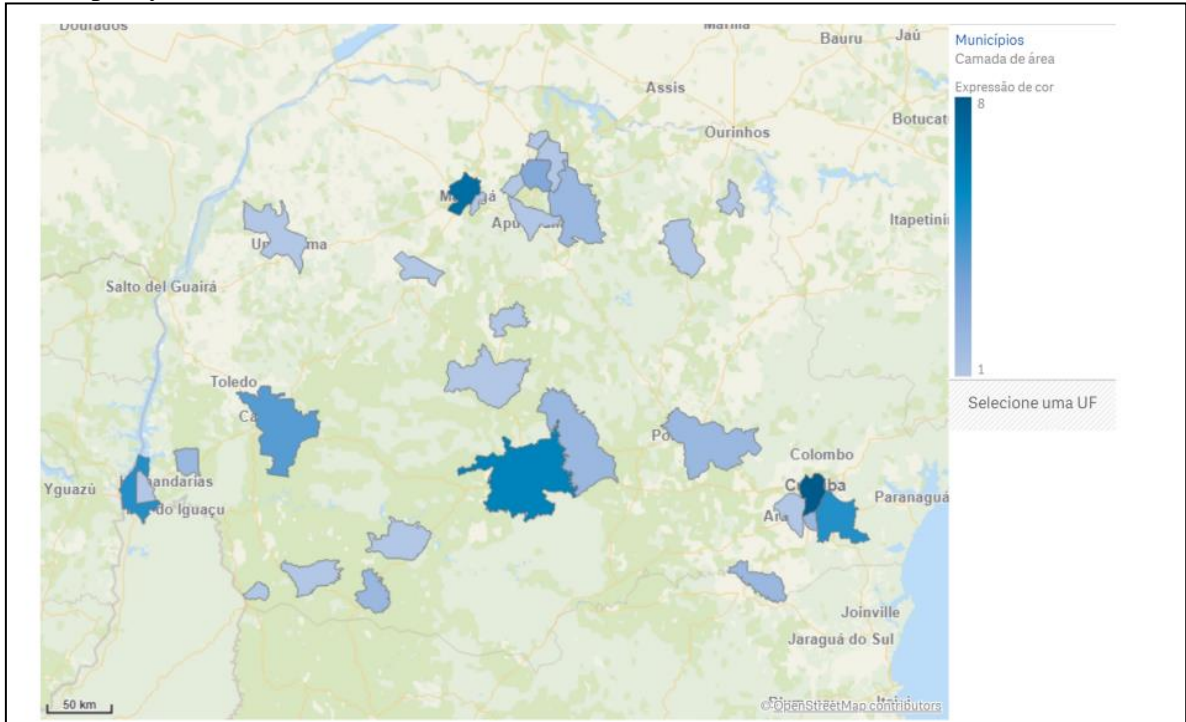
City	Establishments	City	Establishments
Curitiba	8	Araucária	1
Maringá	7	Bom Jesus do Sul	1
Guarapuava	6	Cambé	1
Foz do Iguaçu	5	Chopinzinho	1
São José dos Pinhais	5	Francisco Beltrão	1
Cascavel	4	Ibaiti	1
Rolândia	3	Ivaiporã	1
Fazenda Rio Grande	2	Joaquim Távora	1
Londrina	2	Peabiru	1
Medianeira	2	Pitanga	1
Pato Branco	2	Prado Ferreira	1
Ponta Grossa	2	Sabáudia	1
Prudentópolis	2	Santa Terezinha de Itaipu	1
Rio Negro	2	Sarandi	1
Apucarana	1	Umuarama	1

Source: Brazilian Micro and Small Business Support Service – SEBRAE (2021).

Table 7 shows that the city of Curitiba stands out with 11.8% (8 units) of the 68 industries of the sector located in the state. In the sequence is Maringá, with 10.3% (7 units); Guarapuava, with 8.8% (6 units); Foz do Iguaçu and São José dos Pinhais, with 7.3% (5 units) each; Cascavel, with 5.9% (4 units); and Rolândia, with 4.4% (3 units). In addition, there are 7 cities with 2.9% (2 units) each and 16 cities with only 1 plant in this sector, representing approximately 1.5% each.

This distribution of industries of the sector per municipality in Paraná can be better visualized with Figure 7:

Figure 7 - Map of the distribution of flat and safety glass manufacturing industries by municipality in Paraná



Source: Brazilian Micro and Small Business Support Service – SEBRAE (2021).

Regarding job generation, Table 8 presents the amount of jobs generated from 2014 to 2019, according to the data available from the Annual List of Social Information (RAIS):

Table 8 - Number of people employed in the sector - Brazil

Year	Manufacturing industry	CNAE 23.11-7-00 Manufacture of flat and safety glass	%
2014	8,171,022	20,858	0.26 %
2015	7,566,900	19,009	0.25 %
2016	7,148,013	17,928	0.25 %
2017	7,105,206	17,333	0.24 %
2018	7,098,152	18,120	0.26 %
2019	7,219,258	17,813	0.25 %
Total	44,308,551	111,061	0.25 %

Source: Annual List of Social Information - RAIS (2021).

According to Table 8, in the six years analyzed, the participation of industries that have the economic activity of Manufacture of flat and safety glass was responsible, on average, for 0.25% of job generation in the manufacturing industry sector. Note that the variation in the

quantity of hired in the period is very low, being on average 3% in one year in relation to the previous one.

As for the industry's product generation, Table 9 presents the national industrial sector product production and sales of the Flat and Safety Glass Manufacturing sector from the years 2014 to 2019, according to data available from the Brazilian Institute of Geography and Statistics - IBGE:

Table 9 - Production and sales of products in the domestic industrial sector and the Flat and Safety Glass Manufacturing sector

Year	National Industry Sector		Manufacture of flat and safety glass	
	Production value (thousand reais)	Net sales revenue (thousand reais)	Production value (thousand reais)	Net sales revenue (thousand reais)
2014	2,590,773,318	2,165,993,301	5,478,182	4,644,570
2015	2,548,936,587	2,158,084,466	5,735,027	4,848,409
2016	2,539,811,947	2,156,364,117	5,653,632	4,700,204
2017	2,760,553,564	2,294,090,323	6,837,458	4,678,988
2018	3,170,934,332	2,621,089,496	6,400,543	5,397,834
2019	3,333,559,299	2,790,544,489	6,210,187	5,366,674

Source: Brazilian Institute of Geography and Statistics - IBGE (2021).

According to Table 9, between the years 2014 and 2019, the production value of flat and safety glass manufacturing industries represented, on average, 0.22% of the national industrial sector production. In terms of net sales revenue, the representativeness of industries in this economic activity was similar, averaging 0.21% relative to the total industrial sector. The best production result of the flat and safety glass plants was in 2017, while their highest net sales revenue was in 2019.

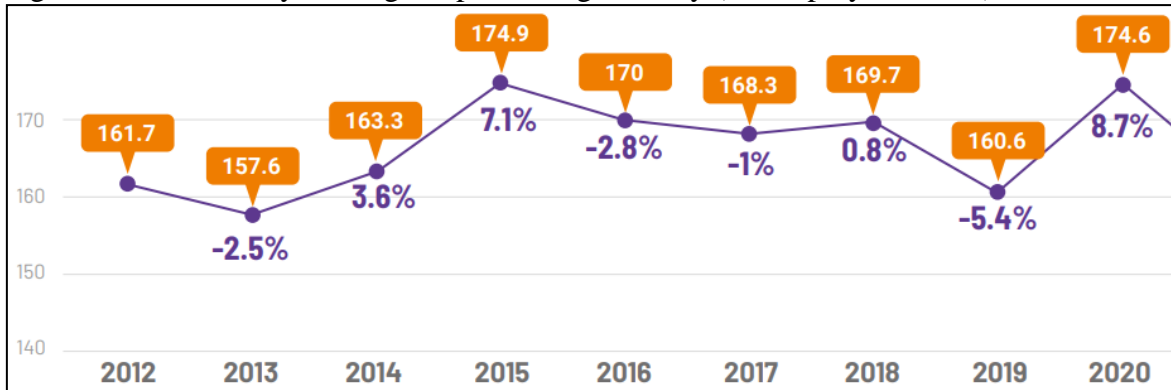
Regarding the economic outlook of the glass sector, according to the report published by ABRAVIDRO (2021), despite the adversities caused by the Covid-19 pandemic, in 2020, the glass sector had positive results. In the year under review, the production of processed glass grew 14.4% and tempered glass, the main product of the sector, grew 17.1%. Non-automotive processed glass, on the other hand, also managed to grow, presenting the best index since 2015, with a 12% increase in sales.

The positive results of the glass sector reflect the high demand for the product, especially in the second half of 2020, a consequence of the classification of civil construction as an essential activity during the pandemic, allowing its operation, the provision of emergency aid

by the government and the increased savings of families, who began to invest in improvements in their homes (Abravidro, 2021).

As for the industry's productivity between 2009 and 2020, it can be seen in Figure 8:

Figure 8 - Productivity in the glass processing industry (m²/employee/month)

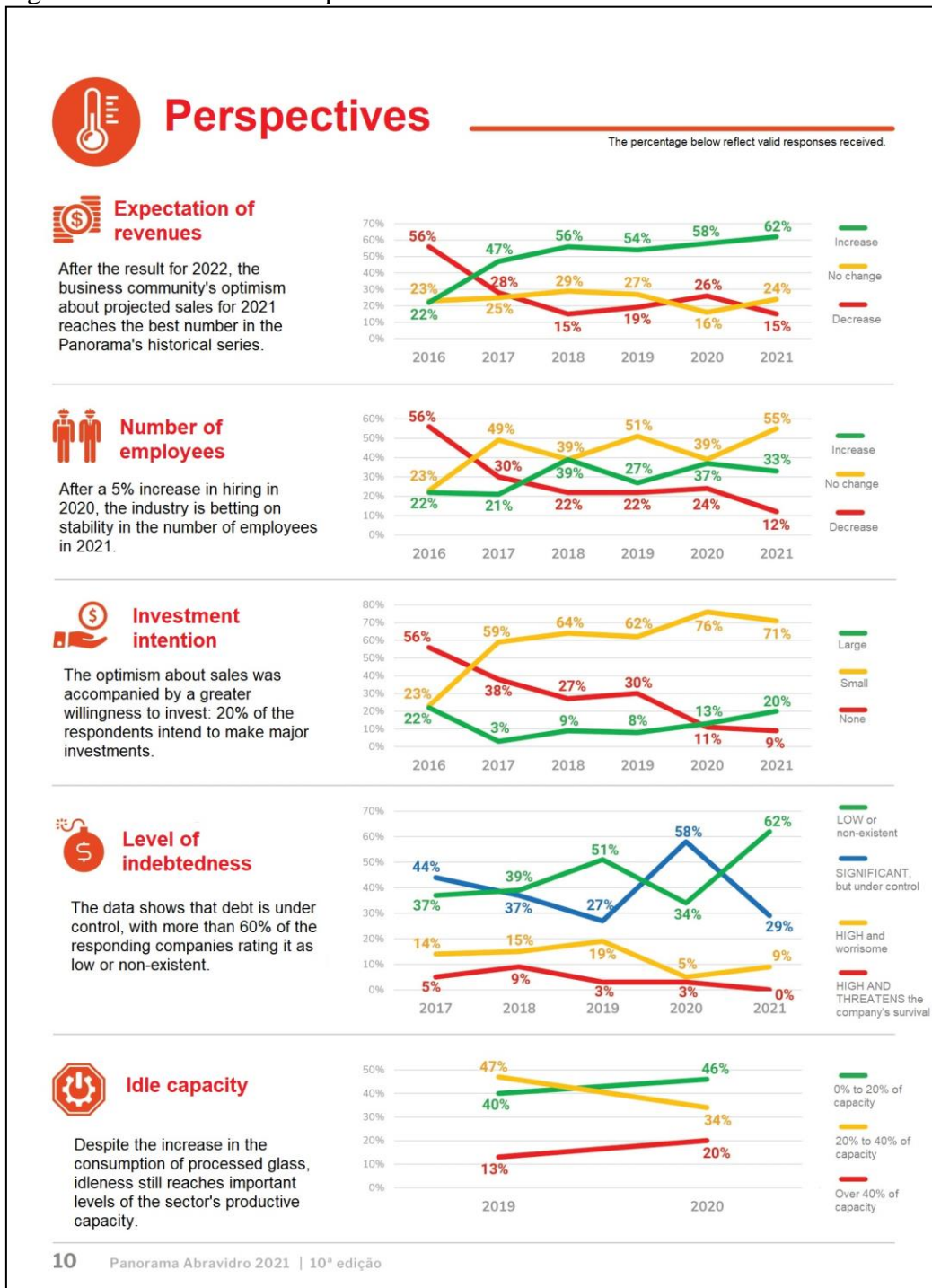


Source: Brazilian Association of the Flat Glass Distributors and Processors [Abravidro] (2021).

According to Figure 8, it can be seen that there was an increase in the industry's productivity over these 11 years, especially in 2015, 2016, and 2020. In 2020, the second best productivity level of the historical series was reached, with about 8.7% growth compared to 2019 (Abravidro, 2021).

Abravidros surveyed its members about the main points that provide data to generate a thermometer of the sector's economy, for the years 2016 to 2021; the results are presented in Figure 9:

Figure 9 - Glass Sector Perspectives



Source: Brazilian Association of the Flat Glass Distributors and Processors [Abravidro] (2021).

As shown in Figure 9, in the expectation of sales, with the exception of 2016, in the other years, most entrepreneurs of the sector expressed positive expectations of increased sales, and the expectation of 2021 is the highest of the historical series. In relation to the number of employees, there are oscillations in expectations over the years analyzed, and, for the most part, expectations were for stability in the number of employees. As for investment intentions, the

highest percentages, throughout the years, were of few intentions to invest. However, in 2021, there was an improvement, increasing to 20% the entrepreneurs who have great intentions to invest, the highest percentage since 2016 (Abravidros, 2021).

As for the degree of indebtedness, over the 11 years, most companies had controlled indebtedness; in 2021, they had the best result with about 62% of the companies with low or no debt. Regarding idle capacity, even with the increase in consumption, the industry still suffers from a considerable percentage of idleness (Abravidros, 2021).

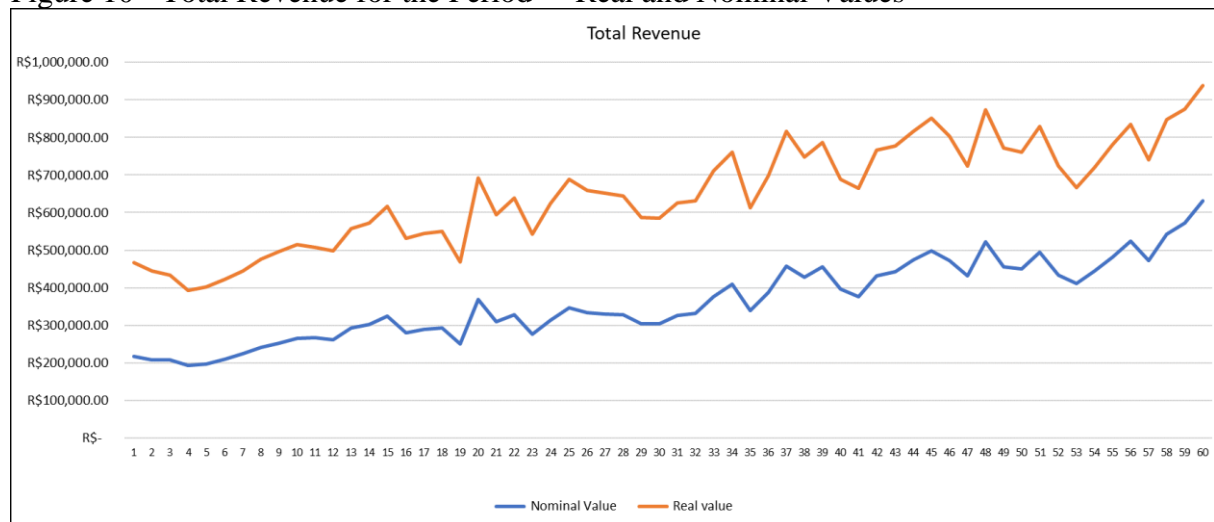
5 ANALYSIS AND INTERPRETATION OF RESULTS AND INTERVENTION PROPOSAL

This chapter is composed of the analysis and interpretation of the results, performing the analysis of the DRE of the 60 months within the *Simple Nacional* regime, provided by the company, updated for January 2022 values by the IPA-M index. Next, the results of the simulations of the Actual Profit and Presumed Profit tax regimes with Monte Carlo Simulation, using the @Risk software, are presented. Finally, an intervention proposal is presented, in which strategies and alternatives are presented for financial equilibrium when faced with a change in the tax regime.

5.1 ANALYSIS OF THE STATEMENTS OF INCOME - DRE

With the values of the accounts of the DRE of the 60 months updated for values of January 2022 with the IPA-M, line graphs were generated in order to analyze the behavior of the Total Revenue, Costs and Expenses in the period, and this data corresponds to the *Simple Nacional* tax regime. Figure 10 presents the graphic of the nominal and real values of the Total Revenue:

Figure 10 - Total Revenue for the Period* - Real and Nominal Values



*July 2015 to June 2020

Source: Elaborated by the author (2022).

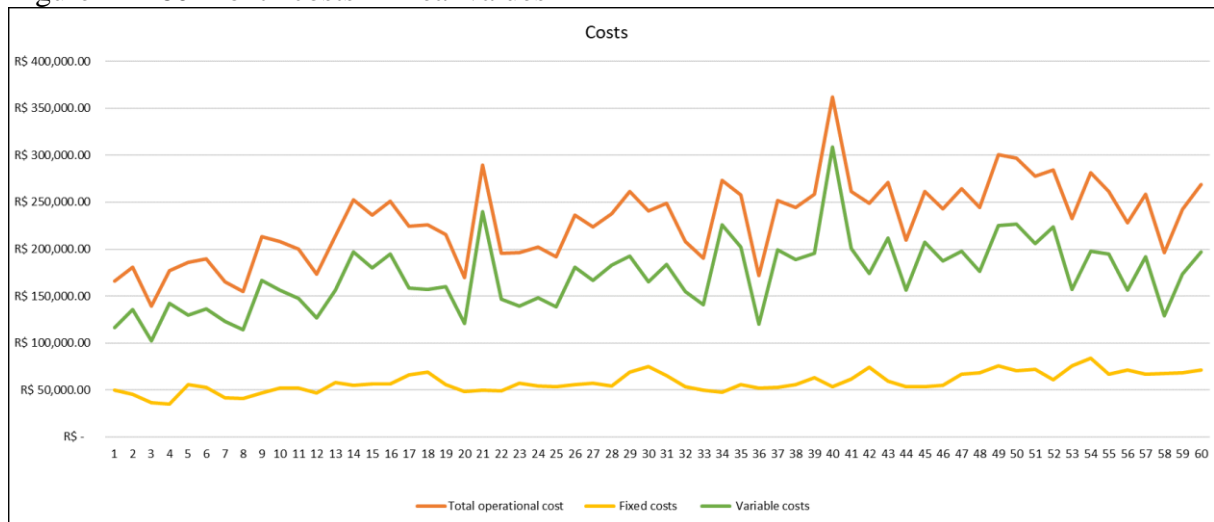
Despite the oscillations, Figure 10 demonstrates that, both in real and nominal values, the Total Revenue follows a growth trend. This corroborates Alpha Industry's concern with the growth of its revenues and the consequent change in its tax regime. As of the 53rd month, it is

possible to verify that, in nominal values, the tax regime is already considered, so that Alpha Industry already starts to have a Total Revenue higher than R\$400,000.00 per month; this, in the accumulated of 12 months, can disqualify the company from *Simple Nacional*, that is, obtaining an annual revenue higher than R\$4,800,000.00.

Considering that the objective is to analyze the behavior of the values throughout the period, only the real values are considered in the graphs of costs, expenses and net income. In Figure 10, the nominal values were included because they are the values considered for the classification in the Tax Regime.

Figure 11 shows the actual cost figures for Alpha Industry during the 60 months:

Figure 11 - 60-month costs* - Real values



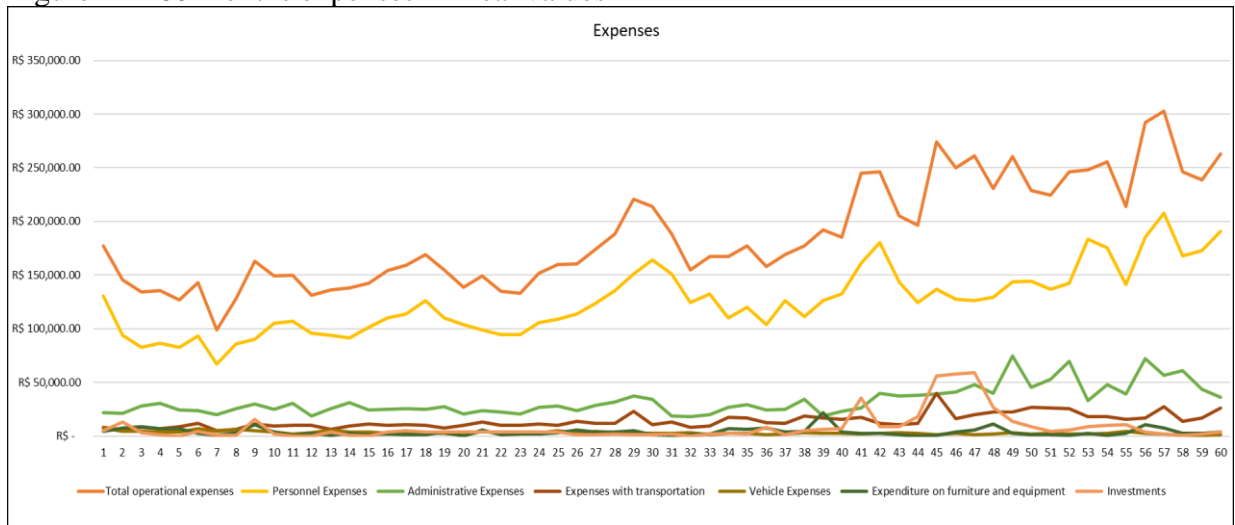
*July 2015 to June 2020

Source: Elaborated by the author (2022).

Figure 11 shows that fixed costs oscillate very little. The variable costs, on the other hand, have greater fluctuation, being the main responsible for the variability of total operational costs.

Figure 12 shows the actual expense figures for Alpha Industry during the 60 months:

Figure 12 - 60 months expenses* - Real values



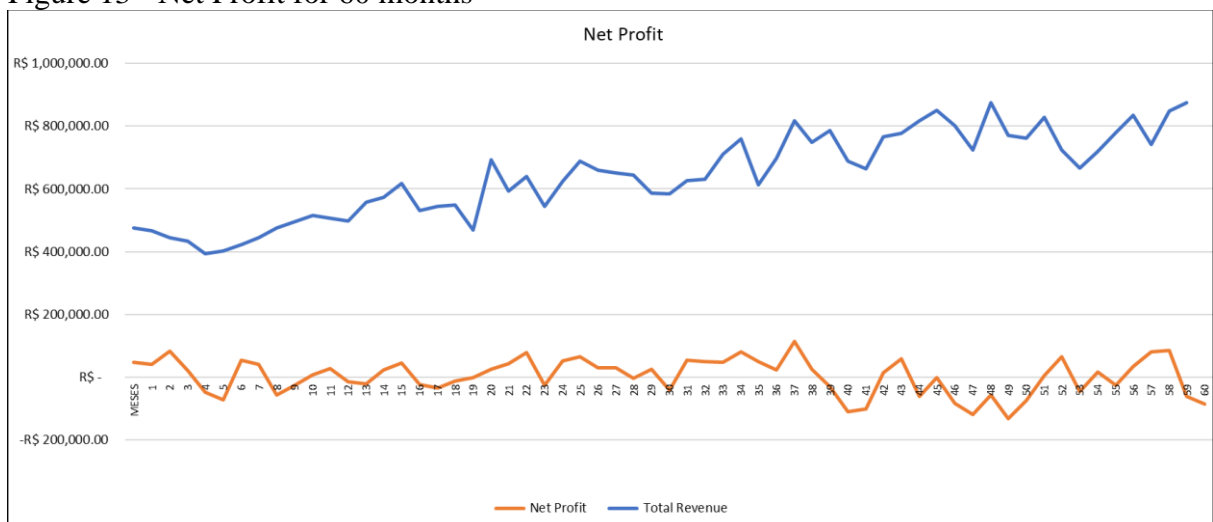
*July 2015 to June 2020

Source: Elaborated by the author (2022).

Figure 12 shows that the personnel expense has the greatest weight within the operating expenses. The other expenses - vehicles, furniture and equipment, administrative, investments and transportation - present few oscillations and the values are less representative within the total operating expenses, when compared individually with the personnel expense.

In Figure 13, the actual net income figures for Alpha Industry during the 60 months are shown, including in the graph the total revenue for comparison purposes:

Figure 13 - Net Profit for 60 months*



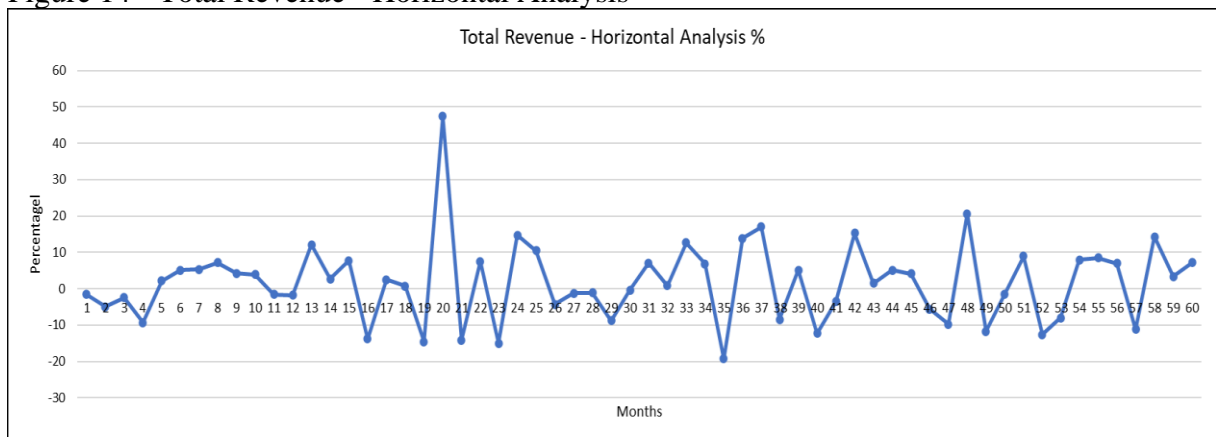
*July 2015 to June 2020

Source: Elaborated by the author (2022).

From Figure 13, it can be seen that even in months when total revenue was growing, the company made a loss. Thus, higher revenue does not imply a higher net profit. This result may indicate an imbalance in the company's cost and expense control.

In Figure 14, the graph resulting from the horizontal analysis of the real values of the Total Revenue of the 60 months is presented, that is, the percentage variation of the Total Revenue of a month in relation to the previous month:

Figure 14 - Total Revenue - Horizontal Analysis

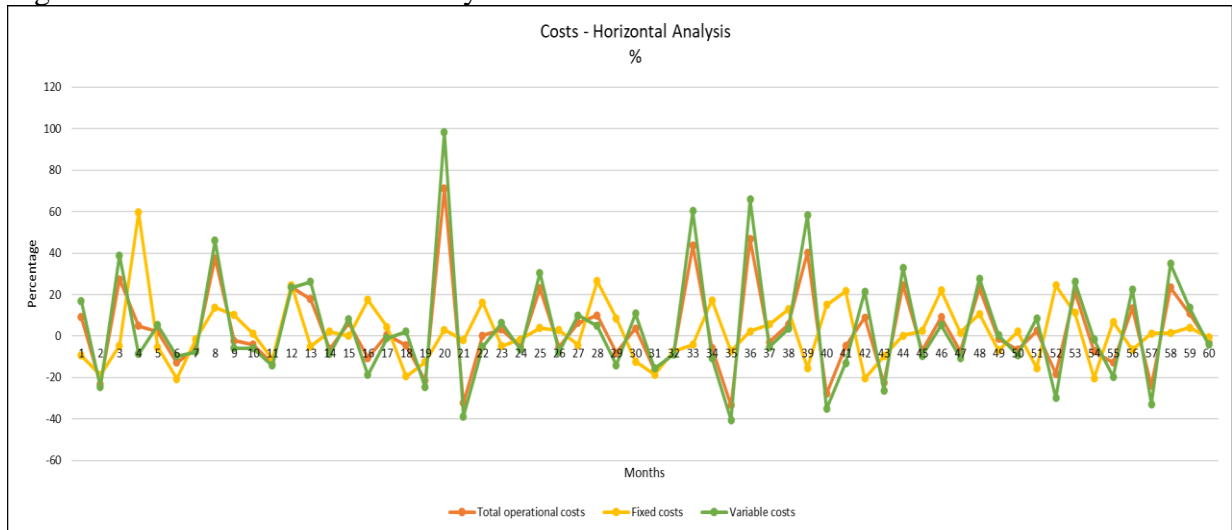


Source: Elaborated by the author (2022).

From Figure 14, it can be observed that the variation of the Total Revenue of a month in relation to the previous one was mostly positive. The percentage of variation was mostly in the range of up to 10%, with a few exceptions, such as the 20th month, which increased more than 47% in relation to the previous one. This may demonstrate that Alpha Industry does not present a turnover with much volatility.

In Figure 15, the graph resulting from the horizontal analysis of the actual Cost values in the 60 months is presented, that is, the percentage variation of one month's cost in relation to the previous month:

Figure 15 - Costs - Horizontal Analysis

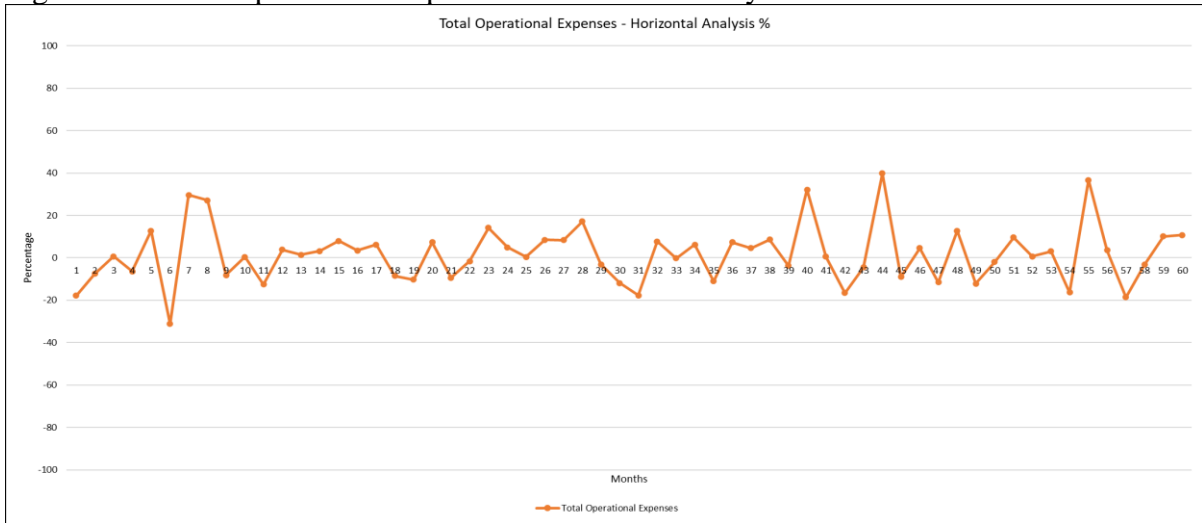


Source: Elaborated by the author (2022).

In Figure 15, one can see that the variation of fixed costs in a month in relation to the previous one presents oscillations mostly lower than 20% and, in a few situations, the variation in fixed costs was higher than the others. The variable costs, on the other hand, presented greater variations, reaching almost 100% in the 20th month, for example. The variations in total operating costs, in turn, were similar to those of variable costs in the analyzed period.

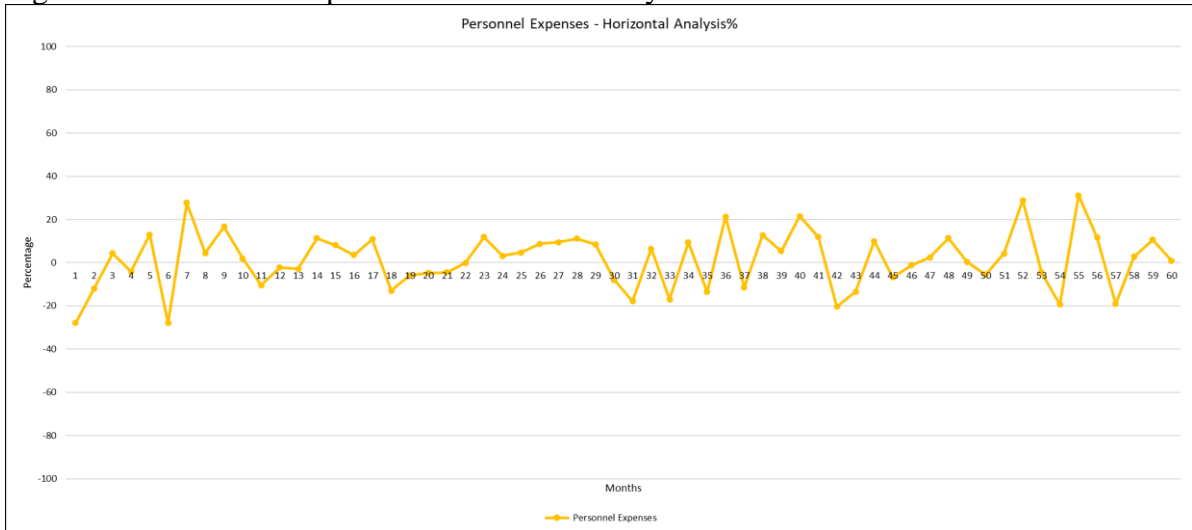
The horizontal analysis of the expenses was inserted in individual graphs to make the verification clearer. Figures 16, 17, 18, 19, 20, 21, and 22 present the horizontal analysis of Total Operational Expenses, followed by the other expenses that compose it - personnel expenses - which includes payroll and other expenses with employees, such as food, transportation vouchers, among others, administrative expenses, vehicle expenses, transportation expenses, expenses with furniture, equipment, and investments.

Figure 16 - Total Operational Expenses - Horizontal Analysis



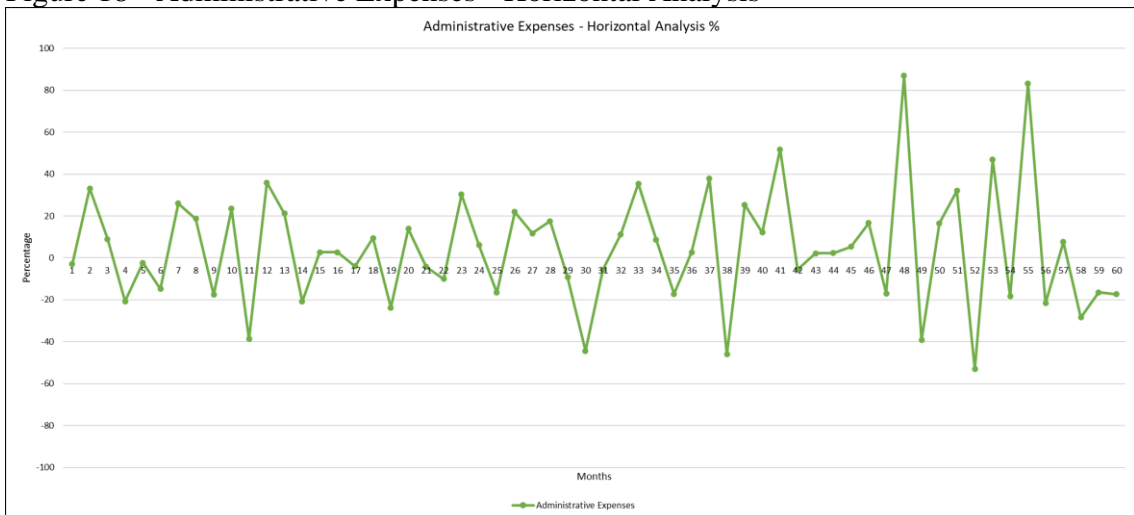
Source: Elaborated by the author (2022).

Figure 17 - Personnel Expenses - Horizontal Analysis



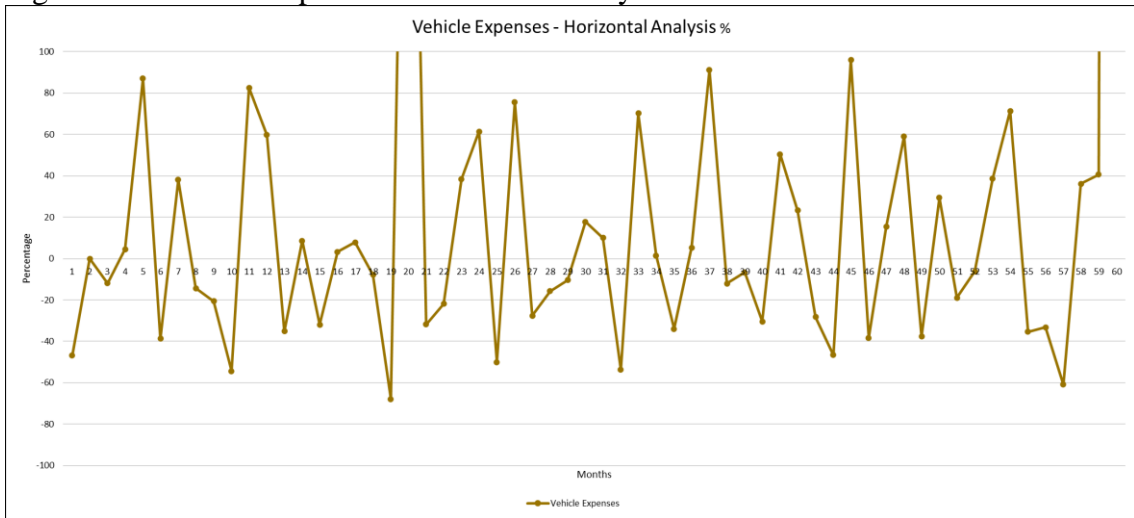
Source: Elaborated by the author (2022).

Figure 18 - Administrative Expenses - Horizontal Analysis



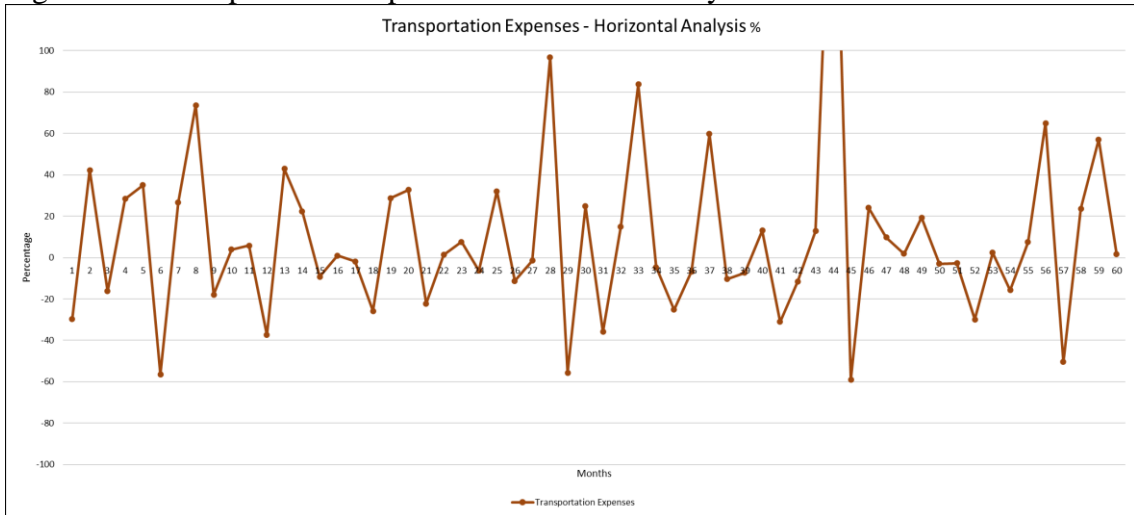
Source: Elaborated by the author (2022).

Figure 19 - Vehicle Expenses - Horizontal Analysis



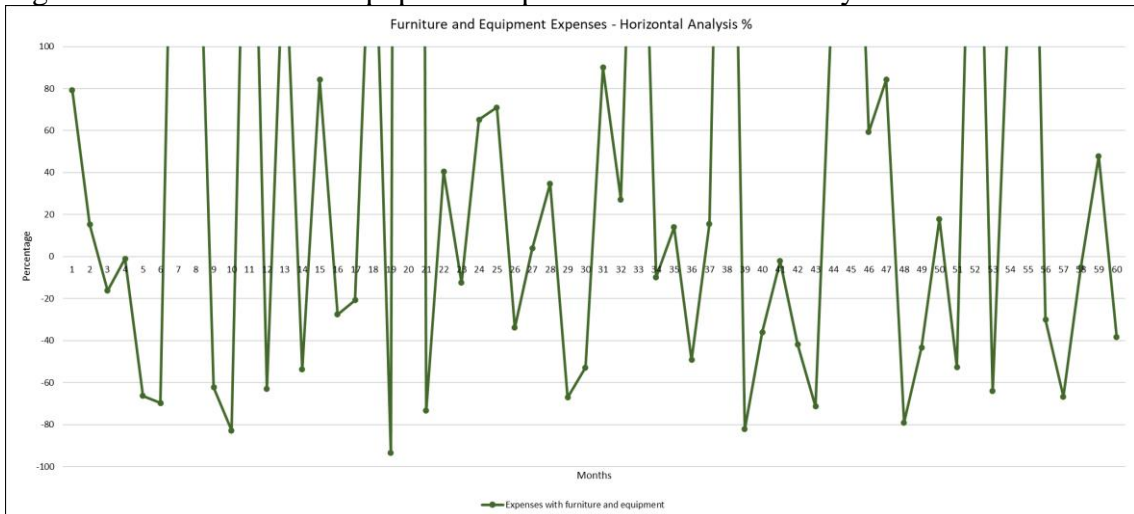
Source: Elaborated by the author (2022).

Figure 20 - Transportation Expenses - Horizontal Analysis



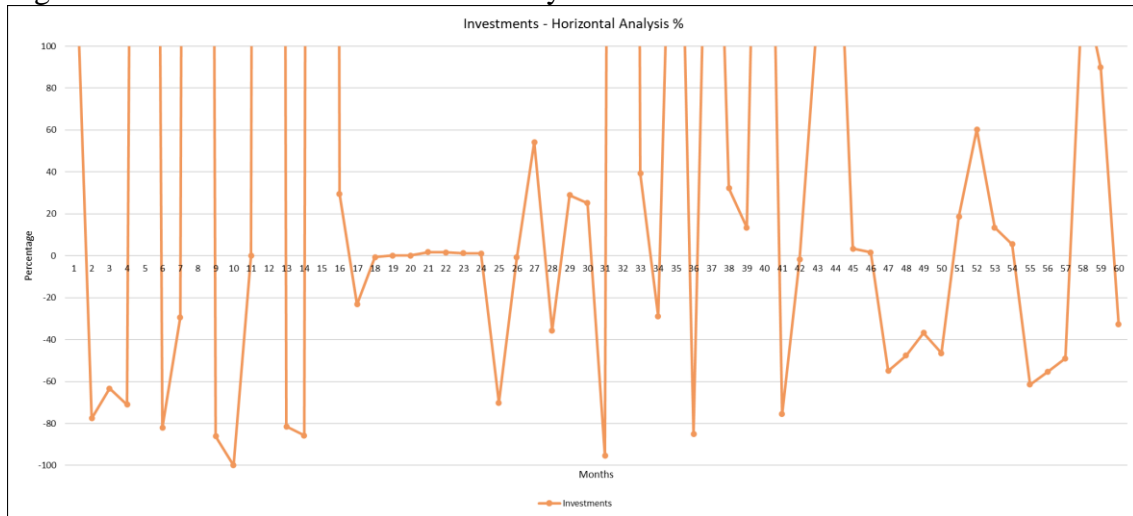
Source: Elaborated by the author (2022).

Figure 21 - Furniture and Equipment Expenses - Horizontal Analysis



Source: Elaborated by the author (2022).

Figure 22 - Investments - Horizontal Analysis

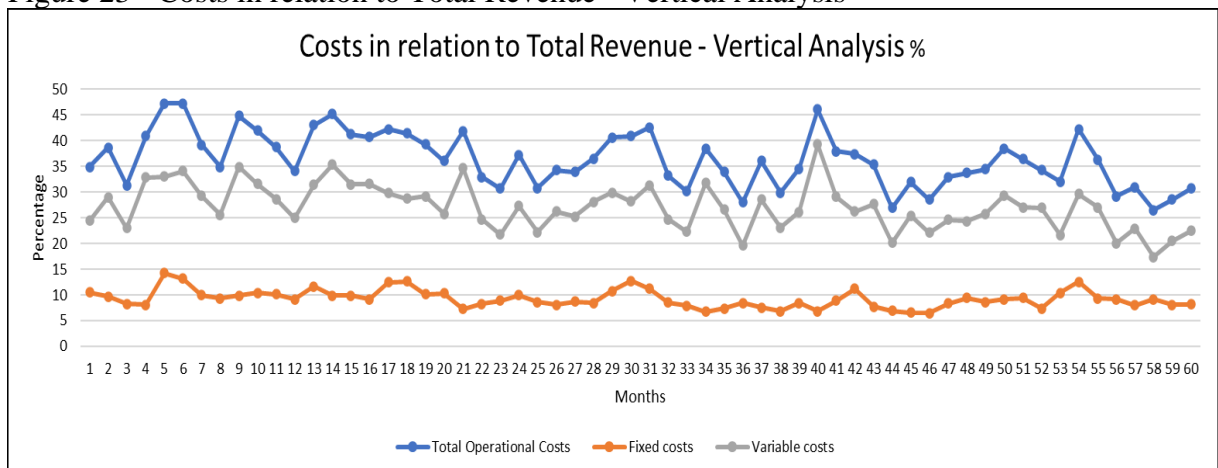


Source: Elaborated by the author (2022).

In Figure 16, it can be seen that the variations in total operating expenses from one month to the next were mostly less than 20%. Figure 17, of the personnel expenses, also did not present sharp oscillations, remaining with variations below 30%, for the most part. In Exhibit 18, the administrative expenses presented more significant variations during the period, reaching over 80% in the 48th and 55th month. In Figure 19, one can see that the vehicle expenses suffered high variations during the period, with months that obtained increases higher than 100%. In Figures 20, 21, and 22, one can see that the expenses with transportation, the expenses with furniture and equipment, and the investments also presented high variations during the 60 months, with increases and decreases exceeding 100% in the case of investments.

Figure 23 presents the graph resulting from the vertical analysis of the actual values of Costs in relation to Total Revenue in the 60 months, that is, the percentage variation of the costs of a month in relation to the total revenue of the same period:

Figure 23 - Costs in relation to Total Revenue - Vertical Analysis

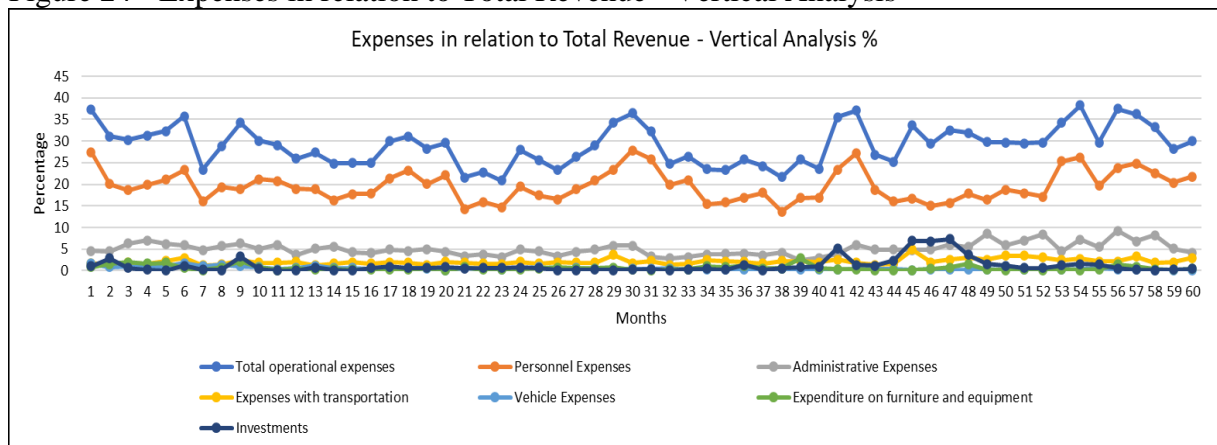


Source: Elaborated by the author (2022).

Figure 23 shows that during the 60 months analyzed, the fixed costs corresponded at least from 6% to 15% of the Total Revenue, without significant oscillations. The variable costs corresponded from 17% to 40% of the Total Revenue during the period, presenting greater variability. The Total Operational Costs, in turn, which are composed of fixed and variable costs, corresponded from 26% to 47% of the Total Revenue during the analyzed period.

In Figure 24, the graph resulting from the vertical analysis of the real values of Expenses in relation to Total Revenue in the 60 months is presented, that is, the percentage variation of the costs of a month in relation to the total revenue of the same period:

Figure 24 - Expenses in relation to Total Revenue - Vertical Analysis



Source: Elaborated by the author (2022).

Figure 24 demonstrates that investments, vehicle expenses, expenses with furniture and equipment, and transportation expenses correspond, in the period, to amounts less than 5% of Total Revenue. The administrative expenses varied from 5% to 10% of the Total Revenue. The expense with personnel is the most representative, corresponding from 13% to 26% of the Total Revenue. Composed of the other six expenses, Total operational expenses showed greater variability, influenced by the expense with personnel, corresponding from 22% to 37% of Total Revenue.

Finally, it was possible to verify that, despite the variability in the values between the months observed in the horizontal analysis, the Total Revenue of Alpha Industry presented a growth trend in the analyzed period, evidencing the concern with the exit from the framing of the *Simple Nacional* tax regime. If the company studied continues to increase its revenues, it will have to migrate to the Presumed Profit or Actual Profit tax regime.

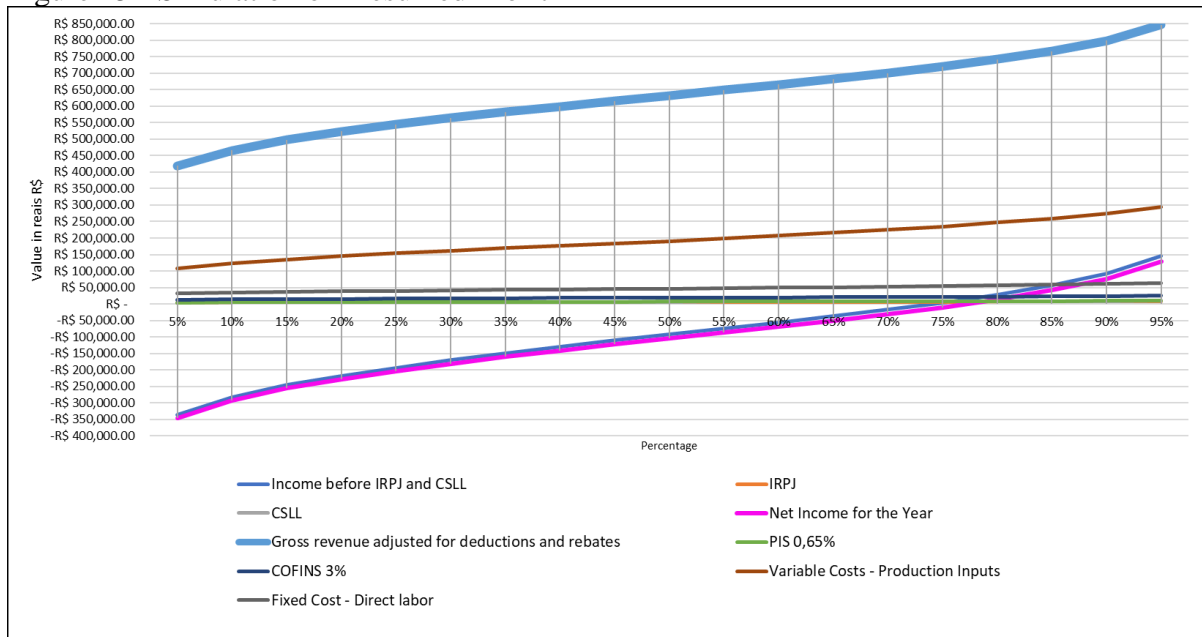
As to costs, fixed costs showed little oscillation during the 60 months, and their values varied in percentages of less than 20% from one month to the next, corresponding from 6% to 15% of the Total Revenue in the period. The variable costs showed greater fluctuation, varying more than 100% in value from one month to the next, corresponding from 17% to 40% of the Total Revenue during the period. The total operational costs - the sum of fixed and variable costs - suffered the greatest influence from the variable costs, having its behavior and variations similar to the variable costs, in the analyzed period, corresponding from 26% up to 47% of the Total Revenue in the analyzed period.

As far as expenses are concerned, personnel expenses are the most important among the operational expenses, ranging from 13% to 26% of the Total Revenue, despite having presented, in most cases, variations below 30%. The other expenses - vehicles, furniture and equipment, administrative, investments and transportation -, even presenting high percentage variations in the horizontal analysis, present few oscillations when we analyze the values over the months, being the least representative expenses in the vertical analysis.

5.2 SIMULATION OF THE TAX REGIMES WITH MONTE CARLO SIMULATION

To carry out the simulation, after monetarily updating the values of the Income Statements for the 60 months, the arithmetic mean, minimum value, maximum value, and standard deviation were calculated, and inserted into the @Risk software generating the probabilities of values for 10,000 simulations. From the results obtained in the simulation for the Presumed Profit tax regime (Appendix A), a graph was generated to analyze the main results, as shown in Figure 25:

Figure 25 - Simulation of Presumed Profit



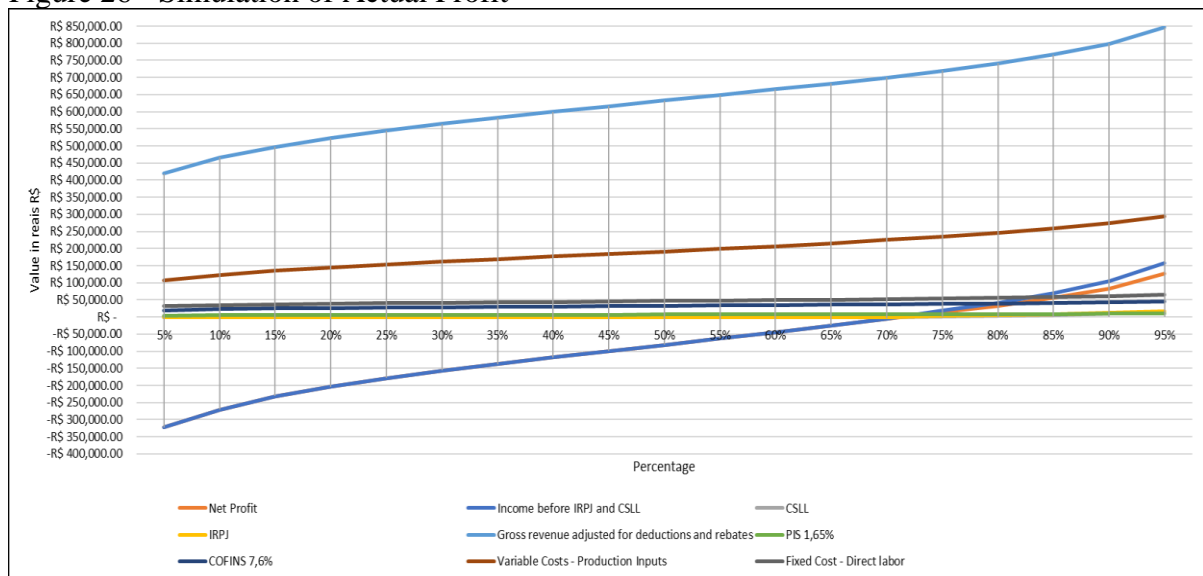
Source: Elaborated by the author (2022).

According to Figure 25, the result before income tax and social contribution starts presenting positive values as of 75%. In other words, there is a 75% probability that the company studied will have a loss in this account. As of the 80% probability, in which billing exceeds R\$741,000.00, it becomes possible to obtain a positive result in the Net Income for the year, even in the face of IRPJ and CSLL that are calculated presumptively, i.e., even if the company shows a loss, there would be an incidence of IRPJ and CSLL. Therefore, there is an 80% probability that Alpha Industry will have a loss under the Presumed Profit tax regime.

Still in Figure 25, regarding costs, the variable cost presented a behavior that represented from 25% to 35% of the adjusted Gross Revenue and the fixed cost represented from 7% to 8% of the adjusted Gross Revenue. Regarding PIS/COFINS, they represent 0.65% and 3% of the revenue, respectively, according to the variation of the adjusted gross revenue, due to its calculation basis.

From the results obtained in the simulation for the Actual Profit tax regime (Appendix B), a graph was generated to analyze the main results, as shown in Figure 26:

Figure 26 - Simulation of Actual Profit



Source: Elaborated by the author (2022).

According to Figure 26, it can be seen that the result before income tax and social contribution begins to show positive values as of 75%. In other words, there is a 75% probability that the company studied will have a loss in this account, and with this, the incidence of IRPJ and CSLL begins. From the 75% probability, in which the billing exceeds R\$720,000.00, it becomes possible to obtain a positive result in the Net Income for the year. Therefore, there is a 75% probability that Alpha Industry will have a loss under the Actual Profit tax system.

Still, observing Figure 25, regarding costs, the variable cost presented a behavior that represented 25% to 35% of the adjusted Gross Revenue and the fixed cost represented 7% to 8% of the adjusted Gross Revenue. Regarding PIS/COFINS, in the Actual Profit, these taxes are non-cumulative, i.e., there are deductions in their calculation basis. Because of this, in the simulation, PIS represented about 1% of the adjusted Gross Revenue, while COFINS corresponded to approximately 5%.

Therefore, with the simulations, it was possible to verify that, under the Actual Profit tax system, it is possible to obtain a positive Net Income with revenues exceeding R\$720,000.00, representing a probability of 25%. While, in the Presumed Profit regime, the probability of a positive Net Profit is 20%. Even with the use of PIS/COFINS credits in the Actual Profit, the values were higher than in the Presumed Profit. However, in the assumed profit, IRPJ and CSLL are levied, regardless of whether there is profit or not. In the Actual Profit, on the other hand, the advantage, in this case, is the incidence of these taxes only in the event of a positive result.

5.3 INTERVENTION PROPOSAL: STRATEGIES AND ALTERNATIVES FOR THE FINANCIAL BALANCE IN FACE OF THE CHANGE IN THE TAX REGIME

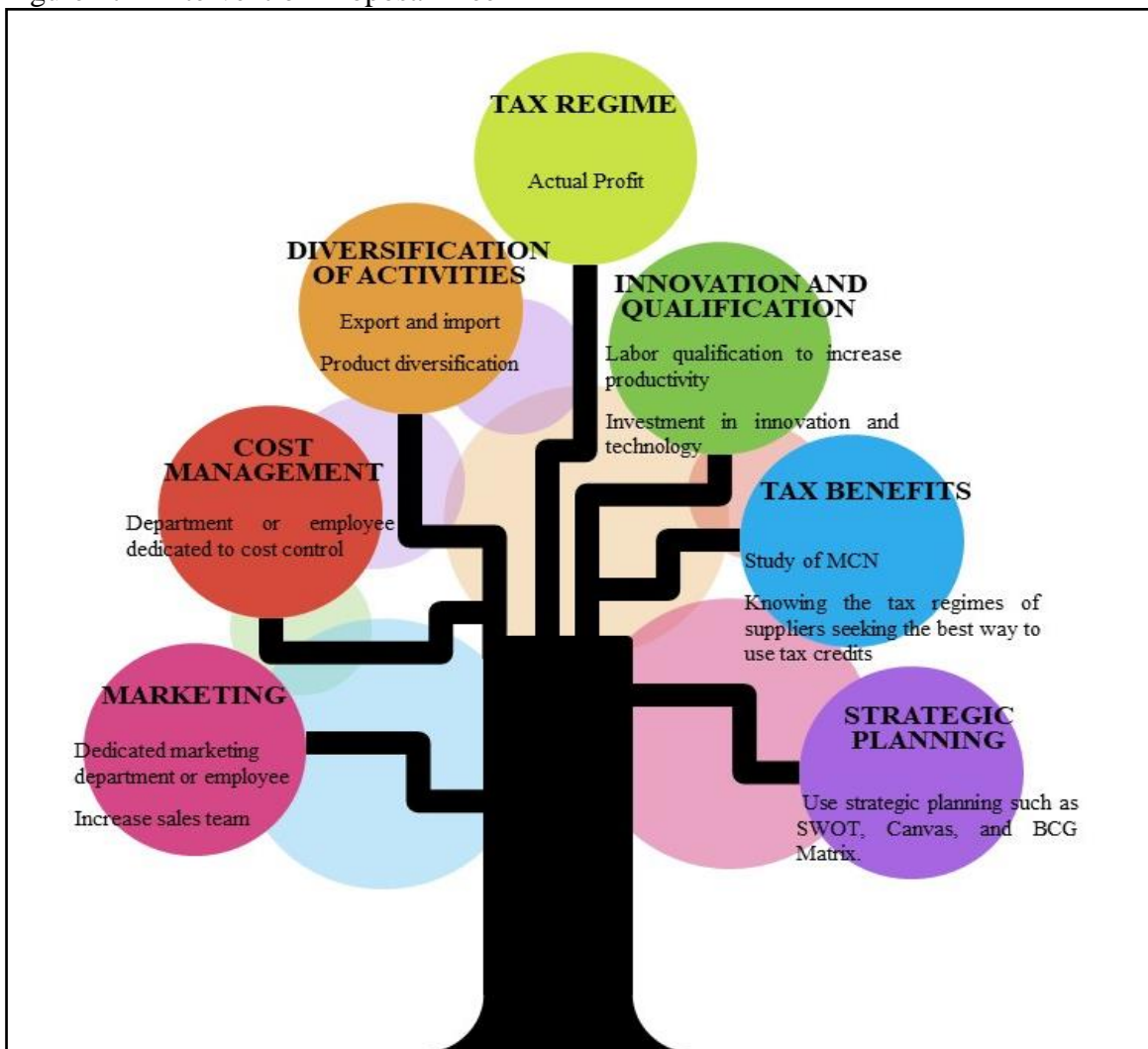
This item intended to point out possible strategies and alternatives that the company studied can pursue to improve its results, seeking financial equilibrium in order to sustain its growth process. The alternatives are based on the analysis of the 60-month DREs data and the Monte Carlo simulation data for the Actual Profit and Presumed Profit regimes of Alpha Industry. These are suggestions that can be analyzed by the company studied, if they should be practiced.

Based on the analysis performed with data from the 60-month DREs, it was observed that the company's Total Revenue showed a growth trend during the analyzed period, as shown in Figure 10. It becomes necessary to analyze whether this revenue growth is linked to a specific moment in the economy of the market in which Alpha Industry operates, such as a sales increase stimulated by a government incentive, for example. This information is important so that it is possible to analyze whether this growth is organic, that is, whether it was achieved by the company itself or whether it is derived from external factors. If it is not an organic growth, the company studied may present difficulties in sustaining the growth of its sales in the long term (Morozini & Martin, 2013).

As demonstrated by the simulation of the tax regimes, the company studied presents positive results from a billing higher than approximately R\$700.000,00/month. In other words, with revenues above R\$300,000.00/month, the company is out of the Simples Tax Regime and starts having a high tax incidence, which implies losses, forcing it to change tax regime. However, the study points out that, in order to change tax regime, the increase in revenues must be high, that is, more than double. Therefore, to maintain the profitability and competitiveness of the business, the company cannot allow a billing lower than R\$700,000.00 for many months, because it becomes unsustainable in the long term both in the Presumed Profit and the Actual Profit.

The alternatives that might be adopted by Alpha aiming at sustaining its revenues and obtaining competitive advantage might be directed towards internal resources, as presented in Figure 27. Such improvements consist of actions to change the tax regime, investment in marketing and in the sales team, cost management, product diversification and exploration of new markets, investment in innovation and in manpower qualification, search for tax benefits, and Strategic Planning, among others.

Figure 27 – Intervention Proposal Tree



Source: Elaborated by the author (2022).

- 1) **Marketing:** As verified by Figure 3, in the Organization Chart of Alpha Industry, there is no marketing department or an employee who is exclusively dedicated to this activity. Alpha Industry could create a department or delegate an employee for this function, because marketing is of utmost importance for a more detailed study of the market, the clients, and the product, seeking more appropriate marketing strategies for the company to meet the clients' needs and improve customer service, which are some of the main points of modern marketing, which can be used with technology in its favor. With this, increased sales and market share will be a consequence (Kotler, 2021). Associated with the investment in marketing (and as a complement to this action), it is recommended to increase the sales team. The company has 8 salespeople. It is understood that this number must be doubled, if not tripled. It is also recommended to

hire a manager to lead the team, manage conflicts, implement goals, and demand actions from the sales people.

- 2) Cost Management: A point that stood out in the DRE analysis were the high oscillations of variable costs, which shows that the company needs a better control of costs in order to verify the reason for the high variability, in case waste is occurring, for example. This control can be performed by a department or a specific employee with a degree in Production Engineering.
- 3) Diversification of activities: An alternative to expand the market is to export. By selling abroad, the company can benefit from the exemption of ICMS, IPI, PIS, and COFINS. Furthermore, there is the possibility of searching for international suppliers with more advantageous prices. You can qualify to start in foreign trade with the free assistance of PEIEX, which is the Export Qualification Program offered by the Brazilian Trade and Investment Promotion Agency (Apex-Brasil) (Apex-Brasil, 2022).
Another strategy is the diversification of products. Alpha Industry currently supplies the glass market for agricultural and heavy machinery, as well as some special projects in the automotive sector. The company could study the feasibility of turning its production to serve also the automotive, construction, furniture, and decoration markets. This could help the company to expand its market.
- 4) Change of Tax Regime: Change from the Simple Tax Regime to the Actual Profit as pointed out in the Monte Carlo Simulation.
- 5) Innovation and qualification: Another highlight is the personnel expense, which is the account that has the greatest weight within the operating expenses. It is important to verify that there is no idle capacity and that the company is very labor intensive. If these problems are found, the alternatives are to qualify the workforce to increase productivity, invest in innovation and technology, and improve processes to reduce costs.
- 6) Tax benefits: On the tax issue, there is the alternative of conducting a study to search for tax benefits in the sector it operates, such as verifying if the MNC, currently used by Alpha Industry, are the most appropriate for its products, for example. Furthermore, it is important to verify if the company is classifying correctly the inputs and intermediate products that are part of the production process and to know the tax regimes of its suppliers, seeking the best way to use tax credits, such as ICMS, IPI, PIS, and COFINS.

- 7) **Strategic Planning:** To analyze in a more detailed way other aspects of the company that need improvement, it is advisable to perform Strategic Planning with the use of other tools, such as SWOT analysis, Canvas, and BCG Matrix - Boston Consulting Group.

It is understood that such actions can contribute to Alpha Industry's achievement of its objectives, especially the increase in revenues. It is noteworthy that the actions proposed above were presented and validated with the company's board of directors and that some of them have already been implemented (change in the tax regime, hiring of a production engineer, a mechanical engineer, a commercial manager, and increase in the commercial team) and/or are in the implementation phase, such as innovation in the production process and team qualification.

6 CONCLUSION

The objective of this work was to analyze Alpha Industry's strategies when faced with the challenge of changing its tax regime, with the help of the probabilistic Monte Carlo Simulation model as a tool to assist in tax planning, since it is a model that allows one to get closer to reality because it considers the uncertainty factor and the relationships among the variables.

Regarding the horizontal and vertical analysis of the DREs, it was possible to verify that the Total Revenue of Alpha Industry presented a growth trend in the analyzed period, evidencing the concern with the disqualification from the *Simples Nacional* tax regime. If the company studied continues to increase its revenues, it will have to migrate to the tax regime. Based on the simulation, it was found that the regime that presents the best results was the Actual Profit, in which it is possible to obtain a positive Net Income with revenues exceeding R\$720,000.00, representing a probability of 25%. For the Presumed Profit, the probability of a positive Net Income is 20%.

The intervention proposals were to expand the market by exporting and diversifying products to the automobile, construction, furniture, and decoration markets. The personnel expenses, which have the greatest weight within the operating expenses, can be better used to increase productivity with the qualification of the workforce, promoting innovation in technology and improvements in processes. Furthermore, a better control of costs is advisable to avoid high variability and waste. To better focus on increasing sales and market knowledge, a department or an employee focused on Marketing is suggested.

On the fiscal side, it is advisable to conduct a study on the MNCs used by Alpha Industry to verify if they are the most appropriate and if there are any tax benefits that the company can take advantage of. In addition, it is necessary to know the suppliers' tax regimes to be able to take advantage of credits from purchases for non-cumulative taxes. Finally, to know in more detail the points in which the company needs improvements, it is suggested to apply strategic tools such as SWOT, Canvas, and BCG Matrix.

The limitations of this work are that it is a study applied to a specific company. Furthermore, the tax calculation was carried out in a more simplified manner in order to demonstrate how we can use this tool. Tax simulation requires a more detailed analysis of all accounting information since PIS and COFINS credits can make the difference, for example.

As for future work, we suggest applying this methodology to other companies. In addition, a more detailed simulation could be performed using more accounting information from the company. A comparison of the tax simulation between a deterministic and probabilistic method is also suggested, in order to verify if there is a difference between the results.

REFERENCES

- Afonso, J. R., Soares, J. M., & Castro, K. P. (2013). Avaliação da estrutura e do desempenho do sistema tributário Brasileiro - Livro branco da tributação Brasileira. *Inter-American Development Bank*, 1-128.
- Afonso, J. R., & Castro, K. P. (2012). Tributação: insuficiente reformar, necessário novo sistema. *Revista Controle*, 11-31.
- Armstrong, C. S., Glaeser, S., & Kepler, J. D. (2019). Strategic reactions in corporate tax planning. *Journal of Accounting and Economics*, 68(1), 101-232.
- Agência Brasileira de Desenvolvimento Industrial. (2021). *Maturidade Digital das Micro e Pequenas Empresas Brasileiras*. Recovered on September 27, 2021 from https://api.abdi.com.br/filemanager/upload/files/Mapa_da_Digitaliza%C3%A7%C3%A3o_das_MPEs_Brasileiras__1__1_.pdf.
- Assaf Neto, A. (2020). *Estrutura e Análise de Balanços: um enfoque econômico-financeiro*. (12a ed). São Paulo, SP: Editora Atlas.
- Apex-Brasil (2022). *Qualifique sua empresa Peiex*. Recovered from <https://portal.apexbrasil.com.br/qualifique-sua-empresa-peiex/>
- Bisolo, T., & Baggio, D. K. (2012). Planejamento tributário: estudo do regime tributário menos oneroso para indústria. *RAIMED - Revista de Administração IMED*, 195-206.
- Comitê de Pronunciamentos Contábeis (2019). *Pronunciamento técnico CPC 00 (R2). Estrutura conceitual para relatório financeiro*. Recovered on May 20, 2022, from [http://static.cpc.aatb.com.br/Documentos/573_CPC00\(R2\).pdf](http://static.cpc.aatb.com.br/Documentos/573_CPC00(R2).pdf)
- Corrar, J. L. (1993). O modelo econômico da empresa em condições de incerteza aplicação do método de simulação de Monte Carlo. *Caderno de estudos*, 1-11.
- Correia, C. S., & Diógenes, D. F. (2019). A Análise da Carga Tributária na Atual Conjuntura Econômica Brasileira na Indústria de Transformação. *Id on Line Revista Multidisciplinar e de Psicologia*, 530-542.
- Costa, R. d., & Alves, J. d. (2017). A Importância do Planejamento Tributário das Micro e Pequenas Empresas para o Crescimento e Desenvolvimento das Cidades Médias. *Geopauta*, 16-30.
- Decreto nº 7.871/2017 (2017). Regulamento do Imposto sobre operações relativas à Circulação de Mercadorias e sobre prestações de Serviços de transporte interestadual e intermunicipal e de comunicação do estado do Paraná. Recovered from <https://www.sefanet.pr.gov.br/dados/SEFADOCUMENTOS/106201707871.pdf>
- Decreto nº 10.979 de 25 de fevereiro de 2022 (2022). Altera a Tabela de Incidência do Imposto sobre Produtos Industrializados - TIPI, aprovada pelo Decreto nº 8.950, de 29 de dezembro de 2016.. Recuperado em: <https://www.in.gov.br/en/web/dou/-/decreto-n-10.979-de-25-de-fevereiro-de-2022-383062604>

- Dheskali, E., Koutinas, A. A., & Kookos, I. K. (2020). Risk assessment modeling of bio-based chemicals economics based on Monte-Carlo simulations. *Chemical Engineering Research and Design*, 273–280.
- Fabretti, L. C., (2017). *Contabilidade tributária*. (16. ed.). Atlas.
- Fonseca, U. d., Júnior, J. S., & Andrade, C. M. (2017). Planejamento Estratégico Tributário: Um Estudo de Caso em Empresa do Ramo Varejista. *Id on Line Revista Multidisciplinar e de Psicologia*, 360-379.
- Francis, J. R., Neuman, S. S., & Newton, N. J. (2019). Does tax planning affect analysts' forecast accuracy? *Contemporary Accounting Research*, 36(4), 2663-2694.
- Freire, L. L. R. (2016). A indústria de vidros planos. *Caderno Setorial ETENE*, 5-9.
- Fundação Getúlio Vargas. (2022). *Índice de Preços ao Produtor Amplo*. Recovered from <https://portalibre.fgv.br/ipa>
- James, H. L. (2020). CEO age and tax planning. *Review of Financial Economics*, 38(2), 275-299.
- Gularte, L. C., Lima, J. D., Oliveira, G. A., Barichello, R., & Pinto, M. A. (2020). Modelo de avaliação da viabilidade econômico-financeira da implantação de usinas de reciclagem de resíduos da construção civil em municípios brasileiros. *Engenharia Sanitaria e Ambiental*, 281-291.
- He, Y., Liao, N., Rao, J., Fu, F., & Chen, Z. (2019). The optimization of investment strategy for resource utilization and energy conservation in iron mines based on Monte Carlo and intelligent computation. *Journal of Cleaner Production*, 672-691.
- Higuchi, H. (2017). *Imposto de renda das empresas*. São Paulo: IR Publicações.
- Instituto Brasileiro de Geografia e Estatística. (2021). *Sistema IBGE de Recuperação Automática – SIDRA*. Recovered from <https://sidra.ibge.gov.br/acervo#/S/Q>
- Izadi, A., & Kimiagari, A. M. (2014). Distribution network design under demand uncertainty using genetic algorithm and Monte Carlo simulation approach: a case study in pharmaceutical industry. *Journal of Industrial Engineering International*, 1-9.
- Kotler, P. (2021). *Marketing Para O Século XXI*. Editora Alta Books. <https://app.minhabiblioteca.com.br/books/9786555202458>
- Lagodienko, N; Kostenko, T & Rudichenko, M (2019). Optimization of Tax Planning at Ukrainian Enterprises. *Modern Economics*, 18 (1), 79-84.
- Lei Complementar Nº 123 de 14 de Dezembro de 2006*. (2006). Institui o Estatuto Nacional da Microempresa e da Empresa de Pequeno Porte. Brasília, DF: Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos.
- Lei Nº 9.430 de 27 de Dezembro de 1996*. (1996). Dispõe sobre a legislação tributária federal, as contribuições para a seguridade social, o processo administrativo de consulta e dá outras

providências. Brasília, DF: Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos.

Lei Nº 10.865 de 30 de Abril de 2004. (2004). Dispõe sobre a Contribuição para os Programas de Integração Social e de Formação do Patrimônio do Servidor Público e a Contribuição para o Financiamento da Seguridade Social incidentes sobre a importação de bens e serviços e dá outras providências. Brasília, DF: Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos.

Leite, A. A. F.; Bajay, S. V., & Gorla, F. D. (2010). Oportunidades de eficiência energética para a indústria: Relatório Setorial setor vidreiro. *Confederação Nacional da Indústria – CNI*, 1-60.

Marcello, I. E., Souza, D. B., & Pietraszek, N. (2013). Planejamento Tributário: um estudo de caso em uma empresa do ramo de auto peças. *Revista Eletrônica de Administração e Turismo – ReAT*, 252-268.

Maric, B., & Grozdic, V. (2016). Monte Carlo simulation in valuation of investment projects. *Annals of DAAAM & Proceedings*, 686-692.

Metropolis, N., & Ulam, S. (1949). The Monte Carlo method. *Journal of the American Statistical Association*, 335-341.

Molina, P. J. (2017). Análisis de riesgo bajo simulación Monte Carlo para un proyecto de industrialización de carne de bovino. *e-Agronegocios*, 1-17.

Morozini, J. F., & Martin, D. M. L. (2013). Identificação dos fatores que influenciam na escolha da forma de investimento em crescimento (orgânico ou inorgânico) das indústrias brasileiras. *Revista Universo Contábil*, 9(4), 90-109.

Simple Nacional. (2021). *Perguntas e Respostas Simple Nacional*. Recovered from <http://www8.receita.fazenda.gov.br/simplesnacional/>

Portal da indústria (2020). *Peso dos tributos atinge indústria com maior intensidade*. Recovered on October 17, 2021, from <https://noticias.portaldaindustria.com.br/noticias/economia/peso-dos-tributos-atinge-industria-com-maior-intensidade/>.

Porter, M. E. (2004). *Estratégia competitiva: técnicas para análise de indústrias e da concorrência*. (E. M. P. Braga, Trad.). Rio de Janeiro: Elsevier. (Trabalho original publicado em 1947).

Pulcinelli, A. L., Ribeiro, J. P., Destefani, O. F., & Garcia, P. H. (2020). Planejamento Tributário: A desoneração da folha de pagamento no resultado de uma empresa de transportes de cargas. *Id on Line Revista Multidisciplinar e de Psicologia*, 1310-1323.

Purwaningsih, R., Arief, M., Handayani, N. U., Rahmawati, D., & Mustikasar, A. (2017). Market risk assessment on poultry industry using Monte Carlo simulation. *1st International Conference on Engineering and Applied Technology (ICEAT)*, 1-8.

Receita Federal (2022). *Taxa de Juros de Longo Prazo – TJLP*. Recovered from <https://www.gov.br/receitafederal/pt-br/assuntos/orientacao-tributaria/pagamentos-e-parcelamentos/taxa-de-juros-de-longo-prazo-tjlp>

- Relação Anual de Informações Sociais. (2021). *Bases Estatísticas RAIS e CAGED*. Recovered from <https://bi.mte.gov.br/bgcaged/>
- Ribeiro, R. H., Nobre, L. H., Nobre, F. C., & Calil, J. F. (2016). Análise de viabilidade financeira de um investimento em uma empresa da indústria salineira com simulação de Monte Carlo. *Exacta*, 511-525.
- Ribeiro, R. H., Nobre, L. H., Nobre, F. C., & Calil, J. F. (2016). Análise de viabilidade financeira de um investimento em uma empresa da indústria salineira com simulação de Monte Carlo. *Exacta – EP*, 14, 511-525.
- Serviço Brasileiro de Apoio às Micro e Pequenas Empresas. (2021). *Confirma as diferenças entre micro empresa, pequena empresa e MEI*. Recovered on October 17, 2021, from <https://www.sebrae.com.br/sites/PortalSebrae/artigos/entenda-as-diferencas-entre-microempresa-pequena-empresa-e-mei,03f5438af1c92410VgnVCM100000b272010aRCRD>.
- Serviço Brasileiro de Apoio às Micro e Pequenas Empresas (2021). *Data SEBRAE Indicadores*. Recovered on October 17, 2021, from <https://datasebraeindicadores.sebrae.com.br/resources/sites/data-sebrae/data-sebrae.html#/Empresas>.
- Silva, C. V., Batista, A. T., & Sales, H. L. (2019). Aplicação do modelo de Monte Carlo na avaliação da empresa Ambev com custo de capital impreciso. *Revista Eniac Pesquisa*, 153-175.
- Sontag, A. G., Hofer, E., & Bulhões, R. (2015). Planejamento Tributário: um estudo de caso aplicado a uma empresa paranaense. *IPTEC – Revista Inovação, Projetos e Tecnologias*, 211-225.
- Souza, J. C., Santos, P. H., & Andrade, V. M. (2017). Uso do Value-at-risk (VAR) para mensuração de risco em fundos de investimento de renda fixa a partir do modelo deltanormal e simulação de Monte Carlo. *Revista de Gestão, Finanças e Contabilidade*, 60-77.
- Stake, R. (2005). *Qualitative case studies*. Thousand Oaks, CA: Sage.
- Ministério da Economia. (2021). *Tributos federais administrados pela Receita Federal*. Recovered from <https://www.gov.br/receitafederal/pt-br/assuntos/orientacao-tributaria/tributos>
- Vello, A. P., & Martinez, A. L. (2014). Planejamento tributário eficiente: uma análise de sua relação com o risco de mercado. *Revista Contemporânea de Contabilidade*, 117-140.
- Vey, I. H., & Bornia, A. C. (2010). Reorganização societária como forma de planejamento tributário: um estudo de caso. *RACE*, 323-344.
- Vinholis, M. M., Filho, H. M., Shimata, I., Oliveira, P. P., & Pedroso, A. F. (2021). Economic viability of a crop-livestock integration system. *Ciência Rural*, 1-13.
- Zhao, Y. (2021). An Empirical Study on the Chinese Stock Market based on the Mean-CVaR Portfolio Selection Model. *World Scientific Research Journal*, 313-322.

APPENDIX A – RESULTS OF THE PRESUMED PROFIT SIMULATION

Name	Result before income tax and CSLL	IRPJ	CSLL	Net Income for the year	Gross Revenue adjusted for deductions and rebates	ICMS 18%
Description	Output	Output	Output	Output	Input	Input
Minimum	-R\$ 678.721,91	R\$ 1.529,50	R\$ 1.376,55	-R\$ 681.627,95	R\$ 127.458,11	R\$ 25.999,09
Maximum	R\$ 470.959,35	R\$ 10.662,87	R\$ 13.044,87	R\$ 450.470,72	R\$ 1.207.858,60	R\$ 205.583,35
Mean	-R\$ 93.598,16	R\$ 6.057,88	R\$ 6.828,47	-R\$ 106.484,51	R\$ 632.265,69	R\$ 113.806,85
Standard Dev.	R\$ 146.251,33	R\$ 1.039,72	R\$ 1.402,45	R\$ 144.074,46	R\$ 129.856,08	R\$ 23.367,83
Variance	21389450000	1081010	1966854	20757450000	16862600000	546055400
Asymmetry	0.002756984	-0.006121788	0.002263954	0.002115061	0.002263954	0.000246391
Kurtosis	3.034449	3.044719	3.01039	3.033733	3.01039	2.995555
Errors	0	0	0	0	0	0
Mode	-R\$ 79.312,41	R\$ 6.045,05	R\$ 6.810,82	-R\$ 95.563,15	R\$ 630.631,58	R\$ 115.272,26
5% Perc	-R\$ 337.062,21	R\$ 4.349,03	R\$ 4.521,20	-R\$ 346.621,83	R\$ 418.629,32	R\$ 75.360,27
10% Perc	-R\$ 283.415,11	R\$ 4.726,52	R\$ 5.030,80	-R\$ 293.620,16	R\$ 465.814,86	R\$ 83.852,24
15% Perc	-R\$ 245.418,78	R\$ 4.981,40	R\$ 5.374,89	-R\$ 255.919,60	R\$ 497.675,44	R\$ 89.581,00
20% Perc	-R\$ 217.820,63	R\$ 5.183,94	R\$ 5.648,31	-R\$ 228.837,83	R\$ 522.991,93	R\$ 94.135,35
25% Perc	-R\$ 193.738,22	R\$ 5.357,43	R\$ 5.882,53	-R\$ 204.905,34	R\$ 544.678,57	R\$ 98.041,93
30% Perc	-R\$ 169.958,38	R\$ 5.513,37	R\$ 6.093,05	-R\$ 181.530,47	R\$ 564.171,71	R\$ 101.548,17
35% Perc	-R\$ 148.827,61	R\$ 5.657,78	R\$ 6.288,01	-R\$ 160.617,05	R\$ 582.223,05	R\$ 104.798,45
40% Perc	-R\$ 128.768,48	R\$ 5.794,88	R\$ 6.473,09	-R\$ 141.480,44	R\$ 599.360,55	R\$ 107.881,28
45% Perc	-R\$ 109.615,71	R\$ 5.927,43	R\$ 6.652,03	-R\$ 122.468,43	R\$ 615.928,68	R\$ 110.866,27
50% Perc	-R\$ 90.870,71	R\$ 6.057,83	R\$ 6.828,07	-R\$ 103.692,98	R\$ 632.228,53	R\$ 113.805,39
55% Perc	-R\$ 74.299,43	R\$ 6.188,37	R\$ 7.004,30	-R\$ 87.448,56	R\$ 648.546,66	R\$ 116.743,09
60% Perc	-R\$ 56.005,70	R\$ 6.321,06	R\$ 7.183,43	-R\$ 69.142,10	R\$ 665.132,48	R\$ 119.725,51
65% Perc	-R\$ 36.916,89	R\$ 6.458,00	R\$ 7.368,30	-R\$ 50.580,59	R\$ 682.250,09	R\$ 122.805,03
70% Perc	-R\$ 16.867,66	R\$ 6.602,57	R\$ 7.563,48	-R\$ 31.086,20	R\$ 700.321,87	R\$ 126.056,71
75% Perc	R\$ 3.699,09	R\$ 6.758,29	R\$ 7.773,69	-R\$ 10.999,86	R\$ 719.786,35	R\$ 129.561,84
80% Perc	R\$ 27.606,38	R\$ 6.932,02	R\$ 8.008,23	R\$ 12.942,45	R\$ 741.502,72	R\$ 133.467,39
85% Perc	R\$ 56.693,73	R\$ 7.134,09	R\$ 8.281,02	R\$ 41.460,97	R\$ 766.761,23	R\$ 138.019,46
90% Perc	R\$ 92.809,50	R\$ 7.388,81	R\$ 8.624,89	R\$ 76.725,28	R\$ 798.601,15	R\$ 143.743,45
95% Perc	R\$ 145.724,65	R\$ 7.766,08	R\$ 9.134,21	R\$ 129.224,60	R\$ 845.760,20	R\$ 152.228,61

Name	IPI 9.75%	PIS 0.65%	COFINS 3%	Variable costs - Inputs for production	Fixed Cost - Direct labor	Social Charges - production payroll
Description	Input	Input	Input	Input	Input	Input
Minimum	R\$ 14.042,30	R\$ 630,60	R\$ 2.400,18	R\$ 70.415,50	R\$ 25.057,16	R\$ 9.126,83
Maximum	R\$ 114.871,77	R\$ 14.398,50	R\$ 33.995,41	R\$ 341.626,58	R\$ 72.454,79	R\$ 26.228,06
Mean	R\$ 61.645,65	R\$ 7.060,71	R\$ 18.967,67	R\$ 195.333,72	R\$ 47.290,89	R\$ 17.166,59
Standard Dev.	R\$ 12.658,92	R\$ 1.678,18	R\$ 3.895,14	R\$ 56.373,75	R\$ 9.770,01	R\$ 3.546,50
Variance	160248300	2816287	15172130	3178000000	95453090	12577690
Asymmetry	0.001328807	0.002055752	-0.001631784	0.2178787	0.1793251	0.1793228
Kurtosis	3.0017	3.008061	3.003022	2.400207	2.400357	2.400294
Errors	0	0	0	0	0	0
Mode	R\$ 60.851,45	R\$ 7.039,62	R\$ 18.821,31	R\$ 174.353,85	R\$ 44.289,29	R\$ 16.251,10
5% Perc	R\$ 40.819,17	R\$ 4.300,13	R\$ 12.559,59	R\$ 106.916,66	R\$ 31.762,88	R\$ 11.528,40
10% Perc	R\$ 45.422,59	R\$ 4.910,31	R\$ 13.974,31	R\$ 122.641,35	R\$ 34.572,19	R\$ 12.550,78
15% Perc	R\$ 48.524,83	R\$ 5.321,53	R\$ 14.929,81	R\$ 134.724,94	R\$ 36.727,98	R\$ 13.332,28
20% Perc	R\$ 50.991,71	R\$ 5.648,14	R\$ 15.689,73	R\$ 144.906,59	R\$ 38.547,27	R\$ 13.993,05
25% Perc	R\$ 53.104,66	R\$ 5.928,51	R\$ 16.340,31	R\$ 153.871,59	R\$ 40.148,76	R\$ 14.574,26
30% Perc	R\$ 55.005,67	R\$ 6.180,56	R\$ 16.924,25	R\$ 161.989,42	R\$ 41.598,12	R\$ 15.099,59
35% Perc	R\$ 56.765,61	R\$ 6.414,06	R\$ 17.466,22	R\$ 169.438,74	R\$ 42.930,46	R\$ 15.583,45
40% Perc	R\$ 58.436,16	R\$ 6.635,42	R\$ 17.980,55	R\$ 176.406,44	R\$ 44.169,27	R\$ 16.032,96
45% Perc	R\$ 60.053,80	R\$ 6.849,48	R\$ 18.477,45	R\$ 183.485,84	R\$ 45.378,72	R\$ 16.472,03
50% Perc	R\$ 61.644,22	R\$ 7.060,47	R\$ 18.966,89	R\$ 190.901,96	R\$ 46.642,37	R\$ 16.931,34
55% Perc	R\$ 63.234,26	R\$ 7.271,45	R\$ 19.456,80	R\$ 198.690,69	R\$ 47.974,82	R\$ 17.414,12
60% Perc	R\$ 64.851,48	R\$ 7.485,68	R\$ 19.954,09	R\$ 206.926,91	R\$ 49.381,14	R\$ 17.925,24
65% Perc	R\$ 66.519,58	R\$ 7.707,00	R\$ 20.467,87	R\$ 215.697,44	R\$ 50.876,97	R\$ 18.467,99
70% Perc	R\$ 68.283,01	R\$ 7.940,51	R\$ 21.009,68	R\$ 225.101,50	R\$ 52.484,32	R\$ 19.052,93
75% Perc	R\$ 70.179,16	R\$ 8.191,86	R\$ 21.594,55	R\$ 235.350,60	R\$ 54.233,55	R\$ 19.687,40
80% Perc	R\$ 72.294,89	R\$ 8.472,48	R\$ 22.245,72	R\$ 246.678,37	R\$ 56.169,56	R\$ 20.390,04
85% Perc	R\$ 74.764,24	R\$ 8.799,02	R\$ 23.003,64	R\$ 259.556,03	R\$ 58.367,02	R\$ 21.187,24
90% Perc	R\$ 77.867,06	R\$ 9.210,73	R\$ 23.958,26	R\$ 274.799,07	R\$ 60.970,71	R\$ 22.133,12
95% Perc	R\$ 82.455,93	R\$ 9.819,29	R\$ 25.371,01	R\$ 294.672,18	R\$ 64.361,09	R\$ 23.362,86

Name	Payroll Expenses - Administrative, Commercial and Board	Social Security Charges – Admin Payroll, Commercial and Board of Directors	Other employee expenses	Administrative Expenses	Rental Expenses	Depreciation
Description	Input	Input	Input	Input	Input	Input
Minimum	R\$ 2.128,67	R\$ 2.542,52	-R\$187,48	R\$29.458,84	R\$12.410,11	R\$3.844,85
Maximum	R\$ 137.983,47	R\$ 50.066,31	R\$27.630,90	R\$36.004,66	R\$15.167,49	R\$4.699,14
Mean	R\$ 68.470,40	R\$ 24.854,87	R\$13.125,28	R\$32.731,90	R\$13.788,83	R\$4.272,00
Standard Dev.	R\$ 16.168,43	R\$ 5.868,65	R\$3.375,63	R\$1.889,87	R\$796,14	R\$246,66
Variance	261418000	34441060	11394890	3571616	633835,4	60839,52
Asymmetry	0.001048854	0.001987902	0.00187638	1.3222E-06	2.4595E-06	5.47926E-06
Kurtosis	3.010349	3.005717	3.005037	1.799998	1.800001	1.799994
Errors	0	0	0	0	0	0
Mode	R\$ 69.077,86	R\$ 24.486,65	R\$13.167,47	R\$32.633,72	R\$13.637,14	R\$4.472,79
5% Perc	R\$ 41.866,18	R\$ 15.201,61	R\$7.572,65	R\$29.785,86	R\$12.547,60	R\$3.887,49
10% Perc	R\$ 47.752,94	R\$ 17.333,87	R\$8.798,03	R\$30.112,77	R\$12.685,58	R\$3.930,19
15% Perc	R\$ 51.711,99	R\$ 18.772,58	R\$9.625,93	R\$30.440,64	R\$12.823,43	R\$3.972,90
20% Perc	R\$ 54.862,45	R\$ 19.916,02	R\$10.283,82	R\$30.767,36	R\$12.961,34	R\$4.015,61
25% Perc	R\$ 57.565,42	R\$ 20.895,46	R\$10.848,55	R\$31.094,99	R\$13.099,27	R\$4.058,39
30% Perc	R\$ 59.990,16	R\$ 21.777,22	R\$11.354,64	R\$31.422,23	R\$13.237,09	R\$4.101,09
35% Perc	R\$ 62.240,55	R\$ 22.593,07	R\$11.824,17	R\$31.749,76	R\$13.375,12	R\$4.143,77
40% Perc	R\$ 64.373,16	R\$ 23.367,46	R\$12.269,44	R\$32.076,97	R\$13.512,81	R\$4.186,50
45% Perc	R\$ 66.436,22	R\$ 24.116,28	R\$12.700,38	R\$32.404,11	R\$13.650,69	R\$4.229,21
50% Perc	R\$ 68.466,61	R\$ 24.854,26	R\$13.124,72	R\$32.731,42	R\$13.788,78	R\$4.271,99
55% Perc	R\$ 70.498,06	R\$ 25.590,70	R\$13.549,15	R\$33.059,00	R\$13.926,56	R\$4.314,67
60% Perc	R\$ 72.564,12	R\$ 26.340,06	R\$13.980,15	R\$33.386,38	R\$14.064,52	R\$4.357,37
65% Perc	R\$ 74.696,31	R\$ 27.115,11	R\$14.425,67	R\$33.713,57	R\$14.202,24	R\$4.400,12
70% Perc	R\$ 76.945,27	R\$ 27.931,37	R\$14.894,84	R\$34.040,74	R\$14.340,11	R\$4.442,84
75% Perc	R\$ 79.370,51	R\$ 28.811,34	R\$15.400,68	R\$34.367,99	R\$14.478,09	R\$4.485,53
80% Perc	R\$ 82.071,62	R\$ 29.792,80	R\$15.964,63	R\$34.695,26	R\$14.616,06	R\$4.528,30
85% Perc	R\$ 85.217,55	R\$ 30.935,70	R\$16.623,29	R\$35.022,62	R\$14.753,92	R\$4.571,04
90% Perc	R\$ 89.181,87	R\$ 32.374,10	R\$17.449,33	R\$35.350,05	R\$14.891,75	R\$4.613,69
95% Perc	R\$ 95.043,05	R\$ 34.503,28	R\$18.675,08	R\$35.677,28	R\$15.029,69	R\$4.656,44

Name	Vehicle and transportation expenses	Other non-operational revenues	Other non-operational expenses	<i>Pro-labore</i>	INSS on withdrawal (20%)
Description	Input	Input	Input	Input	Input
Minimum	R\$15.450,23	R\$5.584,28	R\$42.102,96	R\$15.230,82	R\$3.322,98
Maximum	R\$18.883,13	R\$6.825,20	R\$51.458,28	R\$46.926,82	R\$9.262,74
Mean	R\$17.166,66	R\$6.204,73	R\$46.780,62	R\$31.423,44	R\$6.284,70
Standard Dev.	R\$991,17	R\$358,25	R\$2.701,01	R\$3.935,34	R\$786,93
Variance	982412.3	128342	7295481	15486900	619258.9
Asymmetry	3.12512E-06	-2.26557E-06	1.08002E-06	-0.00071154	0.000159226
Kurtosis	1.799997	1.799995	1.800001	3.00153	2.992662
Errors	0	0	0	0	0
Mode	R\$18.797,48	R\$6.335,03	R\$47.950,18	R\$31.670,30	R\$6.294,56
5% Perc	R\$15.621,38	R\$5.646,19	R\$42.570,11	R\$24.950,75	R\$4.989,74
10% Perc	R\$15.793,22	R\$5.708,34	R\$43.037,95	R\$26.380,01	R\$5.275,92
15% Perc	R\$15.964,90	R\$5.770,30	R\$43.505,72	R\$27.345,07	R\$5.469,02
20% Perc	R\$16.136,54	R\$5.832,45	R\$43.973,73	R\$28.110,40	R\$5.622,27
25% Perc	R\$16.308,04	R\$5.894,42	R\$44.441,49	R\$28.768,63	R\$5.753,85
30% Perc	R\$16.479,97	R\$5.956,49	R\$44.908,67	R\$29.358,95	R\$5.871,95
35% Perc	R\$16.651,54	R\$6.018,56	R\$45.376,70	R\$29.906,29	R\$5.981,44
40% Perc	R\$16.823,07	R\$6.080,63	R\$45.844,37	R\$30.425,60	R\$6.085,15
45% Perc	R\$16.994,83	R\$6.142,68	R\$46.312,18	R\$30.928,40	R\$6.185,71
50% Perc	R\$17.166,43	R\$6.204,69	R\$46.780,51	R\$31.423,28	R\$6.284,68
55% Perc	R\$17.338,06	R\$6.266,75	R\$47.247,50	R\$31.917,53	R\$6.383,58
60% Perc	R\$17.509,77	R\$6.328,76	R\$47.715,67	R\$32.419,54	R\$6.484,03
65% Perc	R\$17.681,55	R\$6.390,87	R\$48.183,21	R\$32.938,80	R\$6.587,79
70% Perc	R\$17.853,31	R\$6.452,81	R\$48.651,38	R\$33.486,56	R\$6.697,27
75% Perc	R\$18.024,70	R\$6.514,97	R\$49.118,93	R\$34.077,00	R\$6.815,49
80% Perc	R\$18.196,50	R\$6.576,91	R\$49.586,57	R\$34.734,93	R\$6.946,98
85% Perc	R\$18.368,28	R\$6.638,95	R\$50.054,49	R\$35.501,26	R\$7.100,22
90% Perc	R\$18.539,89	R\$6.701,06	R\$50.522,24	R\$36.466,11	R\$7.293,04
95% Perc	R\$18.711,41	R\$6.763,12	R\$50.990,51	R\$37.895,67	R\$7.579,06

APPENDIX B – RESULTS OF THE ACTUAL PROFIT SIMULATION

Name	Result before income tax and CSLL	IRPJ	CSLL	Net Income for the year	Gross Revenue adjusted for deductions and rebates	ICMS 18%
Description	Output	Output	Output	Output	Input	Input
Minimum	-R\$588.363,83	R\$0,00	R\$0,00	-R\$588.363,83	R\$143.603,06	R\$25.548,30
Maximum	R\$456.286,00	R\$46.628,60	R\$41.065,74	R\$368.591,66	R\$1.147.938,27	R\$213.909,92
Mean	-R\$81.391,42	R\$2.908,05	R\$2.356,52	-R\$86.655,99	R\$632.263,21	R\$113.808,16
Standard Dev.	R\$145.465,06	R\$6.015,85	R\$5.112,18	R\$137.432,86	R\$129.819,92	R\$23.372,26
Variance	21160080000	36190440	26134360	18887790000	16853210000	546262300
Asymmetry	-0.01384179	2.532576	2.699826	-0.213529	0.001096071	0.002464056
Kurtosis	2.964591	9.900697	10.97196	2.866608	2.995066	3.005194
Errors	0	0	0	0	0	0
Mode	-R\$147.536,61	R\$0,00	R\$0,00	-R\$147.536,61	R\$627.377,04	R\$112.341,66
5% Perc	-R\$322.547,84	R\$0,00	R\$0,00	-R\$322.547,84	R\$418.687,86	R\$75.362,51
10% Perc	-R\$270.909,56	R\$0,00	R\$0,00	-R\$270.909,56	R\$465.869,71	R\$83.854,84
15% Perc	-R\$231.498,05	R\$0,00	R\$0,00	-R\$231.498,05	R\$497.662,88	R\$89.582,89
20% Perc	-R\$204.006,83	R\$0,00	R\$0,00	-R\$204.006,83	R\$522.978,36	R\$94.131,45
25% Perc	-R\$179.022,37	R\$0,00	R\$0,00	-R\$179.022,37	R\$544.659,33	R\$98.041,54
30% Perc	-R\$156.372,74	R\$0,00	R\$0,00	-R\$156.372,74	R\$564.178,22	R\$101.547,51
35% Perc	-R\$137.575,33	R\$0,00	R\$0,00	-R\$137.575,33	R\$582.225,20	R\$104.799,99
40% Perc	-R\$117.958,63	R\$0,00	R\$0,00	-R\$117.958,63	R\$599.364,53	R\$107.885,46
45% Perc	-R\$99.566,70	R\$0,00	R\$0,00	-R\$99.566,70	R\$615.942,23	R\$110.864,68
50% Perc	-R\$81.591,92	R\$0,00	R\$0,00	-R\$81.591,92	R\$632.244,16	R\$113.804,90
55% Perc	-R\$63.413,22	R\$0,00	R\$0,00	-R\$63.413,22	R\$648.544,29	R\$116.740,70
60% Perc	-R\$44.310,21	R\$0,00	R\$0,00	-R\$44.310,21	R\$665.124,38	R\$119.727,07
65% Perc	-R\$24.583,06	R\$0,00	R\$0,00	-R\$24.583,06	R\$682.265,76	R\$122.809,39
70% Perc	-R\$4.320,44	R\$0,00	R\$0,00	-R\$4.320,44	R\$700.308,61	R\$126.058,35
75% Perc	R\$17.870,65	R\$2.787,06	R\$1.608,36	R\$13.475,22	R\$719.814,12	R\$129.563,00
80% Perc	R\$42.075,93	R\$5.207,59	R\$3.786,83	R\$33.081,50	R\$741.483,73	R\$133.472,36
85% Perc	R\$69.596,12	R\$7.959,61	R\$6.263,65	R\$55.372,86	R\$766.787,74	R\$138.025,02
90% Perc	R\$104.568,60	R\$11.456,86	R\$9.411,17	R\$83.700,56	R\$798.598,30	R\$143.747,06
95% Perc	R\$156.885,71	R\$16.688,57	R\$14.119,71	R\$126.077,42	R\$845.762,44	R\$152.223,42

Name	IPI 9.75%	PIS 1.65%	COFINS 7.6%	Variable Costs - Production Inputs	Fixed Cost - Direct labor	Social Charges
Description	Input	Input	Input	Input	Input	Input
Minimum	R\$11.846,95	R\$508,71	R\$2.630,75	R\$69.714,16	R\$25.250,71	R\$9.120,95
Maximum	R\$111.547,81	R\$14.539,36	R\$61.265,59	R\$342.023,57	R\$72.417,73	R\$26.237,38
Mean	R\$61.645,15	R\$7.060,78	R\$32.521,64	R\$195.333,92	R\$47.290,89	R\$17.166,58
Standard Dev.	R\$12.658,75	R\$1.678,29	R\$7.727,66	R\$56.374,26	R\$9.769,98	R\$3.546,48
Variance	160243900	2816656	59716700	3178057000	95452540	12577520
Asymmetry	-0.000359161	0.003497463	-0.000719266	0.2179111	0.1793523	0.179289
Kurtosis	2.999687	3.011714	2.993207	2.400355	2.400315	2.400262
Errors	0	0	0	0	0	0
Mode	R\$62.121,37	R\$6.997,54	R\$32.812,43	R\$172.976,55	R\$44.528,19	R\$16.077,02
5% Perc	R\$40.816,87	R\$4.300,77	R\$19.806,25	R\$106.897,80	R\$31.764,84	R\$11.529,20
10% Perc	R\$45.418,70	R\$4.910,20	R\$22.616,26	R\$122.647,02	R\$34.575,36	R\$12.550,55
15% Perc	R\$48.522,34	R\$5.321,26	R\$24.510,77	R\$134.730,49	R\$36.730,36	R\$13.332,89
20% Perc	R\$50.990,73	R\$5.648,37	R\$26.016,90	R\$144.905,08	R\$38.546,78	R\$13.992,70
25% Perc	R\$53.104,78	R\$5.928,72	R\$27.307,96	R\$153.869,18	R\$40.149,16	R\$14.574,85
30% Perc	R\$55.005,31	R\$6.180,36	R\$28.466,90	R\$161.983,90	R\$41.596,99	R\$15.100,26
35% Perc	R\$56.766,70	R\$6.413,97	R\$29.543,73	R\$169.434,98	R\$42.928,94	R\$15.583,56
40% Perc	R\$58.437,70	R\$6.635,18	R\$30.563,40	R\$176.409,98	R\$44.168,07	R\$16.033,47
45% Perc	R\$60.051,58	R\$6.849,66	R\$31.549,83	R\$183.488,50	R\$45.377,32	R\$16.471,95
50% Perc	R\$61.644,80	R\$7.060,62	R\$32.521,55	R\$190.892,91	R\$46.643,57	R\$16.932,04
55% Perc	R\$63.233,24	R\$7.271,31	R\$33.491,05	R\$198.693,83	R\$47.973,39	R\$17.414,27
60% Perc	R\$64.850,30	R\$7.485,40	R\$34.479,43	R\$206.931,48	R\$49.380,68	R\$17.924,59
65% Perc	R\$66.522,46	R\$7.706,78	R\$35.498,46	R\$215.698,11	R\$50.876,68	R\$18.468,23
70% Perc	R\$68.281,06	R\$7.940,06	R\$36.574,00	R\$225.102,76	R\$52.485,56	R\$19.052,49
75% Perc	R\$70.183,07	R\$8.192,30	R\$37.733,60	R\$235.343,68	R\$54.236,45	R\$19.686,69
80% Perc	R\$72.297,84	R\$8.472,37	R\$39.025,48	R\$246.679,12	R\$56.169,29	R\$20.390,02
85% Perc	R\$74.760,84	R\$8.798,94	R\$40.530,72	R\$259.546,31	R\$58.367,83	R\$21.186,16
90% Perc	R\$77.863,14	R\$9.210,21	R\$42.423,79	R\$274.804,42	R\$60.971,47	R\$22.132,27
95% Perc	R\$82.457,07	R\$9.819,91	R\$45.228,96	R\$294.689,87	R\$64.362,07	R\$23.365,32

Name	Expenses with payroll - administrative, commercial, and board of directors	Social charges – Admin Payroll, Commercial and Board of Directors	Other employee expenses	Administrative Expenses	Rental Expenses	Expense with furniture and equipment
Description	Input	Input	Input	Input	Input	Input
Minimum	-R\$339,23	R\$2.066,23	-R\$66,33	R\$29.459,13	R\$12.409,99	R\$10.708,18
Maximum	R\$129.056,54	R\$48.187,61	R\$26.119,44	R\$36.004,74	R\$15.167,66	R\$13.087,48
Mean	R\$68.469,16	R\$24.854,69	R\$13.125,10	R\$32.731,90	R\$13.788,83	R\$11.897,81
Standard Dev.	R\$16.165,66	R\$5.867,90	R\$3.375,53	R\$1.889,87	R\$796,14	R\$686,95
Variance	261328600	34432260	11394230	3571616	633835.3	471906.5
Asymmetry	-0.002485643	0.000391502	-0.000414279	-1.91222E-06	3.30789E-06	-6.99917E-07
Kurtosis	3.001906	2.998243	3.00011	1.799995	1.800001	1.800003
Errors	0	0	0	0	0	0
Mode	R\$67.861,87	R\$24.781,11	R\$13.252,07	R\$32.306,38	R\$14.850,56	R\$11.172,05
5% Perc	R\$41.871,34	R\$15.199,88	R\$7.572,68	R\$29.785,63	R\$12.547,56	R\$10.826,96
10% Perc	R\$47.749,41	R\$17.331,69	R\$8.799,08	R\$30.113,31	R\$12.685,50	R\$10.945,92
15% Perc	R\$51.716,06	R\$18.773,02	R\$9.625,78	R\$30.440,21	R\$12.823,55	R\$11.064,94
20% Perc	R\$54.863,38	R\$19.914,93	R\$10.284,09	R\$30.767,65	R\$12.961,24	R\$11.183,72
25% Perc	R\$57.566,79	R\$20.895,10	R\$10.848,21	R\$31.094,75	R\$13.099,27	R\$11.302,91
30% Perc	R\$59.991,77	R\$21.777,07	R\$11.355,13	R\$31.422,08	R\$13.237,12	R\$11.421,66
35% Perc	R\$62.239,02	R\$22.592,48	R\$11.824,31	R\$31.749,81	R\$13.375,13	R\$11.540,74
40% Perc	R\$64.374,13	R\$23.367,28	R\$12.269,48	R\$32.077,11	R\$13.512,78	R\$11.659,76
45% Perc	R\$66.438,55	R\$24.116,38	R\$12.701,01	R\$32.404,51	R\$13.650,70	R\$11.778,71
50% Perc	R\$68.466,79	R\$24.853,25	R\$13.124,77	R\$32.731,77	R\$13.788,70	R\$11.897,74
55% Perc	R\$70.500,69	R\$25.591,72	R\$13.548,69	R\$33.059,14	R\$13.926,45	R\$12.016,60
60% Perc	R\$72.564,63	R\$26.340,71	R\$13.980,11	R\$33.386,28	R\$14.064,57	R\$12.135,57
65% Perc	R\$74.695,26	R\$27.114,66	R\$14.425,30	R\$33.713,85	R\$14.202,24	R\$12.254,64
70% Perc	R\$76.944,67	R\$27.930,22	R\$14.894,38	R\$34.040,93	R\$14.340,15	R\$12.373,69
75% Perc	R\$79.370,07	R\$28.811,07	R\$15.401,57	R\$34.368,35	R\$14.478,11	R\$12.492,49
80% Perc	R\$82.073,39	R\$29.791,89	R\$15.964,72	R\$34.695,46	R\$14.616,05	R\$12.611,50
85% Perc	R\$85.219,28	R\$30.934,28	R\$16.621,96	R\$35.022,95	R\$14.753,85	R\$12.730,43
90% Perc	R\$89.185,16	R\$32.372,40	R\$17.448,94	R\$35.350,06	R\$14.891,77	R\$12.849,48
95% Perc	R\$95.057,29	R\$34.504,19	R\$18.674,33	R\$35.677,20	R\$15.029,58	R\$12.968,46

Name	Expenses with vehicles and transportation	<i>Pro-labore</i>	INSS on withdrawal	Other non-operational revenues	Other non-operational expenses	Shareholder remuneration - Interest on equity
Description	Input	Input	Input	Input	Input	Input
Minimum	R\$15.450,24	R\$2.181,65	R\$436,32	R\$5.584,35	R\$42.103,17	R\$13.369,12
Maximum	R\$18.883,02	R\$2.666,37	R\$533,27	R\$6.825,13	R\$51.458,17	R\$16.339,68
Mean	R\$17.166,66	R\$2.424,00	R\$484,80	R\$6.204,73	R\$46.780,62	R\$14.854,26
Standard Dev.	R\$991,17	R\$139,96	R\$27,99	R\$358,25	R\$2.701,02	R\$857,65
Variance	982411.5	19587.81	783.5146	128342.3	7295485	735571
Asymmetry	6.1369E-07	-7.75279E-07	4.12553E-06	-1.00281E-05	-1.49915E-07	5.57585E-06
Kurtosis	1.8	1.799996	1.800002	1.8	1.800002	1.799998
Errors	0	0	0	0	0	0
Mode	R\$16.565,82	R\$2.470,06	R\$523,10	R\$6.136,48	R\$50.195,61	R\$15.344,45
5% Perc	R\$15.621,58	R\$2.205,81	R\$441,17	R\$5.646,30	R\$42.570,15	R\$13.517,27
10% Perc	R\$15.793,01	R\$2.230,04	R\$446,01	R\$5.708,23	R\$43.038,04	R\$13.665,69
15% Perc	R\$15.964,72	R\$2.254,30	R\$450,86	R\$5.770,38	R\$43.505,82	R\$13.814,24
20% Perc	R\$16.136,58	R\$2.278,52	R\$455,71	R\$5.832,36	R\$43.972,99	R\$13.962,74
25% Perc	R\$16.308,26	R\$2.302,79	R\$460,56	R\$5.894,46	R\$44.441,53	R\$14.111,28
30% Perc	R\$16.479,73	R\$2.327,02	R\$465,41	R\$5.956,47	R\$44.908,97	R\$14.259,98
35% Perc	R\$16.651,34	R\$2.351,27	R\$470,25	R\$6.018,52	R\$45.377,00	R\$14.408,62
40% Perc	R\$16.823,14	R\$2.375,47	R\$475,10	R\$6.080,64	R\$45.844,63	R\$14.557,01
45% Perc	R\$16.994,97	R\$2.399,72	R\$479,95	R\$6.142,57	R\$46.312,71	R\$14.705,63
50% Perc	R\$17.166,36	R\$2.423,97	R\$484,80	R\$6.204,70	R\$46.779,99	R\$14.854,24
55% Perc	R\$17.338,03	R\$2.448,23	R\$489,64	R\$6.266,76	R\$47.247,96	R\$15.002,79
60% Perc	R\$17.509,71	R\$2.472,43	R\$494,49	R\$6.328,81	R\$47.715,80	R\$15.151,30
65% Perc	R\$17.681,32	R\$2.496,69	R\$499,34	R\$6.390,75	R\$48.183,26	R\$15.299,62
70% Perc	R\$17.853,27	R\$2.520,95	R\$504,19	R\$6.452,80	R\$48.651,06	R\$15.448,26
75% Perc	R\$18.024,73	R\$2.545,18	R\$509,04	R\$6.514,89	R\$49.119,40	R\$15.596,89
80% Perc	R\$18.196,65	R\$2.569,44	R\$513,88	R\$6.576,96	R\$49.587,31	R\$15.745,28
85% Perc	R\$18.368,30	R\$2.593,68	R\$518,73	R\$6.638,96	R\$50.054,88	R\$15.893,88
90% Perc	R\$18.539,83	R\$2.617,91	R\$523,57	R\$6.701,02	R\$50.522,44	R\$16.042,43
95% Perc	R\$18.711,55	R\$2.642,11	R\$528,43	R\$6.763,13	R\$50.990,85	R\$16.191,10