

**STATE UNIVERSITY OF THE WEST OF PARANÁ
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PROFESSIONAL MASTER'S DEGREE**

***VALUATION OF COMPANIES BY THE INTANGIBILITY CRITERION OF ITS
ASSETS: a case study in a railway service company***

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Dissertation presented to the Post-Graduate Program in Administration (PPGAdm) - Professional Master's Degree, of the State University of the West of Paraná, as a partial requirement for obtaining the **Master's Degree in Administration**.

Advisor: Professor Delci Grapégia Dal Vesco.

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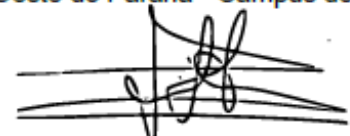
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RESUMO

O tema deste estudo versa sobre a intangibilidade dos ativos empresariais e a sua valoração em uma estatal, com o objetivo de mensurar o *valuation* da companhia ferroviária pelo critério da intangibilidade de seus ativos. Alinhado à contribuição teórica, o *valuation* será tratado com base na visão sistêmica quanto ao valor da empresa e o critério utilizado será de intangibilidade de seus ativos. Composta a prática, serão analisados os procedimentos decisórios da entidade. Foi realizado um estudo de caso na companhia estadual mista, prestadora de serviços logísticos ferroviários, denominada como Estrada de Ferro Paraná Oeste SA, referenciada como Ferroeste. This case study research is characterized with qualitative and quantitative approach. O método para encontrar o valor intangível de uma companhia é importante para validação e para seu reconhecimento, uma vez que seus resultados são cada vez mais decisivos para as tomadas de decisão. Entre diversos modelos teóricos e ferramentas destinadas a encontrar o *valuation* de uma organização, foi levada em consideração a sistematização proposta por Hoss (2018). The procedures of the necessary data to be collected will be separated in qualitative and quantitative variables. Em primeiro lugar, a análise qualitativa, por meio das demonstrações contábeis, os planos de investimentos e a avaliação dos índices contábeis. Na sequência, as qualitativas, com o uso de técnica *Survey* e *Delphi*. Nesse sentido, a valoração dos ativos intangíveis passíveis de identificação torna-se importante à gestão dos mesmos dentro da companhia estatal, uma vez que permite definir a estratégia de gestão para cada ativo intangível chave e identificar as vantagens econômicas proporcionadas e as perspectivas dos possíveis impactos nas tomadas de decisões.

Palavras-chave: Ativos intangíveis; valor agregado; intangibilidade; tomada de decisão.

ABSTRACT

The theme of this study is about the intangibility of business assets and their valuation in a state-owned company, with the objective of measuring the valuation of the railway company using the criterion of the intangibility of its assets. In line with the theoretical contribution, the valuation will be treated based on a systemic view of the company's value and the criterion used will be the intangibility of its assets. Composed of the practice, the decision-making procedures of the entity will be analyzed. A case study was carried out in the mixed state company, provider of railway logistics services, called Estrada de Ferro Paraná Oeste SA, referred to as Ferroeste. This case study research is characterized with a qualitative and quantitative approach. The method to find a company's intangible value is important for validation and recognition, since its results are increasingly decisive for decision making. Among several theoretical models and tools designed to find the valuation of an organization, the systematization proposed by Hoss (2018) was taken into account. The necessary data procedures to be collected will be separated into qualitative and quantitative variables. First, the qualitative analysis, through the financial statements, the investment plans and the evaluation of the accounting indexes. Then, the qualitative ones, using the Survey and Delphi technique. In this sense, the valuation of intangible assets that can be identified is important for their management within the state-owned company, as it allows defining the management strategy for each key intangible asset and identifying the economic advantages provided and the perspectives of possible impacts in decision-making.

Keywords: Intangible assets; added value; intangibility; decision making.

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1 INTRODUCTION

The subject of this study is about the intangibility of business assets and their valuation. It is possible to say that the intangible assets are gaining more and more prominence in business organizations around the world. While tangible assets - identified as machinery - and all types of equipment were once conceptualized by organizations as "key elements", now, in the age of information, that statement is not valid for almost all business companies.

Based on the transition from the industrial society to the knowledge and information society, it is noted that the management of Intangible Assets is increasingly evident within business companies around the world. The resources used in the industrial age were land, capital and labor. Whereas in the transition from the economic era, they are centered on tangible goods and are now moving to the era of generating wealth in intangible goods. Knowledge brought changes in the organizational structure, in order to value the human being as a differential and essential resource for administrative management, as well as other non-tangible assets (Moreira, Violin & Silva, 2014).

The importance of intangibles emerged in the 1980s, relevant to the business competition, to the globalization of trade and to the deregulation in important spheres of the economy, telecommunications, transport and financial services, facilitated by the internet (Hand and Lev, 2002). Technological advances have produced this new way of working and, consequently, the evaluation of intangible assets, highlighting the need to reinvent the concepts of labor values and even the value of the company or brand itself. It is observed that internal and external issues of the entity, as well as the temporal evaluation of the company's past and present, are issues to be evaluated for value creation (Hoss, 2018). It is possible to observe the increasing valuation given by the market and by society to intangible assets in recent years. However, what can be identifiable as this value given to the intangible? The word "intangible" itself has the meaning of "which cannot be tangible; that cannot be touched; untouchable; which cannot be perceived through touch; impalpable". (Ferreira and Monteiro, 2019).

Being presented to the context and analysis of the present research, the intangible value will always be present to an asset or right, which by definition is an asset. The resources that organizations own, which are expected to generate present or future profits, are called assets (Carvalho, Kayo and Martin, 2010). Thus, the Intangible Assets are considered to be assets devoid of physical substance and that, like any other type of asset, have the ability to generate economic benefits to the company. Hat said, it is observed that the Brazilian Accounting

Pronouncements Committee (CPC) 04, correlated to the International Financial Reporting Standards, IAS 38 (IASB – BV2010), highlights that the “Intangible asset is an identifiable non-monetary asset without physical substance.” and that to recognise it, it’s “required that he is identifiable, to differentiate it from the goodwill derived from expected future profitability” (CPC, 2015).

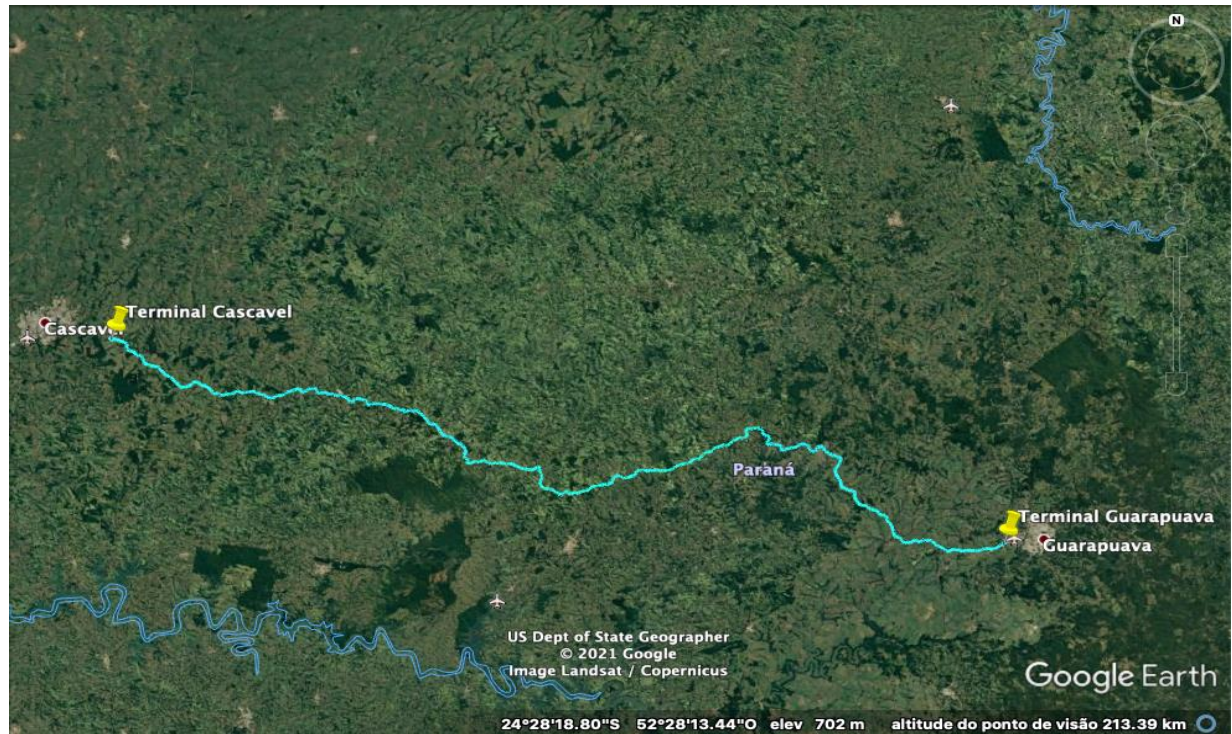
Borinelli and Pimentel (2019) are also in line with the precepts of CPC 04 and IAS 38 by stating that it is possible to make an accounting record of an Intangible Asset, provided that its measurement is reliable, there is no material substance and it is under corporate control. As it is not a physical asset, its accounting recognition is much more complex due to the uncertainty of its measurement and even of its estimated useful life, but this does not eliminate the possibility of its existence, even if it's not recorded (Machado and FÁma, 2011).

Faced with these concepts related to the management moment of the organizations and the importance of their intangible assets, the present work investigates the intangible value that a state-owned company has. The value of a company, commonly, is not that only recorded on its balance sheet. To find the global value of an organization, it is possible to measure it through tools that identify, administratively, in addition to tangibles, its intangible assets, being possible to presented through *Valuation* (De Almeida, 2012). The concept of creating value for organizations through intangible assets is linked to the understanding of the company's real context. For this analysis, the internal and external perspectives of this company will be related (Kayo, 2002) and the use of qualitative and quantitative indicators that can be grouped in the human, procedural, structural and relational quadrants (Hoss 2003, 2008, 2015, 2017, 2018).

Commented by Iudicibus (1994), the study and understanding of intangible or invisible assets are fundamental for administrative management within any company. Such importance is linked to the information that the organization holds and, consequently, can establish strategies to identify economic advantages and impacts on decision-making. Related to the intangible assets and the exposure of the *Valuation* of the studied entity, it was analyzed, in this research, the accomplishment of a case study, specifically in a company that provides railway services, called Estrada de Ferro Paraná Oeste - Ferroeste.

1.1 THE RESEARCH PROBLEM

The State of Paraná has only one public rail service concession entity, the company called Estrada de Ferro Paraná Oeste SA, referred to simply as Ferroeste. It holds a logistical railway stretch that runs for 248.6 kilometers between Cascavel and Guarapuava.



Source: Google Earth (2021).

Figure 1 – Satellite photo - Ferroeste route.

Ferroeste was incorporated on March 15, 1988 and is currently a mixed capital company, whose largest shareholder is the Government of the State of Paraná, with 92.15%. In its year of composition, it received a concession, pursuant to Federal Decree No. 96,913/88, to build and operate a railroad between Guarapuava in the State of Paraná and Dourados in the State of Mato Grosso do Sul (FERROESTE, 2020).

Constructed mainly for the transport of agricultural grains and inputs for planting, its construction began in March 1991, and the construction was built by the Paraná government in partnership with the Brazilian Army (FERROESTE, 2020). In its history, the company was already privatized at an auction in 1996. And the winning consortium Ferropar started their activities in March 1997. However, the consortium operating the service failed to make the planned investments and did not comply with the clauses in the contract. As a result, in 2006, the governor ordered the Ferroeste board to retake control of the railway and it remains managed by the state-owned company (FERROESTE, 2020). Ferroeste trains, on the 248.6-kilometer railway line, transport around 1.5 million tons of grains, inputs and cement annually. The company aims to reduce logistical costs of regional production, offering low tariffs to producers, cooperatives and transporters (FERROESTE, 2020).

The problem with this research started from recurring news in the media about the possibility of privatization of the state-owned company, even with its apparent high financial performance and importance for the region and for customers. Then, the process of privatization of Ferroeste began. At the beginning of June 2020, the railway section was included in the Partnership and Investment Program (PIP), which allows the federal government to assist in the elaboration of a technical project and auction the railway to the private sector (Gazeta do Povo, 2020).

Privatization is defined as the administrative and shareholding transfer from a state entity to a private company. They can be characterized as concession of public services, concession of use of public goods, donation, celebration of partnership terms, partial or total management contracts (Machado, 2015). In the concession of essential services destined to the administration of the Government, the operator is normally the public entity. Infrastructure in the transport sector has been experiencing a growing cycle for private initiatives in recent decades, precisely because of the difficulty in public management for this type of service (Pinheiro, 2000).

Over the years, public organizations have not shown surpluses in their final accounting results and this has raised concerns for public coffers. These concerns are related to improvements and productive performance, as well as intangible assets that receive little investment and are far from the company's accounting reality (Stratioto, Santos and Oliveira, 2020). Ferroeste is not exempt from the aforementioned concerns and presents difficulties in the evaluation of its intangible assets. It is therefore up to this research to analyze the administrative relationship of the company as a state-owned company of the Government and its decision-making.

In this premise, it is understood that there is a research gap for the specifics of these assets that characterize the company's identity. However, when not identified, they fail to present their valuation and their effective contribution as they do not reflect the company's financial reality. In order to obtain strategic information on these assets and, consequently, make decisions, there is a need to apply appropriate tools to the entity. The Hoss Model (2003, 2008, 2015, 2017, 2018) was used as a tool adapted to Ferroeste's reality. Therefore, a study of the indicators was carried out for each quadrant of measurement of intangible assets, divided into four quadrants: human, process, structure and relational.

Based on the knowledge collected in the four models above, using this tool, the proposed systematization will be carried out to value Intangible Assets. Then, analyze the gaps left, to finally present the notes of ideas of the transposition of knowledge about these assets (Hoss,

2018). There are similar studies connected with the same practice that will be used in this work, such as the book by Hoss (2020): *Intangible Assets Itaipu Technological Park – ITP*; Lazzari's master's thesis (2020) – “Value-adding identification tool to support the formulation of strategies focused on intangible assets, networks and integrated reporting, in the medical cooperatives sector: a case study of Unimed”; among others.

This analysis based on periodicals will always aim to provide opportunities within a business context and its intangible assets. The study will improve the knowledge of the subject, still little explored in the entity. To do so, it will be necessary to present the entire context in which the company currently operates, its history, projects, culture and all economic, financial and social analysis. With access to this information, it will be possible to create opportunities for solutions and the design of intangible values, observing internal and external points of the entity, pointing out superior future results and management improvements.

In this sense, the problem situation is the lack of information about the intangible assets in the mixed state-owned company that provides logistics services and, consequently, its organizational performance resources, which will serve as a subsidy in the decision processes.

1.1.1 Research question

Faced with the current government administration, how to measure the potential value aggregators of the company object of study by the criterion of the intangibility of assets?

1.2 GOALS

In view of the relevant topic of Intangible Assets and the problems raised, in order to carry out this research, in this environment, the following objectives are defined to be achieved.

1.2.1 General

Apply measurement tools and constitute, through them, the *Valuation* of companies by the criterion of the intangibility of their Assets in the company that is the object of study.

1.2.2 Specific

- a. Analyze Ferroeste's organizational structure;
- b. Identify the variables that make up the intangibility of the company's assets;
- c. Investigate the intangibility of the company's assets.

1.3 JUSTIFICATION AND CONTRIBUTION OF TECHNICAL PRODUCTION

The social impact of a region essentially depends on the skills it provides and it attracts resources (financial, technological, institutional, among others), national or international, on governmental, sectoral and local economic transparency. Policies that generate conditions and external attractiveness can also generate impacts capable of explaining certain economic growth and income evolution in a region (Haddad, 2009). The Government, being the administrative representative of the public services provided, has great responsibility in the decisions taken, which can boost or reduce economic growth (Haddad, 2009).

The State has a substantial role in the development process and this responsibility cannot be left entirely to the market. The organization, through the control of its information, demands innovation services and identification of its assets. These can contribute to regional progress through intangible capital (Sen, 2000). In this sense, the valuation of identifiable intangible assets becomes important for the management of these within the state-owned company, since it allows defining management strategy for each key intangible asset and identifying the economic advantages provided to the region and customers and the prospects of the possible impacts on decision making. With the expansion of studies and research applied to Intangible Assets, there is an opportunity to carry out the theme especially in a state-owned company. Given its context, it is understood that there may be intangibles not referenced by Ferroeste and, thus, fail to reflect the company's financial reality. Informations like these being essential for decision making.

This study is justified for value management purposes, since, after evaluating the Intangible Assets of the state organization, the manager will be able to improve and/or establish the company's decision-making processes regarding internal and external investments, acquisitions, mergers or private concessions; in addition to analyzing variable economic, financial and social aspects (Hoss, 2018). The business organization, in parallel with decisions and competitive advantages, in its conclusion of the study, can also contribute to public and private processes when they are related to the generation of value.

This study will be able to contribute in the technical and practical production for the decision aid, referring to the modality of the possible contract of concession of public services, in the characteristic of auction for total or partial concession to the private initiative. The social impact may be noticed by society, but this work will not allow the collection of these data.

For Galas and Ponte (2004), indicators are rarely used in government organizations, even if their mission does not have a direct financial focus, they qualify for providing benefits to other companies and social investments.

1.4 STRUCTURE OF THE DISSERTATION

The work is structured in seven chapters: (1) Introduction; (2) Theoretical and Practical References; (3) Research Methods and Techniques – characterized as the Methodological Procedures that will be used; (4) and Problem Situation Context. Next, the (5) Mechanisms Adopted Type of Intervention were presented, followed by (6) Analysis and Interpretation of the Results, and, finally, the (7) Final Considerations in conclusion to the research.

2 THEORETICAL AND PRACTICAL REFERENCES

Hendriksen and Breda (1999) stated that the topic of intangible assets is part of one of the most complex and challenging studies in the administrative and accounting area. There are indications that the first research on Intangible Assets was carried out in 1571, recognized in judicial courts that used the first definitions of intangible assets in the patrimonial evaluation of a certain case (CATLETT; OLSON, 1968). Considered by authors such as Martins (1972), Kaplan and Norton (2000), Edvinsson and Malone (1998), Bontis and Choo (2002), Antunes and Martins (2002), Schmidt and Santos (2002), Kaufmann and Schneider (2004), Perez and Famá (2006), Schlüter (2010), Li and Liu (2010), Hoss, Rojo, Grapegia, Souza, Lezana & Dal Vesco (2010), Crass and Peters (2015), Osinski et al. (2017), Chen and Dauchy (2017), Datta (2017), among many others, it is possible to ascertain the relevance of the topic of intangible assets.

2.1 INTANGIBLE ASSETS

In the entrepreneurial vision of the more perceptive administrators, commercial changes lean towards Intangible Assets in the early 1980s. Accentuated by the pertinent business competitions, by the globalization of commerce and by the deregulation in important spheres of the economy, such as telecommunications, transport and financial services, sequenced by the ease provided by the internet (Hand and Lev, 2002).

Ano	Autor	Evento e significado
1571	Decisões Judiciais	Indícios na literatura que demonstravam a problemática de avaliação do <i>goodwill</i> .
1884	Willian Harris	Publicado na <i>The Accountant</i> : " <i>Goodwill</i> " primeiro trabalho na área contábil.
1909	Henry Rand Hatfiel	Introduziu uma nova maneira de calcular o <i>Goodwill</i> através da percepção da dependência de superlucros da entidade
1914	Percy Dew Leake	Contribuiu na evolução do tratamento contábil do <i>Goodwill</i> com o estudo " <i>Goodwill: its nature and how to value it</i> ".
1936	Gabriel A. D. Preinreich	Elabora o estudo " <i>The law of Goodwill</i> " sobre as tendências de decisões judiciais relativas ao <i>goodwill</i> . Decisões essas que sofreram alterações desde o valor relativo às terras até o conceito atual.
1937	James C. Bonbright	Na obra " <i>The valuation of property</i> ", infere que o <i>Goodwill</i> é justificado nas crenças dos investidores.
1945	Walter A. Staub	Descreve, na obra " <i>Intangible assets, contemporary accounting</i> ", a natureza do <i>goodwill</i> e o tratamento contábil na escrituração.
1963	Maurice Moonitz	Na obra " <i>Accounting: an analysis of its problems</i> ", menciona o problema de mensuração do <i>goodwill</i> , especialmente na capitalização de ganhos futuros.
1968	Catlett e Olson	Produzem o trabalho " <i>Accounting for goodwill</i> ". Considerado um marco no estudo contábil.
1972	Eliseu Martins	Elabora a tese denominada " <i>Contribuição à avaliação do ativo intangível.</i> " Considerada um marco de referência sobre o tema no Brasil.
2001	Baruch Lev	Publica o livro " <i>INTANGIBLES: Management, Measurement, and Reporting.</i> ". Aprofundando e correlacionando a crescente importância dos intangíveis a fundamentos econômicos, contábeis e financeiros.
2002	Chun Wei Choo e Nick Bontis	Na obra " <i>The Strategic Management of Intellectual Capital and Organizational Knowledge.</i> " os autores trazem discussões sobre a criação de conhecimento e capital intelectual nas organizações.
2002	Schmidt e Santos	No livro " <i>Avaliação de Ativos Intangíveis</i> ", os autores abordam aspectos de novos tratamentos contábeis aos intangíveis, de acordo com pronunciamentos emitidos por organismos internacionais de Contabilidade.
2004	Robert S. Kaplan e David P. Norton	Na obra " <i>STRATEGY MAPS: Converting Intangible Assets into Tangible Outcomes</i> ", são apresentadas relações entre a criação de valor a longo prazo e o <i>Balanced Scorecard</i> permitindo quantificar os ativos intangíveis.
2005	José Luiz dos Santos	Tese " <i>Uma contribuição ao estudo da avaliação econômica de ativos intangíveis</i> ", propõe um novo modelo econômico para valoração de ativos intangíveis, além de identificar e analisar os principais modelos existentes.

Table 1: Historical evolution Intangible Assets.
Source: Schmidt and Santos (2002)

In the current moment of real-time knowledge and information, the focus is no longer on tangible assets, as it was in the Industrial Age, but on intangibles. Knowledge, brand, image, among other intangibles have become a key element for creating corporate value in all organizations (Stefano, 2014).

By the Accounting Pronouncements Committee (APC) 04 and correlated to the International Accounting Standards, IAS 38 (IASB – BV2010), the "*Intangible asset is an identifiable non-monetary asset without physical substance*" and for its recognition, "*it requires that it be identifiable, to differentiate it from the goodwill derived from the expectation of future profitability (goodwill)*" (APC, 2015). There are three essential categories that the asset needs to achieve to be defined as an intangible: identification, control and expectation of future economic benefits. In the table below, there is the asset shown according to the technical criteria of the CPC.

ITEM CPC	CRITÉRIO	DESCRIÇÃO
Definição de Ativo Intangível (itens 8 a 17)	<ul style="list-style-type: none"> Identificáveis (para diferenciá-lo do <i>goodwill</i>) 	<ul style="list-style-type: none"> For separável, ou seja, puder ser separado da entidade e vendido, transferido, licenciado, alugado ou trocado, individualmente ou junto com um contrato, ativo ou passivo relacionado, independente da intenção de uso pela entidade; ou Resultar de direitos contratuais ou outros direitos legais, independentemente de tais direitos serem transferíveis ou separáveis da entidade ou de outros direitos e obrigações.
	<ul style="list-style-type: none"> Controlados 	<ul style="list-style-type: none"> Detém o poder de obter benefícios econômicos futuros gerados pelo recurso subjacente e de restringir o acesso de terceiros a esses benefícios
	<ul style="list-style-type: none"> Geradores de benefícios econômicos futuros 	<ul style="list-style-type: none"> Os benefícios econômicos futuros gerados por ativo intangível podem incluir a receita da venda de produtos ou serviços, redução de custos ou outros benefícios resultantes do uso do ativo pela entidade.
Critérios de reconhecimento (itens 21 a 23)	<ul style="list-style-type: none"> For provável que os benefícios econômicos futuros esperados atribuíveis ao ativo serão gerados em favor da entidade; 	<ul style="list-style-type: none"> A entidade deve avaliar a probabilidade de geração de benefícios econômicos futuros utilizando premissas razoáveis e comprováveis que representem a melhor estimativa da administração em relação ao conjunto de condições econômicas que existirão durante a vida útil do ativo. A entidade deve utilizar seu julgamento para avaliar o grau de certeza relacionado ao fluxo de benefícios econômicos futuros atribuíveis ao uso do ativo, com base nas evidências disponíveis no momento do reconhecimento inicial, dando maior peso às evidências externas.
	<ul style="list-style-type: none"> O custo do ativo pode ser mensurado com confiabilidade 	<ul style="list-style-type: none"> Um ativo intangível deve ser reconhecido inicialmente ao custo

Table 2: CPC technical criteria.

Source: Accounting Pronouncements Committee (2015).

It is important to show that the view of the accounting area may be different from the understanding based on resources. However, both lead to the creation of future value, valuable, inimitable and irreplaceable resources (Kayo et al, 2006).

For the accounting records of a company, the Intangible Asset will not always be able to fit in the accounting standards to compose value in its bookkeeping. However, this does not mean that its quantification is impossible. A brand recognized in the market, for example, is understood with a view of greater consumer power, since it establishes bonds of trust with the consumer and commercially strengthens the entity. If the quantification of this brand is taken into account, everything becomes more complex and subjective (Hoss, 2020). Specialists from all professional areas have been dedicated to the analysis and understanding of Intangible

Assets and intellectual properties. However, studies focusing on Intangible Assets are not standardized, since they are distinct and have different approaches. As they are considered a multidisciplinary activity, the study becomes complex and many variables need to be carefully analyzed (Reilly and Schweis, 2013).

Intangibles have been presenting themselves as a great indicator of innovation and a primary source of economic success, when identified and well managed. They do not have physical content, but their values are intrinsically associated with the rights of those who own them (Lopes, 2008). It is emphasized that its importance for organizations to understand the identification and acquisition of intangible assets, which are valuable assets. As pointed out by Cogo and Pires (2008), concise management directs the security of the information that these assets represent as a value to the entity. Domeneghetti and Meir (2009) state that companies with more intangible characteristics have been expanding their economic focus, making intangible assets become unique strategic resources, which can be highlighted as a differential and greater results for the entity.

This business result, when it manages to generate greater profits or surpluses, can demonstrate that value creation is conceived and is related to investments and/or the increase in intangible assets (Barney and Hesterly, 2007).

In the same difficulty in finding the value of intangible assets in an organization, no matter how organized it is, is their degree of importance. Added to the increasing number of studies on the subject, their evaluation and measurement are still divergent (Low and Kaluft, 2002). Given the complexity mentioned by the authors, several methods have been theorized to identify an intangible value and, surely, be accounted for in their economic and financial statements (Gu and Lev, 2011).

2.1.1 Classification and theoretical models for valuation of intangible assets

Some of the theoretical methods advocated by authors have been improved over the years in order to understand the evolution of the subject. In an understandable and direct way, one of the ways of classifying Intangible Assets was presented in 2002 by Kayo in the table below. They were divided into four groups of intangibles, called “Family” of: Human Assets, Innovation Assets, Structural Assets and Relationship Assets.

Família	Alguns ativos intangíveis
Ativos Humanos	<ul style="list-style-type: none"> • conhecimento, talento, capacidade, habilidade e experiência dos empregados; • administração superior ou empregados-chave; • treinamento e desenvolvimento; • entre outros.
Ativos de Inovação	<ul style="list-style-type: none"> • pesquisa e desenvolvimento; • patentes; • fórmulas secretas; • <i>know-how</i> tecnológico; • entre outros.
Ativos Estruturais	<ul style="list-style-type: none"> • processos; • <i>softwares</i> proprietários; • bancos de dados; • sistemas de informação; • sistemas administrativos; • inteligência de mercado; • canais de mercado; • entre outros.
Ativos de Relacionamento (com públicos estratégicos)	<ul style="list-style-type: none"> • marcas; • logos; • <i>trademarks</i>; • direitos autorais (de obras literárias, de <i>softwares</i>, etc.); • contratos com clientes, fornecedores, etc.; • contratos de licenciamento, franquias, etc.; • direitos de exploração mineral, de água, etc.; • entre outros.

Table 3. A proposal for Classification of Intangible Assets.

Source: Kayo (2002, p. 19).

The “families” of Human and Relationship Assets are classified by some authors as Intellectual Capital. Sveiby's proposal, in 1997, refers to intellectual capital as the information management process that operates financial and non-financial measures. Its measurement can be calculated using parameters of expansion and renewal of efficiencies and stability, named as “Monitor of Intangible Assets”, according to Table 3. A few years later, Edvinsson and Malone

(1998) conducted researches and defined intellectual capital as divided into two factors: “1) Human Capital: it is knowledge, experiences, innovation capacity, employees' abilities to perform tasks, resources and the company system; and 2) Structural Capital: IT equipment, software, databases, patents, brands and everything that defends employees productivity”.

This relevant set of indexes can be applied to a wide range of companies, in order to find a universal parameter for checking intellectual capital. On this, the following equation is presented:

$$\text{Organizational Intellectual Capital} = i \times C$$

Where C is a dollar value of intellectual capital and i represents the efficiency coefficient of the use of this capital (Braune, 2012). In 1997, Stewart was based on several previous researches and supported the preservation of intellectual capital as an essential part of intangibles. Intellectual capital should be added to financial capital to compose the value of companies, however, its calculation method was based on the initial idea that intangible assets are the value of the company. His method calculates the present value of returns after fees and is compared to the Return on Assets (ROA). Subsequent to the calculation, the calculated intangible value (CIV) can be found, which is indicated as the abilities that the organization has to use its intangible assets (Braune, 2012).

In the year 2000, Pike and Roos presented a new proposal for classification and language of Intellectual Capital, divided into: human capital, organizational capital and relational capital.

Indicators	External Structure	Internal Structure	Personnel Competence
Growth and Renewal	* Increase in Sales volume; * Increase in market share.	* Investment in information technology; * Time spent on research and development activities. * Personnel attitude index	* Number of years in the profession; * Competence rotation.
Efficiency	* Satisfied customer index; * Sales per employee; * Profit per client.	* Sales per support person.	* Proportion of professionals in the company.
Stability	* Proportion of large clients.	* Age of the organization; * Newcomers rate.	* Professional rotation rate.

Table 4. Sveiby's Intangibility Indicators (1997)
Source: Sveiby (1997) - Adapted by the author.

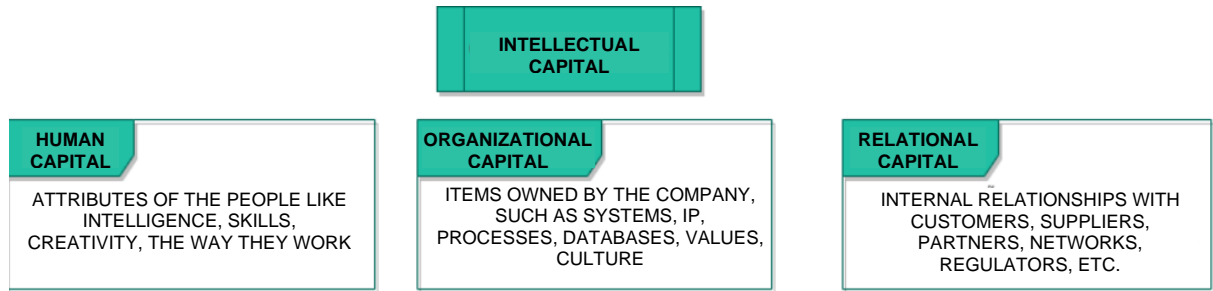


Table 5. Intellectual Capital Categories for Pike and Roos
Source: Adapted from Pike and Roos (2000, p. 3).

It is possible to say that an entity can generate capital internally through values of administrative management, effectiveness of procedures and investment in the intellectual capital implemented; and, in the external environment, with added values to the customer after the purchase, environmental and social impacts resulting from its activities, public opinion, among others (Pike and Roos, 2000). In the subsequent evolution of the studies, Guv and Lev, in 2003, brought important assumptions to be evaluated and new proposals for verifying intangibles. They claim that the approach presented so far had two incorrect assumptions: “1) that there is no error in the capital market price; 2) that the balance of historical values of assets reflects their current values” (Braune, 2012).

Thus, the proposed evaluation method by the aforementioned authors is based on the economic concept of "production function", in which the company's economic performance will be generated by physical, financial and intangible assets (Braune, 2012), as shown in Table 6.

A company's brand is referenced as an example of an intangible asset by Sveiby in 1998, Pike in 2009 and Bontis in 2010. Os autores consideram que o capital humano, estrutural e de relacionamento são avaliados entre os valores escriturados na contabilidade e seu valor de mercado. Where:

$$\text{Intangible value} = \text{Market value} - \text{Book value}$$

For Andriessen (2005), Intellectual Capital is “all the intangible resources that are available to an organization, which gives a relative advantage, and which, in combination, are capable of producing benefits”.

The concept continues with a certain degree of subjectivity and various definitions, but even with different classifications and interpretations of intellectual capital, almost all authors unanimously present the following points:

- “a) Intellectual capital is an intangible asset that needs to be managed;
 b) The management of intellectual capital can create value in the organization;
 c) The management of intellectual capital can generate competitive advantages;
 d) Human capital, customer capital and process capital are the main components of intellectual capital.” (Matos et al, 2010).

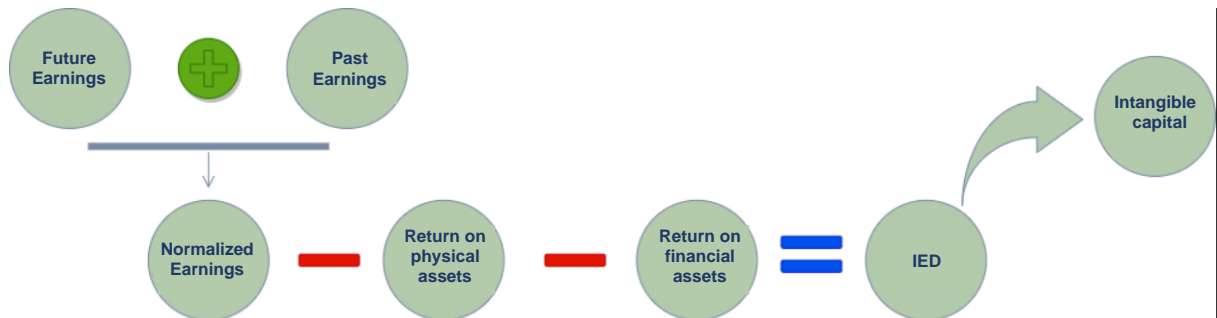


Table 6. Summary of the steps of the Guv and Lev Method.
 Source: Adapted from Guv and Lev (2003).

2.1.2 Approaches to valuation of intangible assets

With an understanding of the need and the benefits that the identification of Intangible Assets can provide to the organization, the Swedish Karl Sveiby came across several studies and researches with different approaches, these with objectives directed to the specific use of the branch of activity, becoming more complex the purpose of highlighting the intangibles.

In this situation, Sveiby (2001) proposes to group the approaches into four categories: Direct Assessment Approaches – DAA; Market Valuation Approaches – MVA; Evaluation of Return of Assets Approaches– ROA; and, Balanced Scorecard Approaches – SA (Schnorrenberger, 2005). The Direct Assessment Approach (DAA) focuses on the direct identification of intellectual capital; the Market Valuation Approach (MVA) calculates the difference between market value and book value; the Evaluation of Return of Assets (ROA) Approach is based on the return that Intangible Assets provide; and, the Balanced Scoreboard Approach (SA) takes as its premise only quantitative aspects (Hoss, 2018).

The grouping of knowledge related to Intangible Assets makes it possible to highlight the relationship of competitive advantages when finding its *Valuation*.

2.2 VALUATION

With the rise of the “age of information”, experts highlight how knowledge has grown in importance and how, over the years, the complexity in reaching the total value of a legal entity has increased. The “invisible” or intangible asset influenced the creation of value so much that it exceeded the most estimated tangible values recorded (Galbreath, 2002).

The financial market value of a company is composed of its visible assets and its intangible assets. The term *Valuation* is understood, most of the time, by specialists in the accounting area. However, investors, shareholders and managers are increasingly looking for studies on the subject, since its possible creation of value and increase in performance may reflect on their interests (Lopes and Iudicibus, 2004).

Valuation is the most complete method, as it covers the entire chain of the company, such as historical information, brand, market assumptions (future), projection of operating profits, investment needs, working capital, as well as the reduction of risks (costs of opportunity), among others (Hoss, 2020). As it is been conceptualized as the financial assessment of a particular company, *Valuation* is often used to define a public title that can be traded on the stock market. The central issue is connected to the prediction of expected values in the future, which can be converted into the intrinsic value of the organization (Ohlson, 2007). Even though it is preferably used to define quotas for shareholders, *Valuation* provides information that is advantageous to decision makers within a business entity. The accounting basis is important to articulate the equity valuation and, together with accurate resources, it can provide decisive information for the company's future and the creation of wealth (De Almeida, 2012).

Fernandez, *et al.*, (2001) argue that the analysis of the strength factors for each *Valuation* depends on factors such as the geographic area where the company is located, comparisons with competitors, among others; and can provide guidance to identify your organization's assessment, which can increase its value. All companies have their *Valuation* and can carry out the evaluation of their price for sale, merger or total or partial acquisition. Even though it is more common in private organizations, public and mixed entities can also be evaluated.

2.3 RAILWAY PUBLIC SERVICES

In Brazil, the rail system is controlled by the Ministry of Transport and regulated by the National Land Transport Agency (ANTT). The country still has its entire railway extension far from ideal – in terms of quality of services and also in the number of lines needed. There are several bottlenecks that limit its growth and, consequently, the socioeconomic development of the region (Lanza, 2020). Brazil has not been successful throughout its history when we analyze the railway sections constituted in its territory. Its works are poorly planned and disjointed, the problems increase when data related to the costs of expanding the rail network are observed. Being necessary for companies to invest in improvements and innovations for transport efficiency and financial gains (Franco, 2006). The Government, being the administrative representative of the public services provided, has great responsibility in the decisions taken, which can boost or reduce economic growth (Haddad, 2009).

The National Development Bank (BNDES) and the cargo financial sector signed, in November of 1952, the first contract with financing for the Central do Brasil Railroad. In this same contract, other financing was approved for the Paraná – Santa Catarina Transport Network, the Northeast Railroad Network, among others. With these resources, bulk wagons and ore wagons were acquired, which transported the crops from the states of Rio Grande do Sul, Santa Catarina and Paraná (Lacerda, 2002).

One of the ways to raise income levels is to locate and implement new economic activities in a given region. When evaluating markers such as per capita product, income and employment growth indicators, we see that there is an increase in goods and services to the local population. The ability to manage public and private (financial, technological and institutional) resources, also considering the modalities of investments, are crucial for the economic development of a region and directly influence sectors such as energy and logistics (Haddad, 2009).

The State has a substantial role in the development process, so this responsibility cannot be left solely to the market. The organization, through the control of its information, demand for innovation services and identification of its assets, and thus, can contribute to regional progress through intangible capital (Sen, 2000). Accompanied by intangible components, it is understood that social capital is related to the organizational order and socialization among the individuals who are part of an entity. Social capital is embedded in the concept that “*an organization must be recognized and interpreted much more than just for what it produces economically*”, and must also be evaluated for its social value (Santiago, 2011).

Thus, Keller (2011) explains the influence of intangibles such as brands, which every company has regardless of whether it wants to disclose. According to him, it can provide economic value advantages such as: greater loyalty, marketing actions, higher profit margins, greater inelasticity to price increase, greater elasticity to price reduction, possible licensing opportunity or brand extension. Brazilian government investments decreased significantly between 1985 and 1993, directly related to the fiscal tightening and the external debt crisis. In 1995, there were only R\$ 18 million in investments. Privatizations now inject investments of R\$ 414 million annually (Campos, 2015).

In 1992, RFFSA was included in the National Privatization Program (PND). The administrator of this project was the BNDES, which, with a team of consultants, prepared the concession model. So that a single shareholder would not directly or indirectly hold more than 20% of the shares of the floating capital, a shareholder control was foreseen, establishing ceilings for the fees. The Brazilian railroads were handed back to the governments, as they did not generate enough revenue for the private operation. Thus, they came to be seen as a mechanism for social and economic policies (Lacerda, 2002).

Comparing Brazil with the United States, while in the former the private investments are of U\$ 11,084 per kilometer, the latter reaches U\$ 33,816. The same happens with productivity indicators: Brazil 9.3 TKU (tons per useful kilometer). The production in TKU is obtained by multiplying the tonnage transported by the distance traveled per worker; and in the United States it is 21.2 TKU. The lack of investment in the sector is clearly evidenced in the number of modals that the country presents (Nunes, 2006).

In a possible privatization of the company, it is expected that new investments will occur in the modernization of the line from Guarapuava to Cascavel, in the construction of a branch connecting Cascavel-PR to Dourados-MS and another connecting Cascavel to Foz do Iguaçu-PR, and in the construction of a new stretch linking Guarapuava to Paranaguá-PR, named Nova Ferroeste, with the proposed extension, the railway line should be approximately 1,371 kilometers long and may have nine cargo terminals between the states of Paraná and Mato Grosso do Sul. (AGÊNCIA DE NOTÍCIAS DO PARANÁ, 2020).

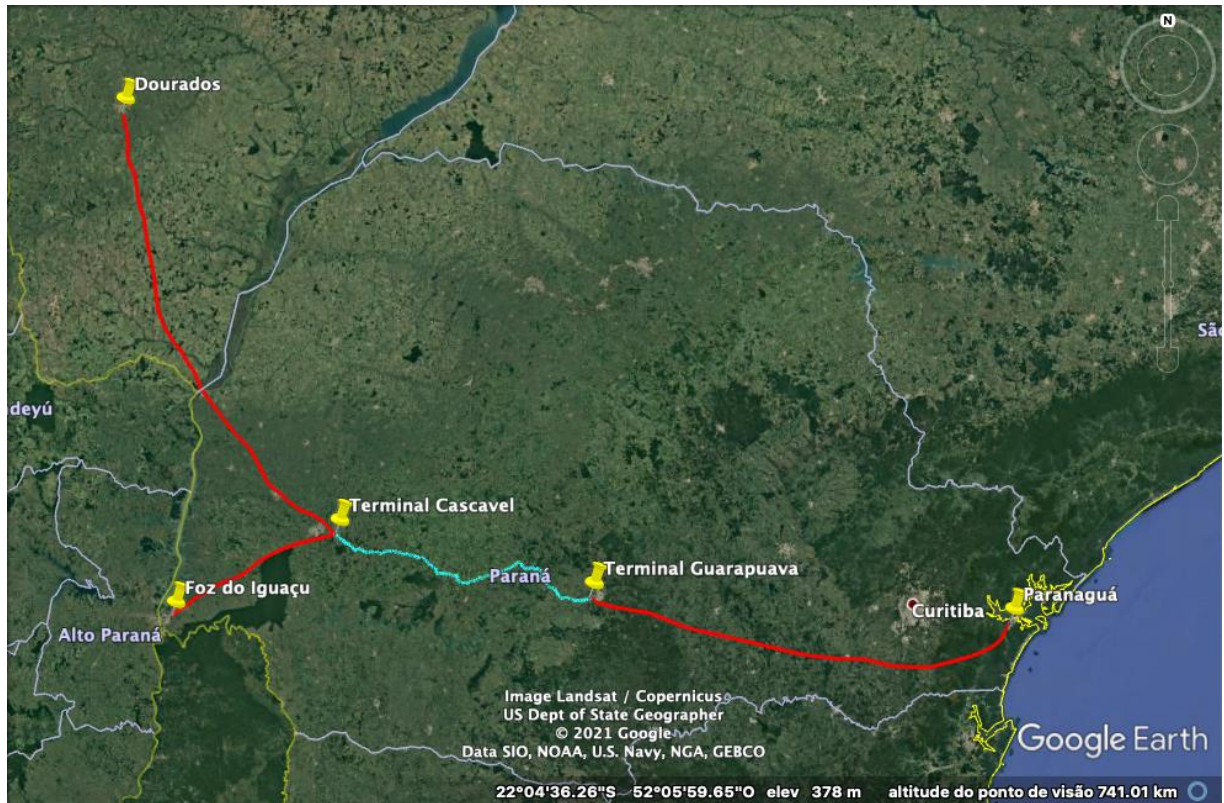


Figure 02. Ferroeste's proposed extensions.
Source: Lanza and Spenciere (2020).

2.4 RAILWAY LOGISTICS IN BRAZIL

Currently, the Federal Constitution has stated that the Union is responsible for exploring rail transport services through authorization, concession or permission, always by means of a bidding process, as provided by the law on service concessionaires and permissionaires (Adrião, 2018). The wave of privatization that hit Brazil was briefly traced along with the neoliberal thinking that began in the 1990s and spread across the United States and Europe. Due to the need to promote the country, these lands experimented with the sale of their properties to minimize economic crises (Machado, 2015). Do Couto (2002, p. 54-55) mentions that, in 1981, companies under state control were transferred to the private sector. Among them, eighteen in the Sarney government, in the governments of Fernando Collor and Itamar Franco, sixty-six state-owned companies were transferred. In the 1990s, there were several concessions for federal highways, followed by airports and railways that sought funds from the private sector.

It was not an easy task, there was a need to create special municipalities to intervene in different interests (public administration, concessionaires, users, civil society, public opinion). But it is important to mention that there was significant technical progress and development

after the concessions. However, the services still need a lot of improvement. At the time, such partnerships with the private sector proved to be crucial, without the State showing signs of submission or oppression. In short, the capacity lies with those who manage private or state organizations, and there is no relationship with the size of the state (Machado, 2015).

Regardless of private, public or mixed administration, the logistics in the country lacks effective means of transport, and incentives to increase its transport capacity are essential, since there is an emerging production and market. With logistical planning - incentive measures - and unnecessary bureaucracy reduction, the railway sector can provide significant results to the economy of companies and industries directly and internally linked (Lanza, 2020). As, for example, the feasibility of *shortlines*, known as the possibility of building railway lines through the private sector and short stretches. Brazil is challenged by the reforms mentioned or similar for this necessary logistical planning. The proposal will certainly be of great contribution to the revitalization of a large part of the rail network and evolution of the rail market and the consequent reduction of logistics costs for many other areas of the country (Lanza, 2020).

2.5 SIMILAR EXPERIENCES IN BRAZIL AND THE WORLD

To structure this work, it was necessary to collect data and knowledge already developed in previous researches. This is to show the problems already solved on the topic and others that left gaps. The search sought national and international articles, from October 2019 to April 2020. Theses and dissertations were collected, filtering the works defended in the last ten years (2010 to 2019). The place of analysis was the Capes portal and the Brazilian Institute of Information in Science and Technology (IBCT), which develops and coordinates the Brazilian Digital Library of Theses and Dissertations (BDTD).

The theses and dissertations of the seven selected studies were analyzed, two of them were defended in 2010; only one in 2012 and 2013; two in 2015; and finally, one in 2016. The following main themes observed were divided: (1) power of Intangible Assets; (2) influence of political connection on intangible assets and social impacts; (3) economic and socioeconomic advantages provided to the region; and (4) consequences of unaccounted intangible assets. In the analyzed works, the main objectives are (1) organizational performance from the analysis of trust and the direction given to the intellectual intangible capital in organizations; (2) the influence that politics has on intangible assets and the social impacts they can provide; (3) the socioeconomic relationship that the company provides to society, since its main objective is to

know the process of strategic adaptation, identifying the critical events that occurred and that its process of strategic adaptation improves when the entity assumes a more active posture and administrative management understands the importance of unidentified intangibles; (4) Finally, the research published by the *Revista de Administração da UNIMEP* aims to analyze the effects of innovation, measured by investments in R&D and intangible innovation assets, on the performance of Brazilian firms, under a multidimensional approach, supported by the analysis by RBV.

3 TECHNICAL PRODUCTION RESEARCH METHODS AND TECHNIQUES

It is found that the topic of intangible assets has aroused interest in the academic field for some time, as shown by Andriessen (2004), based on the significant increase in publications and research in recent years. As previously described about the challenges in identifying intangible assets and also measuring them, studies have used variables to get as close as possible to their economic value, with basis and evidence (Bastos and Abreu, 2020). Quantifying the Intangible Assets of companies highlights the need to research the variables that add value, accompanied by the search for wealth generation processes. To arrive at a scientific approach and present supporting information, the research used the following techniques that are described (Cooper and Schindler, 2003).

From questions observed by the researcher, during years of services provided as a public employee in the company, during the year 2012 until the present moment, the author served as an aid to trace the direction that the research would follow, since there were decision-making and still without a history of evaluating intangibles in the company. In this work, a case study was carried out in the mixed state company, called Estrada de Ferro Paraná Oeste SA, which will be referred to as Ferroeste. The case study allows for in-depth and representative research on the proposed theme. (MARCONI; LAKATOS, 2007).

3.1 METHODS

The method used was the deductive, starting from the existing global literature, in order to extract conclusions and considerations. Also, inductive reasoning was used in the research, mainly in the survey of variables for the valuation of Intangible Assets (MARCONI; LAKATOS, 2007).

In the present work, a deductive analysis of the considerations and conclusions presented was used. In the data analysis, the information was collected through quantitative and qualitative researches. For Knechte (2014), quantitative research is considered matters that act on human and/or social problems, based on the test of a theory and composed of variables quantified in numbers. In this context, quantitative works are associated with information from statistical analyses.

When related to its objectives, research can be exploratory, descriptive or explanatory. According to Silva & Menezes (2000), descriptive research points to the need to present the

attributes of a certain population, phenomenon or the establishment of variable relations. It is developed through the use of standardized data collection techniques, questionnaires and systematic observation. Vergana (2000) adds that descriptive research establishes a correlation between variables and defines their nature. Following in the same direction, Mattar (1999) reports that there must be an interrelation between the research problem and the purpose of the study in order to have certain characteristics or the existence of variable relations.

As it is a case study, this dissertation uses instruments such as interviews and questionnaires. Based on these data, an investigation based on quantification will be carried out, and will examine, with statistical resources, the percentage, the average and standard deviation. In such a way, mediate opinions and information using the researcher's neutrality in the face of the investigation of reality (Knechtel, 2014). It can thus be seen that quantitative research works with data collected directly in the field of investigation or with data already practiced by other research matrices that investigate information (Knechtel, 2014). Regarding the qualitative research part, Strauss and Corbin (1998, p. 10) conceptualize: “any type of research that produces discoveries not obtained by statistical procedures or other means of quantification.”

Denzin and Lincoln (2000, p. 5) point out that qualitative research involves “an interpretive and naturalistic approach to its object of study”. It can refer to lived experiences, behaviors, as well as organizational routine and part of the analysis is interpretive. This means that qualitative researchers study things in their natural setting, seeking to understand and interpret the phenomenon in terms of what meanings people attach to it. Qualitative research demonstrates the dynamic relationship between the subject and the real world, so the subject's subjectivity cannot be translated into numbers. However, the attributions of meanings are basic in the qualitative process, as well as the interpretation of the phenomena found there. The method does not require the use of statistical techniques, the process and its meaning are the main focuses of this stage (Silva and Menezes, 2000).

3.2 RESEARCH DESIGN

This case study research is characterized with qualitative and quantitative approach. Such an approach is complex in the sense of relating theories and concepts on the subject and applying it to the reality of a specific case. The use of qualified and detailed data collection

tools is essential to achieve your goals through these data and information collected (Creswell, 2007).

Furthermore, defining a recognized and certified method for valuing a company is important for validation and recognition, since its results are increasingly decisive for decision-making (Matos, Lopes and Matos, 2013). There are several theoretical models and tools aimed at finding the *Valuation* of an organization. Over the years, these have surpassed the frontiers of knowledge and have been improving. For the research layout, the systematization proposed by Hoss (2018) was taken into account.

The systematization of the Value of Intangible Assets (VIA) mentioned above has three fundamental elements:

- a) Average Adjusted Intangible Income – RIA_{me} ;
- b) Determination of Intangible Value – DIV ; and
- c) Determination of the Intangible Coefficient – DIC .

In this systematization, a formula was proposed to support the generation of corporate wealth and add value to its intangibles. Where:

$$VIA = (RIA_{me} + DIV_{me}) \times (1 + DIC)$$

VIA = Value of Intangible Assets;
 RIA_{me} = Average Adjusted Intangible Income.
 DIV_{me} = Determination of Intangible Value;
 DIC = Determination of the Intangible Coefficient.

The fundamental items to find the organization's intangibles and, consequently, achieve the research objectives, focus on these pillars of measurement of the qualitative aspect and generation of values by the company (Hoss, 2018).

Therefore, the research has the following variables that can be better visualized in Table 8:

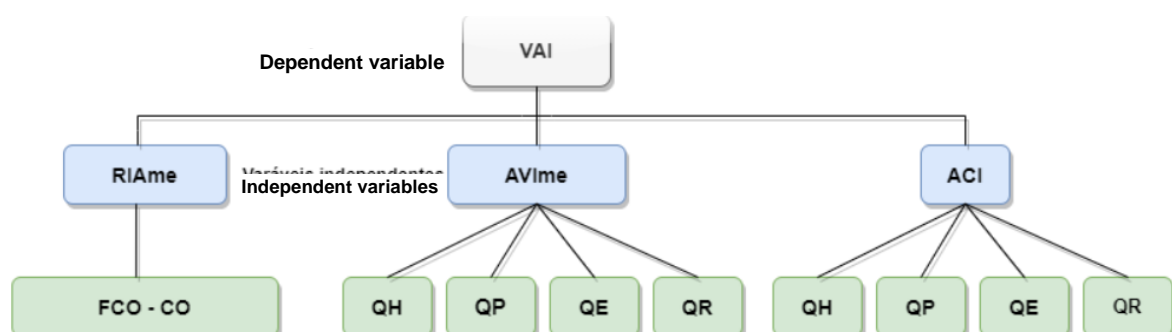


Figure 3. Organization Chart – Statistical Association of Systematics.
Source: Hoss (2018).

Where: HQ = Human Quadrant; PQ = Process Quadrant; SQ = Structural Quadrant; and RQ = Relational Quadrant.

3.3 DATA COLLECTION PROCEDURES

Since this is a research with a qualitative and quantitative approach in the case study of the state-owned Ferroeste, it is necessary to use data triangulation. For this, the crossing of the three sources of information is mandatory: company documents, interviews and questionnaires. Using a multimethod, there will be more than one way adopted within these procedures, which could be through documents, observations, interviews and digital media (Da Silva *et al* 2017).

The procedures of the necessary data to be collected will be separated in qualitative and quantitative variables. First, quantitative analysis, through financial statements, investment plans and the evaluation of accounting ratios. Subsequently, the qualitative variables were portrayed using *Survey, Delphi*, interviews, questionnaires and *brainstorming techniques*. These questionnaire techniques consist of dividing into categories and groups that aim to achieve the objectives of the study, such information is essential in data analysis, as well as its verification. They will be applied to a sample of employees and management, classified as internal components; and applied to customers and suppliers, classified as external components.

Public	Actors involved	Technique used
Internal (2 interviews and 1 questionnaire)	CEO	Individual interview
	Administrative and financial director	Individual interview
	Production director	Individual interview
	Human Resources Manager	Individual interview
	Financial and Commercial Manager	Individual interview

External (31 interviews)	External <i>players</i> identified as "clients"	Individual questionnaire
	External <i>players</i> identified as "suppliers"	Individual questionnaire
	Internal players identified as "employees"	Individual questionnaire

Table 7. Participation of the *players* involved.
Source: Author himself (2021).

Related to the projection, forecast of future income and expenses, this will be carried out for the three future years. First, the company's financial income was projected, using macroeconomic variables, and second, projecting each of the variables individually (Hoss, 2018).

3.4 PROCEDURES AND DATA ANALYSIS

For the analysis of the contents obtained in the data collection, there is no standard model to be followed specifically, this due to the data collection procedures, in addition to the interpretations of the answers and data analysis. All to reinforce the credibility of the research and robustly present the results (Prodanov and Freitas, 2013). The *Google Forms* platform will support the application of questionnaires to internal and external components. With the help of the statistical *software* called *Statistical Package for the Social Sciences* (SPSS), the necessary information for the samples, content analysis and data organization will be compiled. The results were compiled and graphed using *Excel 2010 software*. Table 8 provides the reader with a view of the steps covered according to each objective:

Step	Goals	Methodology for data collection	Samples	Data analysis model	Result obtained
1	Structuring the Theoretical Framework	Bibliographic research	56 (articles, dissertations and theses).	Bibliometric analysis	Structure research, data and knowledge developed in previous research.

2	Develop a spreadsheet with the qualitative variables, related to each quadrant of Intangible Assets	Interview	5 experts (company connoisseurs)	Descriptive analysis.	Model questionnaire of critical variables related to Intangibles for Ferroeste.
3	Tabulate the information generated by the questionnaire in the perception of the <i>players</i>	Questionnaire	31 <i>players</i>	Statistic	Measurement of the qualitative results of intangible assets in the perception of Ferroeste's <i>players</i> .
4	Identify the relationships of Ferroeste's management with its customers and suppliers, according to the relational quadrant	Interview	3 especialistas	Descriptive analysis.	According to the relational quadrant, identify qualitative indicators of Ferroeste's intangible assets.
5	Assign values and apply the Hoss method concept that are identified as intangible assets at Ferroeste.	Documentary Research	Reports from the management area (board)	Descriptive analysis.	Identification of qualitative variables that generate value in relation to the Trial Balance Sheets.
6	Demonstrate the strategies for Ferroeste, according to the <i>Valuation</i> results,	Documentary Research	Final research	Bibliometric analysis	Presentation of the results to Ferroeste's management according to the survey.

Table 8 - integrated methodological representation of the research.
Source: Author himself (2021).

3.5 PROFESSIONAL SKILLS USED IN PROBLEM SOLUTION

The researcher has extensive knowledge of the company that is the object of study, mainly because he works in the Human Resources area. The function requires extensive knowledge of all procedures, since it is necessary to know the activity of the employees. By being at the forefront of issues related to people, decision-making is commonly intermediated or requested, with the knowledge of the Human Resources manager.

The experience as a student in the Accounting Sciences graduation was essential for the interpretation of data from the financial statements. The postgraduate course in Human Resources also assists in research related to the qualitative method. Finally, the disciplines of this master's degree served to shape the robustness of theoretical research and, above all, the flexibility in times of uncertainty.

3.6 LIMITATIONS OF RESEARCH METHODS AND TECHNIQUES

The limitations associated with the research will not highlight the flaws that the work has, but rather demonstrate new possibilities for studies and the difficulties that were identified throughout the procedures. The main limitations were found during the application of questionnaires. As it is a company that operates in several cities, communication with *players* within the city of Cascavel (larger population and sample) was more effective. Once the author was able to personally go to the interviewees, it was possible to explain the intention and importance of the research, obtaining 100% response from them. However, *players* from other cities or abroad, when it was not possible to contact in person, the percentage of respondents was lower.

This percentage was not enough for the survey not to take place, but the intended total population was not reached. However, the required sample was reached so that the results could be achieved and presented with credibility, according to the statistical percentages. Difficulties were also identified regarding the deadline in view of the grandeur that the work has. The comparison is exactly related to the private company that was hired by the Government of the State of Paraná to assess the global value of Ferroeste and a possible opening of auction for privatization. The company started work in June 2020, had the deadline to deliver in September 2021 and requested an extension. The new deadline for delivery of the contracted company's works is for November 2021. Finally, studies specifically related to railways have few published works. The amount is further reduced when this rail relation is connected to Intangible Assets and/or *Valuation*.

4 CONTEXT OF THE PROJECT OR PROBLEM SITUATION

The state-owned Ferrocarril del Estado, active in the field of railway services, characterized SA, whose largest shareholder is the Government of the State of Paraná, with solely regionalized capital, regulated by the National Agency of Land Transport (ANTT) will be the object of study and problem situation as explained. The company's Valuation or any other management study applied to the topic of intangibles has never been carried out since its construction. The

organization has potential intangible assets, not yet identified, which may serve as an administrative strategy in future corporate decisions.

In 1988, the Paraná State Government founded the Estrada de Ferro Paraná Oeste SA (Ferroeste) and its objective was to build a railway line between the Port of Paranaguá-PR and the interior of the state. The construction began on March 15, 1991; on December 19, 1994, the first section (Guarapuava to Agrária) was opened to traffic; and, after about four years of work, in 1995, the railway was completed (Guarapuava to Cascavel). As the objective of the State of Paraná at the time was only the construction of the line, on December 10, 1996, an auction was held to the private sector and the Ferropar consortium took over the operation on March 1, 1997. Thus, it continued with logistics services until 2006, when the operation returned to the Government of Paraná, due to several failures to pay the auction installments and the contractual terms of expansion (Lanza, 2020).

Ferroeste aims to ship an important part of the production of western Paraná, mainly grains (soybean, corn and wheat), bran and containers, destined for the Port of Paranaguá, on the coast of the state (Ferroeste, 2021). The railroad has as its mission and goals: to transport rail cargo, for export and import; manage the logistics structure of its terminals and facilitate and service the operation of customers in its units located in the terminals for the flow of production; facilitate the implementation of partnerships and the installation of new customer activities and services at the terminals; to focus on reducing logistical costs for producers and customers; serve large, medium and small producers, cooperatives and cargo transport companies with affordable fares; promote the expansion of the rail network to meet the aspirations of society in Paraná and the country's development needs (Ferroeste, 2021).

Furthermore, the company aims to reduce the logistical costs of production flow, serve customers and facilitate the development of the West region by offering rail transport. Currently, with 130 employees, Ferroeste has four physical offices established in four cities in the State of Paraná. Its employees and units are divided as follows: head office in the city of Curitiba, where it only has an administrative office, formed by 15 employees, located at Av. Iguazu, 420, 7th floor. In Cascavel, some production sectors and an administrative department are established, with 56 employees, as shown in Table 9 below. The unit is located in a strategic location for receiving trucks that unload through the dumper to the wagons, as well as receiving the loaded wagons that arrive with the goods to the customers.

Located on BR 277, km 576, with a total area of 112,442m², within this area, there are thirteen other private companies, with concession of area to operate, facilitate and streamline the services provided by Ferroeste. Such private companies have an “*out pert*” contract, which

means that they have to fulfill a certain minimum quantity of goods transported through Ferroeste, in return, the areas to operate are assigned. The strategy was intended to encourage companies that need logistics services. Still on the Cascavel unit, the production sectors are divided between Moega (truck unloading and wagon loading), Railway Station (logistics center for monitoring locomotives) and Traction (personnel exclusively responsible for driving trains).

At the Guarapuava headquarters, there is also an administrative area and three other sectors, divided into Via Permanente – a sector that maintains the railway structure, as well as responds to emergency events, such as the fall of a rock barrier. Like the Cascavel unit, this one has the railway station department – responsible for the remote monitoring of the locomotives, control center and authorization of trains for departure. The third department of the unit is the railway workshop, which is responsible for the maintenance of locomotives and repairs in some wagons.

Finally, there is a team of eight road workers and a supervisor, in the city of Guaraniaçu, also known as the department of Via Permanente, the Guaraniaçu sector has the same competences as the Via Permanente of Guarapuava, however, it serves the railway section between Cascavel and Laranjeiras do Sul.

FUNCTIONAL BOARD OF FERROESTE - JULY/2021			
HEADQUARTERS	DEPARTMENT	NUMBER OF EMPLOYEES	TOTAL
CURITIBA	ADMINISTRATIVE	15	15
CASCAVEL	ADMINISTRATIVE	14	56
	MOEGA	20	
	TRAIN STATION	10	
	TRAFFIC AND MOVEMENT	12	
GUARAPUAVA	ADMINISTRATIVE	13	51
	VIA PERMANENTE	16	
	TRAIN STATION	8	

	RAILWAY WORKSHOP	14	
GUARANIAÇU	VIA PERMANENTE	8	8
Total			130

Table 9. Ferroeste Functional Board.

Source: Author himself (2021).

The management of the state-owned railway is managed by three directors, who are appointed by the Secretariat of Infrastructure and Logistics (SEIL) of the Government of the State of Paraná. The board is divided between the CEO, the production director and the administrative and financial director. The current board took over at the beginning of 2019 and, together with the other employees, achieved record revenue figures for the company. The size of the company is identified as a large company, since its annual gross revenue is above 12 million. In its registration with the Federal Revenue of Brazil, its description of the main economic activity is registered by the code 49.11-6-00 (Rail Cargo Transport), and as a secondary activity, it has four other descriptions: road and rail terminals (52.22-2-00); loading and unloading (52.12-5-00); activity of the port operator (52.31-1-02); and general warehouses - issue of warrant (52.11-7-01).

Since it was retaken by the state, Ferroeste has been the target of strategic political issues. While the political party that “recovered” the railroad from the population says that the best strategy is to maintain it, even with losses at the end of the accounting year, the opposition party, and now in power, understands that privatization is necessary so that the route can be expanded, since the company's cash and not even its granting authority are in a position to perform. The idea for the project arose after the perception of the manager and researcher who works in the organization, who always heard that Ferroeste was a potency, a “white elephant”, however, the directors were not able to present profits, even with high revenues. The problem has always been the excessive expenses with diesel oil and lubricants, a consequence of old locomotives – there are 14 locomotives, all with manufacturing date before the 80s. The investment in these machines would be an alternative, however, a locomotive costs more than 2 million reais each. Being made unfeasible by the company's current cash and the Government does not analyze the investment with a short-term return.

It was identified with some experts from the entity, that Ferroeste always had potential, but needed a railroad to connect it to the port. After all, connecting Cascavel to Guarapuava is not a good strategy and is largely dependent on the private railroad that transports the commodities to the port of Paraná. Ferroeste, after several periods with accounting losses, with

state administrative management, the Paraná government is once again considering privatizing the entity. With a vision to attract new investments from the private sector in the revitalization and expansion of the railroad to the states of Santa Catarina and Mato Grosso do Sul. There are considerable challenges such as the low profitability of the railroad and the division of revenues to the main stretch that leads to the port, which is shared with the company Rumo Logística (Lanza, 2020).

With such planning, the idea of the granting authority, the Government of the State of Paraná, is focused on the financial and economic interests of the region, governmental spheres of the participating municipalities, the State of Paraná and also nationally. There is a great responsibility to present reliable data, mainly due to the current situation of the company and the possibility of privatization. The characteristic of the central theme also involves interests of a social, business, public and political nature.

Thus, the research analyzes the current scenario of the organization that is interested in concession or privatization altogether. “Until now, according to the government of Paraná, the concession has proved to be the best choice”. (2021). The interest of society and legal certainty are key points to formulate the project and provide an attractive business environment to the market. The fact is that studies show that a train with 100 cars can replace 357 trucks with goods. In this assessment, Mato Grosso do Sul will have a 32% reduction in logistics costs with the new railroad, reducing from R\$3.8 billion in road transport to R\$2.6 billion for Nova Ferroeste. The state of Paraná is expected to have cost savings of approximately 23% (Progresso Digital, 2021).

The present study was carried out on the Estrada de Ferro Paraná Oeste (Ferroeste) which is considered a unique case in the Brazilian context, not only because it is a mixed railway and relatively short in length, but because many specialists consider that there is a large potential in it, but that for years financial losses have been added to public coffers. In this context, Ferroeste is characterized as a strategic space in the scope of the proposed and necessary development in the region of the State of Paraná and Mato Grosso do Sul.

The results of this research will present data and tools applied and validated to value aggregators, which will serve as a basis for formulating a strategy focused on intangible assets not identified by the company. First, the quantitative accounting numbers are presented. Then, a model of qualitative indicators of the company case study was elaborated, this measured from the perception of active *players*, followed by research extended to other internal and external individuals that have a relationship with the company. These assumptions relate to the specific objectives of the work.

In the following chapter, the activities developed, the tools, the influencing factors and the identification of the relevant results of this research will be detailed. Following the case study protocol suggested by Yin (2003), it is recommended that the proposed model, to demonstrate greater reliability to the research, follow the steps: a) overview of the case study project; b) field procedures; c) case study questions; d) guide to the case study report.

5 TYPE OF INTERVENTION AND MECHANISMS ADOPTED

This chapter contemplates the tasks developed in the organization of the mechanisms used in the stages of the collected materials, directed to the results and objectives of this dissertation. The chapter is divided into five other subchapters: (1) Organizational structure; (2) Identification of critical variables; (3) Analysis of Average Adjusted Intangible Income (RIAme); (4) Determination of Average Intangible Value (AIVme); and, finally, (5) Calculation of Intangible Coefficient (CIC). Compilations of the information and data found will be presented, through the specific tools and demonstrated throughout each stage.

After planning and carrying out the research, the analysis of the results will be presented. These are divided into qualitative and quantitative. Where the quantitative will be presented from the financial statements, while the qualitative elements by the *Delphi* technique and *brainstorming*.

5.1 ANALYSIS OF FERROESTE'S ORGANIZATIONAL STRUCTURE

After identifying the problem situation, the proposal was first raised to the CEO, who promptly accepted that the research be carried out, as well as being available to assist with the information and team of people necessary for the research.

5.1.1 ANALYSIS OF THE COMPANY'S FINANCIAL AND ECONOMIC STATEMENTS

In this subchapter, the financial statements for the years 2017 to 2020 were reviewed and Ferroeste's financial statements for the three future years were projected, aiming at an analysis of the economic and financial situation of the organization.

BALANCE SHEET FERROESTE

ASSET	2017	2018	2019	2020	2021	2022	2023
CIRCULANT	5.667	4.839	7.566	8.738	9.000	9.270	9.270
Financial Asset	858	108	1.803	542	559	575	575
Cash and equivalents	858	108	1.803	542	559	575	575
Cash and equivalents	858	108	1.803	542	559	575	575
Operating Asset	4.809	4.730	5.763	8.195	8.441	8.695	8.695
Customers and receivable operations	616	376	705	346	356	367	367
Taxes to be recovered	186	195	229	1.793	1.846	1.902	1.902
Stocks	3.785	3.648	3.741	2.971	3.060	3.152	3.152
Other achievable rights	216	507	1.043	3.083	3.175	3.270	3.270
Prepaid expenses	5	5	44	3	3	3	3
Not CIRCULANT	296,102	289,601	283,816	278,667	287,027	295,637	295,637
LONG TERM ACHIEVEMENT	1.742	2.160	2.810	2.828	2.912	3.000	3.000
Judicial Deposits	1.736	1.853	2.349	2.362	2.433	2.506	2.506
Judicial blockades	6	0	454	459	473	487	487
Rents, leases and sub-concessions	43.458	43.458	43.458	43.458	44.762	46.105	46.105
(-) Provision for losses	(43.458)	(43.458)	(43.458)	(43.458)	(44.762)	(46.105)	(46.105)
Other achievable rights	0	306	6	6	7	7	7
INVESTMENTS	-	-	-	-	-	-	-
IMMOBILIZED	294,360	287,442	281,006	275,839	284,114	292,638	292,638
Immobilized	294,360	287,442	281,006	275,839	284,114	292,638	292,638
INTANGIBLE	-	-	-	-	-	-	-
Intangible Assets	127	-	-	-	-	-	-
Accumulated Amortization	(127)	-	-	-	-	-	-
TOTAL	301,770	294,440	291,382	287,404	296,027	304,907	304,907
PASSIVE	2017	2018	2019	2020	2021	2022	2023
CIRCULANT	14.180	13.123	12.386	12.870	13.256	13.653	13.653
Operational	14.180	13.123	12.386	12.870	13.256	13.653	13.653
Providers	3.711	2.428	2.126	1.285	1.323	1.363	1.363
Labor Obligations	3.077	1.463	1.221	1.379	1.420	1.463	1.463
Tax Obligations	1.521	3.056	3.226	3.185	3.280	3.379	3.379
Others	5.870	5.563	5.077	6.184	6.369	6.560	6.560
Resources of Public Entities	-	613	737	837	863	888	888
NON CIRCULANT	6.299	5.719	4.810	4.214	-	-	-
NET WORTH	281,291	275,599	274,186	270,321	278,431	286,784	286,784
Organization Assets	430,924	438,924	443,924	443,924	457,242	470,959	470,959
Accumulated Deficit	(149.633)	(163.326)	(169.739)	(173.603)	(178.812)	(184.176)	(184.176)
TOTAL	301,770	294,440	291,382	287,404	291,686	300,437	300,437

Table 10 – Ferroeste Balance Sheet.
Source: Author himself (2021).

For the projection of the following three periods, the exponential rate of 3% was used. Based on the Focus Report that presents the statistical summary, calculated on market expectations (Banco Central 2021).

5.1.1.1 Liquidity analysis

This analysis demonstrates Ferroeste's ability to meet its obligations. As ASSAF NETO (2008, p. 119) defines: “*liquidity indicators aim to measure the payment capacity (financial slack) of a company, that is, its ability to correctly fulfill the passive obligations assumed*”.

The liquidity indicators shown were interpreted based on the organization's accounting and financial analysis, according to the information contained in the financial statements. The Immediate Liquidity presented in the last four years reflects the company's difficulty in meeting its liabilities with the current cash availability. Considering each index individually, it is not possible to make the statement. However, as all indices were below 1, the entity's management requires attention. Immediate Liquidity shows that for every R\$ 1.00 of obligation, the company has values below R\$ 1.00 in all years. However, this index does not take into account the rights that will be receive (Da Silva, 2005).

Current liquidity is considered a gauge of the entity's financial health. Related to Current Assets and Current Liabilities, it presents how much the organization has resources compared to the discharge of its short-term debts. (Da Silva, 2005). In the last four years, the company has not presented sovereignty over its debts. Consequently, dry liquidity will present indexes below or equal to current liquidity, since this is only differentiated by the subtraction of inventories in Current Assets. Since the company does not contain inventory, the key figures are the same.

Immediate Liquidity	2017	2018	2019	2020
		-		
Available	857.97	108.26	1.803,33	542.38
Current Liabilities	14.179,73	13.122,96	12.386,43	12.869,63
Index	0.061	0.01	0.15	0.042

Current Liquidity	2017	2018	2019	2020
Current Assets	5.667,08	4.838,71	7.565,94	8.737,81
Current Liabilities	14.179,73	13.122,96	12.386,43	12.869,63
Index	0.40	0.37	0.61	0.68
Dry Liquidity	2017	2018	2019	2020
A.C. - Stocks	5.667,08	4.838,71	7.565,94	8.737,81
Current Liabilities	14.179,73	13.122,96	12.386,43	12.869,63
Index	0.40	0.37	0.61	0.68

Table 11 – Liquidity Analysis.
Source: Author himself (2021).

5.1.1.2 Debt analysis

The analysis is related to short-term debt. According to ASSAF NETO (2008, p. 122), they “also provide elements to assess the degree of financial commitment of a company to its creditors (mainly financial institutions) and its ability to meet the financial commitments assumed in the long term.”

Related indices to determine an organization's total indebtedness will be presented by “General Indebtedness”, “Third-Party Capital”, “Short-Term Debt over Total Indebtedness” and “Equity Fixed Assets”. Commonly used, the General Indebtedness provides to identify the total debt that a certain entity has in comparison with its total assets. To find the index, it is necessary to use the value of Current Liabilities, add the Non-Current Liabilities and divide by the total Assets of your Balance Sheet. Ferroeste presented low indexes, it is understood that the lower the index, the more satisfactory the numbers are, as they represent that the company has sufficient assets to pay all its debts.

The calculation of the second index is made up of Liabilities (sum of Current Liabilities + Non-Current Liabilities), divided by Shareholders' Equity. The relationship between them identifies the amount of secured debt per unit of equity. Thus, depending on the financial situation, the lower the index, the better its ability to guarantee third parties, based on its own

capital (ASSAF NETO, 2008). It is understood that the company Ferroeste presents satisfactory numbers, since they were below 1, in the four years analyzed.

The formula for establishing the “Short-Term Debt over Total Indebtedness” comprises the ratio of the total debt the company has to the total short-term debt – understood as the current financial year. Therefore, the lower the index, the more comfortable the company will be in meeting its short-term obligations. Ferroeste has almost 70% of its short-term debt. The index must take into account its form of receipt of revenue, if the company has a high cash and receives in the short term, the index does not become worrying. This is the case with Ferroeste, which receives almost all of its short-term revenues.

Finally, in conclusion to the indebtedness ratios, the “Immobilizations of Shareholders' Equity” allows to identify how much the company is dispensing resources – making investments – in its permanent assets. The indices show that there was no investment of its fixed assets. Thus, it demonstrates that there is a lack of investments made in the company in recent years and still getting rid of some of these fixed assets.

General Indebtedness	2017	2018	2019	2020
P.C. + P.N.C.	20.478,47	18.841,52	17.196,32	17.083,45
Total Assets	301,769.53	294,440.17	291,381.96	287,404.43
Index	0.07	0.06	0.06	0.06
Third Party Capital	2017	2018	2019	2020
P.C. + P.N.C	20.478,47	18.841,52	17.196,32	17.083,45
NET WORTH	281,291.07	275,598.64	274,185.64	270,320.98
Index	0.07	0.07	0.06	0.06
Short-Term Debts on Total Indebtedness	2017	2018	2019	2020
P.C.	14.179,73	13.122,96	12.386,43	12.869,63
P.C. + P.N.C	20.478,47	18.841,52	17.196,32	17.083,45
Index	0.69	0.70	0.72	0.75
Fixed Assets of Equity	2017	2018	2019	2020
At.N.C.	296,102.45	289,601.46	283,816.01	278,666.62
NET WORTH	281,291.07	275,598.64	274,185.64	270,320.98
Index	1.05	1.05	1.04	1.03

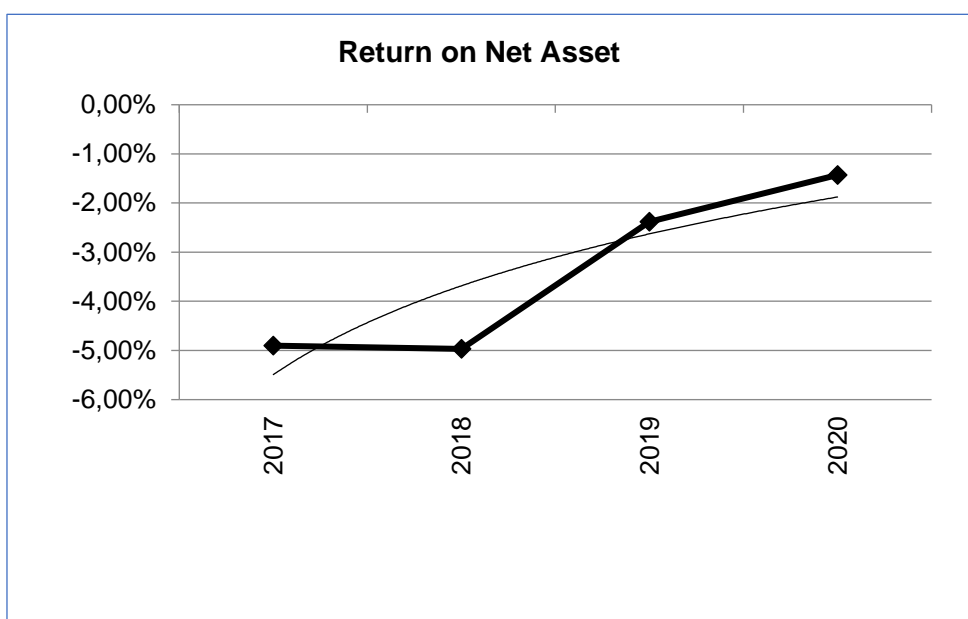
Table 12 – Indebtedness Analysis.
Source: Author himself (2021).

5.1.1.3 Profitability analysis

Even though Ferroeste does not have the mission of presenting profits, in any entity it is important to present surpluses for the sequence of its existence, taking into account the need for its own investments. The analysis of profitability indexes can show, from a financial point of view, if the organization has been achieving profitability or, if there is an interest in being sold, if it is worth the investment. It is important to remember that all the indices found, whether high or low, depend on individual analysis, taking into account the specificities of each company, such as commercial segment, creation time, size, private, state or mixed characteristics, among others. (Da Silva, 2007). The indicators in this subchapter were all identified as negative, since the company had a deficit in recent years.

Net Margin	2017	2018	2019	2020
Net Surplus/Deficit	(13.781,45)	(13.692,42)	(6.530,72)	(3.864,66)
Net Revenue	15.962,33	18.671,01	28.427,45	18.955,29
Index	-86,34%	-73,34%	-22,97%	-20,39%
Asset Profitability	2017	2018	2019	2020
Net Surplus/Deficit	(13.781,45)	(13.692,42)	(6.530,72)	(3.864,66)
Asset	301,769.53	294,440.17	291,381.96	287,404.43
Index	-4,57%	-4,65%	-2,24%	-1,34%
Return on Equity	2017	2018	2019	2020
Net Surplus/Deficit	(13.781,45)	(13.692,42)	(6.530,72)	(3.864,66)
NET WORTH	281,291.07	275,598.64	274,185.64	270,320.98
Index	-4,90%	-4,97%	-2,38%	-1,43%

Table 13 – Profitability Analysis.
Source: Author himself (2021).



Graph 01 - Return on Equity.

Source: Author himself (2021).

Thus, the joint analysis of all calculations, together visualized by graph 01, demonstrates the relationship that Ferroeste presents in a growing financial and economic, with an organization of accounts and is close to achieving positive financial values. It will be shown in the sequence, according to forecasts, that the company will show a profit as early as the year 2021.

5.1.1.4 Ferroeste's solvency analysis and continuity conditions

The mechanisms used in the Solvency Analysis of a company, as well as exposing its conditions of continuity, are structured to demonstrate the probability of the organization complying with its obligations and continuing to exist, being based at the end of the analysis as a solvent, insolvent or indefinite company (Butruille, 2018).

The analysis parameters of these three possible opinions are defined as: final value greater than 7 and 0 = solvent company; range between -3 and zero will be characterized with vagueness; and finally, if the company presents numbers between -3 and -7, it is considered insolvent. It is observed that the company is highly solvent, where all items were above zero. The second calculation (X2) stands out, which relates the total assets to its obligations, showing the considerable amount of assets in relation to its debts.

Risk Factor			2017	2018	2019	2020
X 1	Net Surplus/Deficit NET WORTH	x 0,05	(13.781,45) 281,291.07	(13.692,42) 275,598.64	(6.530,72) 274,185.64	(3.864,66) 270,320.98
		Index	(0,00)	(0,00)	(0,00)	(0,00)
X 2	Asset Total Liabilities	x 1,65	301,769.53 20.478,47	294,440.17 18.841,52	291,381.96 17.196,32	287,404.43 17.083,45
		Index	24.31	25.78	27.96	27.76
X 3	A.C. - Stocks Current Liabilities	x 3,55	5.667,08 14.179,73	4.838,71 13.122,96	7.565,94 12.386,43	8.737,81 12.869,63
		Index	1.42	1.31	2.17	2.41
X 4	Current Assets Current Liabilities	x 1,06	5.667,08 14.179,73	4.838,71 13.122,96	7.565,94 12.386,43	8.737,81 12.869,63
		Index	0.42	0.39	0.65	0.72
X 5	Total Liabilities NET WORTH	x 0,33	20.478,47 281,291.07	18.841,52 275,598.64	17.196,32 274,185.64	17.083,45 270,320.98
		Index	0.02	0.02	0.02	0.02
(X1 + X2 + X3 - X4 - X5)			25.28	26.68	29.46	29.43

Table 14 – Solvency analysis and continuity conditions.

Source: Author himself (2021).

5.1.1.5 Review

After analyzing Ferroeste's financial statements and accounting indexes, it is possible to affirm that the company is able to continue its activities, even with deficits in its last accounting years. Its profitability and liquidity needs attention, however, the indebtedness analysis shows that Ferroeste can afford its debts. The company, in its provision for the coming years, already has a surplus and corroborates the solvency indices, and it is possible to affirm that the financial balance in the calculated indices will be understood in its next annual closing in view of its positive conditions for growth.

5.1.2 Committee of Experts

According to the structure of employees already presented in a previous chapter, Figure 04 (Ferroeste organizational chart) below shows the company's organizational chart:

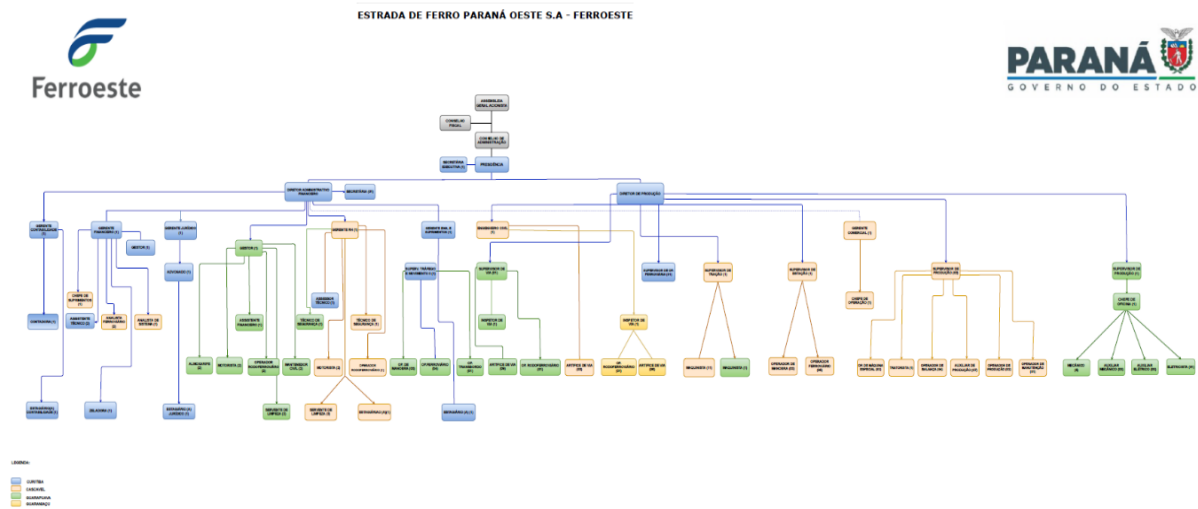


Figure 04: Ferroeste Organization Chart.
Source: Ferroeste (2021).

It is evident that the superior hierarchical lines are considered as specialist *players* of the company. From this, at first, only the directors and managers were considered as capable, knowing the company as a whole. It was taken into account when choosing these specialists: (1) the hierarchical level, (2) working time in the organization and (3) the broad knowledge of the company - knowledge beyond their area of work, taking into account the relationship with other departments. Thus, five experts were selected to carry out the next stage of the research. These five individuals were appointed as the “committee of experts”. Taking into account the level of the board that jointly participates in all decision-making issues of the company, the three directors were selected: CEO, production director and the administrative and financial director.

Next, the managers with the highest hierarchical level, analyzing the working time and the relationship with the other departments. It was comprehend that the commercial manager and the human resources manager would have these skills to participate in the meeting, using *brainstorming* and the *Delphi* technique to reach the company's critical variables.

5.2 IDENTIFICATION OF CRITICAL VARIABLES

After identifying the specialists, using the *Delphi* technique, the first level model was created, which will bring together the specialists to generate information related to the organization's competitive intelligence and the company's critical variables. The *Delphi* technique uses the principle of interviewing individuals and/or groups with rigorous knowledge of the subject addressed.

In the research, the Hoss Model for Valuing Intangible Assets was used to achieve its objectives and results. His model is an example of how to show a company's wealth generation and value addition. The Hoss Model is given by the following formula:

$$\text{VIA} = (\text{RIA}_{\text{me}} + \text{DIV}_{\text{me}}) \times (1 + \text{DIC})$$

VIA = Value of Intangible Assets;

RIA_{me} = Average Adjusted Intangible Income.

DIV_{me} = Determination of Intangible Value;

DIC = Determination of the Intangible Coefficient.

The collection of quantitative and qualitative data was started to arrive at the information. First, the Hoss Model suggests the indication of critical variables, the qualitative indicators, so that they can be grouped into four value-adding quadrants: (1) Human Quadrant; (2) Processes Quadrant; (3) Structural Quadrant; and (4) Relational Quadrant:

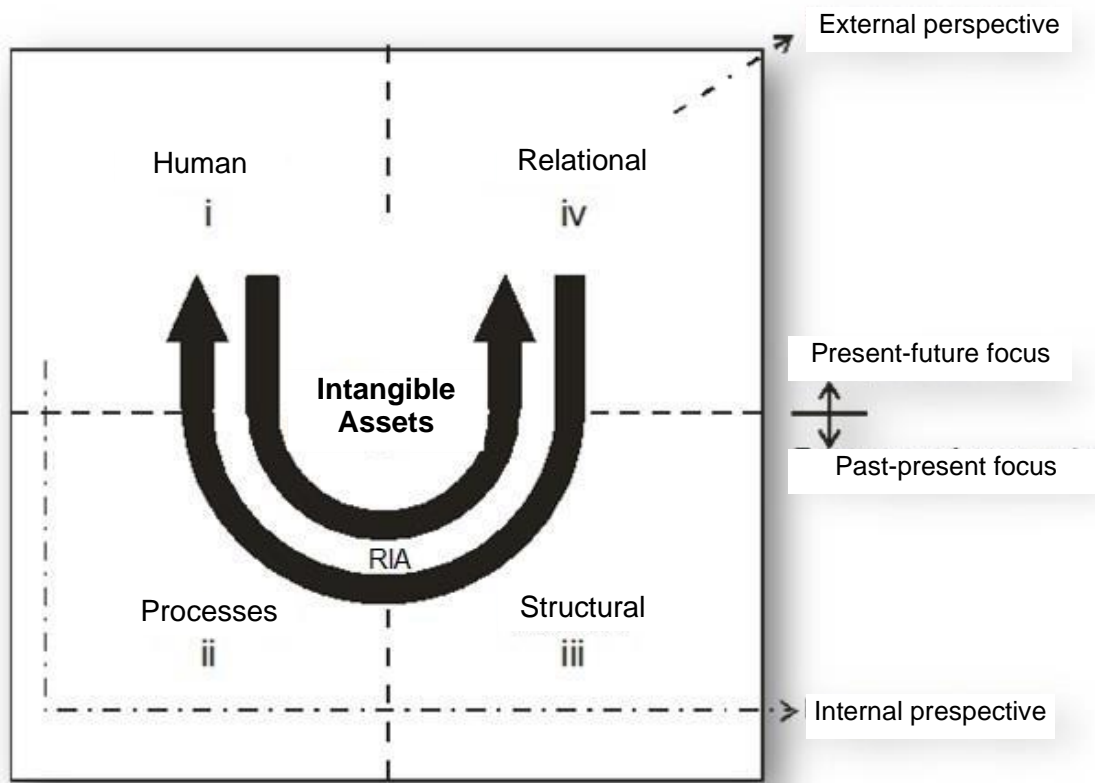


Figure 05: Hoss Model - Intangible Assets

Source: Reprint of Intangible Assets – Itaipu Technological Park (p. 133).

Figure 05 illustrates the quadrants that will be presented below. It will be a fundamental part of the company's creation of intangible value, as it comprises temporal levels of past-present (structural and processes quadrant) and future (human and relational quadrant), analyzing the factors from an internal perspective (in the first three quadrants) and external perspective (relational quadrant). In order to show possible values to complement the Value of Intangible Assets (VIA).

In each of the quadrants, 14 indicators were used for the committee of experts to vote with scores from 0 to 7, where 0 was considered the lowest value, and 7 the highest value. Taking into account the value of each indicator, as previously presented to the experts in Table 15:

RESOURCE VALUE / CRITICAL VARIABLE	SCORE				
	0	1 to 3	3.5	4 to 6	7
What is its effect on the organization's profitability?	Highly negative	Negative impact	Null impact	Positive impact	Highly positive

What is the influence needed to help the company not have a competitive advantage?	Highly negative	Negative impact	Null impact	Positive impact	Highly positive
What is the influence needed to help the company gain competitive advantage?	Highly negative	Negative impact	Null impact	Positive impact	Highly positive
Do other companies have the same resource?	All of them	The majority	Half of them	Some	None
It generates an increase in profitability as a consequence. Gives a competitive advantage to the company. Rare or scarce resources tend to have a higher value.	Highly negative	Negative impact	Null impact	Positive impact	Highly positive
What is the quality level of this resource?	Far below the sector average	Below the sector average	At the sector average	At the level of the best	Unquestioned leadership

Table 15: Resource / variable evaluation model.

Source: Adapted: Santos, Gohr and Cruz (2011), based on Mills et al. (2002).

Table 15 was presented so that the committee could better understand how to evaluate each indicator, even though it is usual to use the lowest value for the lowest score and the highest value for the high score, the presentation of the first column was ideal to understand what should be taken into account on each critical variable.

Below is the tabulation of the fourteen variables which the respondents were instructed to score, according to Table 15 and justify their choices. However, the score could only be attributed to the seven most important variables for the company, according to the base model by Hoss (2003, 2008, 2015, 2017, 2018).

1 - Human Quadrant	
Indicators (choose 7)	
H1	Accessibility to the information system
H2	Senior management or corporate governance
H3	Alignment of business strategy
H4	Organizational and Individual Systemic Learning
H5	Autonomy and flexibility of human resources
H6	Training and investments in human resources
H7	Work Conditions
H8	Professional Performance
H9	Copyright
H10	Competitive Intelligence, formulation and application of strategies
H11	Policy of professional incentives
H12	Waste reduction and rework policy
H13	Structured knowledge production: manuals, processes
H14	Employee satisfaction

Table 16 – Ferroeste Human Quadrant.
Source: Author himself (2021).

After obtaining the results of Ferroeste's expert committee, referring to the human quadrant, in Table 16, the results are presented:

Critical variables - Human Quadrant	
H1	Accessibility to the information system
H2	Senior management or corporate governance
H3	Alignment of business strategy
H5	Autonomy and flexibility of human resources
H7	Work Conditions
H10	Competitive Intelligence, formulation and application of strategies
H14	Employee satisfaction

Table 17 – Critical Variables - Ferroeste Human Quadrant.
Source: Author himself (2021).

It is observed that the intangible factors that were most relevant by the respondents were: H1, H2, H3, H5, H7, H10 and H14. These seven variables will serve as a basis for the Human Quadrant in the questionnaires related to subchapter 5.5 – Calculation of Intangible Coefficient (CIC).

In our second quadrant, in the Process Quadrant, the same trick was followed with the selection of the seven most important variables out of the fourteen presented below:

2 - Processes Quadrant	
	Indicators (choose 7)
P1	Control structure and flow
P2	Research and development
P3	Communication process
P4	Computerization process
P5	Product/service innovation process
P6	Quality process
P7	Cost reduction process
P8	Operational process
P9	Upper management processes
P10	Performance evaluation processes
P11	Operational processes
P12	Processes via the internet
P13	After sales service
P14	Information Systems - Technology Acquisition

Table 18 – Ferroeste Processes Quadrant.
Source: Author himself (2021).

The results obtained are shown in Table 19:

Critical variables - Processes Quadrant	
P1	Control structure and flow
P5	Product/service innovation process
P6	Quality process
P7	Cost reduction process
P9	Upper management processes
P11	Operational processes
P12	Processes via the internet

Table 19 – Critical Variables - Ferroeste Processes Quadrant.
Source: Author himself (2021).

Answered by the expert committee, it was identified that the variables with the most important intangible factors are: P1, P5, P6, P7, P9, P11 and P12.

In the next quadrant, you can see the questions proposed by the Hoss Model (2003, 2008, 2015, 2017, 2018), related to the Structural Quadrant:

3 - Structural Quadrant	
	Indicators (choose 7)
E1	Equipments
E2	Physical space
E3	Production structure
E4	Lighting, ventilation and cleaning
E5	Innovations and structure research

E6	Administrative facilities
E7	Sanitary facilities - adequacy and cleanliness
E8	Maintenance and conservation of physical facilities
E9	Maintenance and conservation of equipment
E10	Work stations
E11	Structural projects
E12	Audiovisual and multimedia resources
E13	Communication network (internet)
E14	Information technology applied to the company

Table 20 – Ferroeste Structural Quadrant.
Source: Author himself (2021).

Ferroeste's expert committee indicated that the critical variables in this quadrant are:

Critical Variables - Structural Quadrant	
E1	Equipments
E2	Physical space
E3	Production structure
E8	Maintenance and conservation of physical facilities
E9	Maintenance and conservation of equipment
E10	Work stations
E11	Structural projects

Table 21 – Critical Variables - Ferroeste Structural Quadrant.
Source: Author himself (2021).

Shown in Table 21, the respondents evaluated the quadrant questions with greater difficulties, since they identified the essential quadrant in more than seven categories. The following variables were arrived at: equipment (E1), physical space (E2), production structure (E3), maintenance and conservation of physical facilities (E8), maintenance and conservation of equipment (E9), work stations (E10) and structural projects (E11).

In our last quadrant, the same path as the previous quadrants was followed and the relational quadrant was presented to respondents:

4 - Relational Quadrant	
R1	Customer Acquisition/Maintenance
R2	Product certification
R3	Organizational development
R4	Rights
R5	Competitive intelligence
R6	Licenses
R7	Trademarks/Patents
R8	Institutional mission
R9	Relationship networks
R10	Environmental and social policies
R11	Product quality awards
R12	Regulatory environment and legal restrictions
R13	Organizational vision and objectives
R14	Services associated with products and after-sales

Table 22 – Ferroeste Relational Quadrant.
Source: Author himself (2021).

Finally, the expert committee of the company under study decided that the critical variables in this quadrant are:

Critical Variables - Relational Quadrant

R1	Customer Acquisition/Maintenance
R4	Rights
R5	Competitive intelligence
R8	Institutional mission
R9	Relationship networks
R12	Regulatory environment and legal restrictions
R13	Organizational vision and objectives

Table 23 – Critical Variables - Ferroeste Relational Quadrant.
Source: Author himself (2021).

In the table above, the relationship with external agents that the company has can be observed, evidenced in the Relational Quadrant. Thus, the committee identified items R1, R4, R5, R8, R89, R12 and R13 as the greatest aggregators of intangible value.

5.3 CALCULATION OF AVERAGE ADJUSTED INTANGIBLE INCOME.

Next, the Hoss model for the valuation of Intangible Assets was continued. According to the formula previously presented: $VAI = (RIA_{me} + AVI_{me}) \times (1 + ACI)$. The table below shows the dependent variable and the independent variables, applying the proposed systematization. Figure 06 represents the global aspect of the next elements that will be exposed:

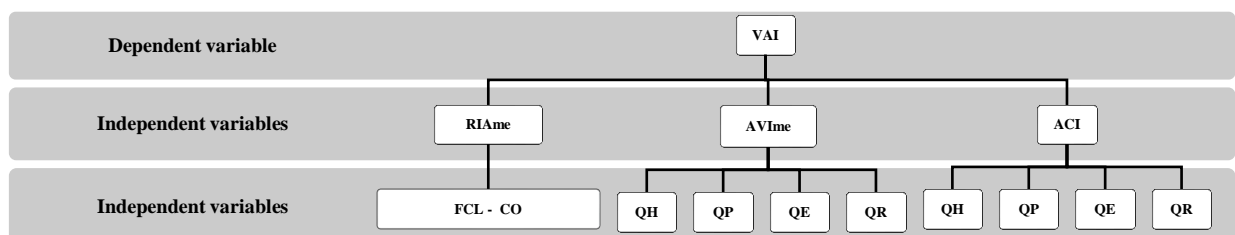


Figure 06: Statistical Association of Systematics.
Source: Hoss (2018).

Where: HQ = Human Quadrant; PQ = Processes Quadrant; SQ = Structural Quadrant; RQ = Relational Quadrant.

The first component of the independent variable is shown below in Table 01:

AIR - Adjusted Intangible Result								
	1	2	3	4	5	6	7	
Periods	2017	2018	2019	2020	2021	2022	2023	Subtotal
(=) EBITDA	-13,349.13	-13,346.22	-6.247,54	-3.793,82	4.298.461,74	4.618.310,28	4.985.050,30	13.865.085,61
(-) Investments	5.702,02	-7.045,31	-6.435,25	-5.167,32	8.275,17	8.890,93	9.596,96	13.817,19
(=) FCL	(19.051,16)	(6.300,91)	187.71	1.373,50	4.290.186,57	4.609.419,35	4.975.453,34	13.851.268,42
Annual rate	6,75%	6,50%	4,50%	2,00%	6,94%	6,94%	6,94%	
I	1	2	3	4	5	6	7	
Periods	2017	2018	2019	2020	2021	2022	2023	Subtotal
(+) FCL	-19,051.16	-6.300,91	187.71	1.373,50	4.290.186,57	4.609.419,35	4.975.453,34	13.851.268,42
(-) Cost	18.987,15	17.913,91	12.338,3	5.406,42	19.323,08	19.902,78	19.902,78	113,774.47
(=) RIA	(38.038,30)	(24.214,82)	(12.150,64)	(4.032,9)	4.270.863,48	4.589.516,57	4.955.550,57	13.737.493,95
Average								1.962.499,14
Standard deviation								2.480.046,90
RIA -s								(517.547,77)
RIAme								1.962.499,14
RIA +s								4.442.546,04

Table 01: Adjusted Intangible Result – Ferroeste.
Source: Author himself (2021).

The Adjusted Intangible Result (AIR) was obtained from the data and information in the financial statements. Using the three previous periods and four future periods, these obtained through percentages of the projection for the year of 2021 - demonstrated by the company's administrative projection.

To find the value of Free Cash Flow (FCF), the following formula is used: $FCF = EBITDA - (-) Investments$. And, to finally arrive at the AIR value, the FCF value is calculated, subtracting the Opportunity Cost (OC). Damodaran (2004) emphasizes that FCF should consider all holders of rights, such as shareholders and financiers, and represents the cash

originated from their operations after investments – FCF is considered the factor that represents aggregate wealth.

The EBITDA, *Earnings Before Interest, Taxes, Depreciation and Amortization* or Earnings before interest and taxes on income, depreciation, amortization and depletion is composed of the total Gross Revenue, less commercial, general and administrative expenses; and added to the total book value of entries arising from other net operating income and expenses.

Subsequently, the “Investments” account is subtracted, which is the sum of the Fixed Assets and Intangible Assets accounts for the period minus the same accounts for the previous year. This is to demonstrate the investment value in that specific period.

Finally, the Opportunity Cost was reached through the ledger account: Equity multiplied by the annual rate. The proposal represents the opportunity cost of the company being evaluated for the proposed period -3 to +3, also identified by $i=1$ to $i=7$. In our research, the year of 2017 was used as the first period and the last period for the year of 2023.

With the values, a descriptive statistical analysis of the AIR was performed, relating the seven periods. That said, the mean and standard deviation values were arrived at. As shown, the AIRme (Average Adjusted Intangible Result) was 1,962,499.14.

The Average Adjusted Intangible Result (AIRme), as a quantitative variable, from the financial point of view, adopted the accounting cost of profit as a basis to arrive at the intangible value. However, given the legal accounting requirements, there was a need for adjustments to define its real value (Hoss, 2018). With the statistical analysis, the standard deviation of the evaluated periods was revealed: 2,480,046.90; the minimum value (517,547.77) and the maximum value RIA+s 4,442,546.04.

5.4 DETERMINATION OF AVERAGE INTANGIBLE VALUE

For the Intangible Value Determination (IVD), the variables referenced by Kaydos, W. (2017), Butler et. al. (2000), Edvinsson and Malone (1998), Kaplan and Norton (1997), Lev (2017), Hoss (2003), Hoss (2010), Sousa, Rojo and Hoss, (2012), Hoss (2015), as well as there were complements of the brainstorming and Delphi technique.

An interview was carried out with Ferroeste's committee of experts to arrive at the values of the quadrants in the investigation of the qualitative variable.

As for the quantitative assessment, in the Calculation of the Average Intangible Value (AIV_{me}) an investigation was carried out of all accounting accounts related to investments or to be invested, regardless of being treated as Intangible Assets by accounting. That is, costs or expenses that, in some way, were identified as investments, are accepted because the generated values are identified in the other variables of the systematic proposed by the Hoss Model.

The period of the previous three years, the current year and the investment plans for the three subsequent years were also taken into account. To calculate the AIV_{me} of the human, processes, structural and relational quadrants, the formula below was adopted:

$$AIV = AIV_h + AIV_p + AIV_e + AIV_r$$

$$AVI_{me} = \frac{\sum_{i=1}^7 AVI_i}{7}$$

Using as a premise the perspectives, focuses and variables of the Table 23 below:

Quadrants	Perspectives		Focus		Variables	
	Internal	External	Past-present	Present-future	Qualitative	Quantitative
Human	X			X	X	X
Processes	X		X		X	X
Structural	X		X		X	X
Relational		X		X	X	X

Table 23 – Ferroeste Quadrants Variables.
Source: Author himself (2021).

5.4.1 Determination of intangible value - human quadrant

The Committee of experts, after interviews and meetings, together with the researcher, identified the values below:

DIV - Determination of Intangible Value

Human Quadrant	1	2	3	4	5	6	7
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Periods	2017	2018	2019	2020	2021	2022	2023	Subtotal
Human Resources	1.010.372	974,638	984,539	1.619.288	1.731.683	1.860.537	2.008.283	10.189.340
Trainings / Courses / Specialization	4.380	9.024	2.100	2.100	2.246	2.246	2.424	24.520
Vocational courses / recycling	40.000	45.000	50.000	55.000	58.818	58.818	63.488	371,123
Additional Service Time	198,997	231,041	259,292	316,458	338,424	338,424	365,298	2.047.934
Food stamp	1.032.774	1.025.617	1.280.619	1.810.734	1.936.417	1.936.417	2.090.187	11.112.765
Attendance Award	8.304	8.011	8.092	13.309	14.233	14.233	15.363	81.546
Life insurance	25.602	34.076	27.010	24.983	26.717	26.717	28.839	193,945
Health insurance	1.066.930	1.339.617	1.584.663	1.711.971	1.830.799	1.830.799	1.976.183	11.340.961
(=) DVI (h)	3.387.361	3.667.023	4.196.315	5.553.844	5.939.336	6.068.190	6.550.065	35.362.134

Table 24 – Determination of Intangible Value – Human Quadrant Ferroeste.

Source: Author himself (2021).

In the Human Quadrant, the researcher focused on finding particularly value-adding investments. The item “Human Resources” is related to the salary of employees who have remuneration above the market. That is, they are identified as key parts of the company and considered investments in intellectual capital. Other highlights are the variables related to the market differential, with which the company is concerned with providing a better quality of life for its employees. These are the examples of the Additional Service Time, Food stamps, Attendance Award and Life insurance.

Other interesting variables are courses and training, which are investments in human capital that the entity offers to employees, with a view to improving work and professional skills.

Last but not least, since it is the item with the highest value, the Health Insurance. Ferroeste invests in health so that its employees can have peace of mind in a possible problem, as well as their dependents who are also covered by the private health insurance.

5.4.2 Determination of intangible value - processes quadrant

Following the same premise as in the quadrants of this chapter, the committee of experts identified the variables of the Processes Quadrant below. These are related to the procedures that Ferroeste presents and the identification of items that add value to the entity's intangibles:

Processes Quadrant	1	2	3	4	5	6	7	
Periods	2017	2018	2019	2020	2021	2022	2023	Subtotal

Information Technology	92.103	92.795	100,407	108,476	116,006	124,638	134,535	768,959
Legal Advice	707,681	0	115,078	687,525	735,246	789,956	852,686	3.888.172
Professional Services Individuals (PSIs)	77.732	0	0	352,509	376,976	405,027	437,190	1.649.434
Audit	22.600	15.750	16.550	16.550	17.699	19.016	20.526	128,690
Board of Directors (CEO, AFD and PD)	920,306	894,025	1.054.031	1.077.655	1.152.455	1.238.209	1.336.536	7.673.217
(=) AIV (p)	1.820.422	1.002.570	1.286.065	2.242.715	2.398.382	2.576.846	2.781.473	14.108.473

Table 25 – Determination of Intangible Value – Ferroeste Processes Quadrant.

Source: Author himself (2021).

The researcher was able to identify five variables in this quadrant. Firstly, it was attributed to Information Technology, which concentrates all the investments made in the resources that encompass the security of the company's information and also any resources that prove the development of the sector.

In Legal Advice and Services of self-employed professionals, they belong to the application of resources in the legislative area. Because it is a highly active department by the entity, since it has old and future processes that will serve as a basis for upcoming and important decisions. Subsequently, the external audit comes for the same justification, since in a possible privatization, it is essential that its accountability is updated.

In conclusion to this quadrant, the variable Board of Directors provides the investment in the administrative body of the highest hierarchical level of the company, divided between the decision makers of Ferroeste who concentrate the CEO, the administrative and financial director and the production director.

5.4.3 Determination of intangible value - structural quadrant

The Structural Quadrant will present the financial accounts that offer or will offer to Ferroeste investments that can generate wealth. The expert committee, guided by the researcher, indicated four variables:

Structural Quadrant	1	2	3	4	5	6	7	
Periods	2017	2018	2019	2020	2021	2022	2023	Subtotal

Ancillary Transport Costs	146,476	261,764	228,765	218,850	234,041	251,456	271,424	1.612.776
Information Security	42.990	26.523	22.543	20.956	22.411	24.078	25.990	185,492
Costs with maintenance parts on Locomotives and Wagons	1.157.559	737,080	0	363,519	388,751	417,678	450,846	2.357.873
Maintenance services with the Workshop: Wagons and Locomotives	757,179	1.069.567	1.609.064	146,100	156,240	167,866	181,196	3.330.033
(=) AIV (e)	2.104.204	2.094.934	1.860.372	749,425	801,443	861,078	929,456	9.400.912

Table 26 – Determination of Intangible Value – Ferroeste Structural Quadrant.
Source: Author himself (2021).

The Ancillary Transport Costs comprise the accounts related to the railway operation, such as equipment, yard maintenance, facilities integrated into the railway structure, as well as parts that provide improvements to wagons and locomotives belonging to the organization's fixed assets. Investments in supplies and secondary equipment for railway logistics activities, such as radios, devices intended for security, signaling and computer equipment, are listed under Information Security – in the case of information between the locomotive and the railway station. Over the years listed, it was possible to identify the costs invested so that the operation could be maintained with a reliable structure and efficient services. This generation of value is identified in the last two variables: Cost of maintenance parts in locomotives and wagons and Maintenance services with the railway workshop.

5.4.4 Determination of intangible value - relational quadrant

In the fourth and last quadrant, the values of the Relational Quadrant that presented the highest value of richness in relation to the other quadrants are displayed.

Relational Quadrant	1	2	3	4	5	6	7	
Periods	2017	2018	2019	2020	2021	2022	2023	Subtotal

Generated Business	17.440.122	20.523.032	31.343.519	20.848.217	22.295.292	23.954.285	25.856.494	162.260.962
Other Business	1.404.179	0.00	0.00	8.000.000	8.555.280	9.191.878	9.921.805	37.073.143
Development	1.404.179	1.076.572	1.267.196	1.394.739	1.491.548	1.602.534	1.729.792	9.966.561
Investments	2.673.397	0.00	0.00	500,000	534,705	574,492	620,113	4.902.707
(=)AIV(r)	22.921.876	21.599.605	32.610.715	30.742.957	32.876.825	35.323.190	38.128.204	214.203.372

Table 27 – Determination of Intangible Value – Ferroeste Relational Quadrant.
Source: Author himself (2021).

The Generated Business variable is directly related to Ferroeste's mission when it mentions “reducing the logistical costs of the flow of production, serving customers and facilitating the development of the West region through the offer of rail transport”. It is understood, therefore, that all revenues from rail logistics activities are characterized as wealth generation as intangible.

In the following variable, two investments were identified in different years: 2017 and 2020, context in which a legal agreement was made with the company Rumo Logística. The company had to pay a lawsuit and it was agreed that the amounts would be reversed in investments such as: increasing the efficiency and safety of the logistics service provided to customers; 150 kilometers from an alignment lift; 150 km of *placer* - leveling and alignment of the line; ballast adjuster; provision of wooden sleepers for stations and exchange services; hardware; fixing clip; concrete sleeper exchanges; machine hour supply of excavator and bucket truck (cleaning / rubble); barrier fall detector; locomotive on-board computer (LBC); remote locomotive central system; among other useful parts for railroad.

The next variable is named “Development”. These are the amounts directed to the accounts of the railway terminal condominium in the city of Cascavel. The condominium is divided between Ferroeste and the other thirteen private companies that use the terminal. Part of the amounts are terminal expenses and part are applied as investments and necessary improvements. As the entire area belongs to Ferroeste, this generation of value is concentrated there.

Finally, the Investment variable closes the Relational Quadrant. The item specifies the investments that the Government of the State of Paraná made in 2017 and 2020. In this first year, the Government acquired four hundred wagons to help the company increase its revenues.

The greater number of wagons represented a greater volume of transported goods and the generation of wealth is easily linked to the quadrant.

5.5 DIC - DETERMINATION OF THE INTANGIBLE COEFFICIENT

With the identification of critical variables related to the company's intangibles, it was possible to prepare the specific questionnaire and reach the stage of analysis of the average adjusted intangible result. This next item in the equation is connected to the qualitative perspective of adding value to the company. This will be the last component that will compose the VIA equation.

First, the specialists (CEO, production director, administrative and financial director, human resources manager and commercial manager) scored which variables would be selected for research. Those critical variables framed as the most relevant in view of Ferroeste's reality. For each quadrant, a list of variables was presented, based on the Hoss (2018) model, where only the first seven variables with the highest scores were selected for each quadrant and, thus, formulating a questionnaire that was later applied to the *players*.

Table 28 below was used to score the questionnaire:

Number of points	Answer
7 (seven)	Excelent
6 (six)	Great
5 (five)	Really good
4 (four)	Good
3.5 (three and a half)	Average (the expected)
3 (three)	Regular
2 (two)	Weak
1 (one)	Insufficient
0 (zero)	Nonexistent

Table 28 - Likert Scale for the Evaluation of Qualitative Variables.

Source: Adapted from Likert (2015)

Individually, in each variable, it is necessary to calculate the average. From its result, 3.5 is subtracted, which will be the standard average, and finally, it is multiplied by the factor 0.071429. In the four quadrants, all these results were summed. This final data will be translated as:

- a) average greater than 3.5: variable that adds value to the company;

b) average lower than 3.5: variable that destroys wealth for the organization. (Hoss, 2018).

In Figure 07 below, it is possible to visualize where the values that generate wealth for the institution will be introduced. The factor 0.071429 was determined through the systematization of the four quadrants. Identified from a total of 100%, it is understood that each quadrant has 25%, dividing by 7 (maximum score linked to a variable) it gives 3.571429, subtracting the average (3.5), we have 0.071429. Therefore, the aggregation of value happens when the result of a variable is above the average value.

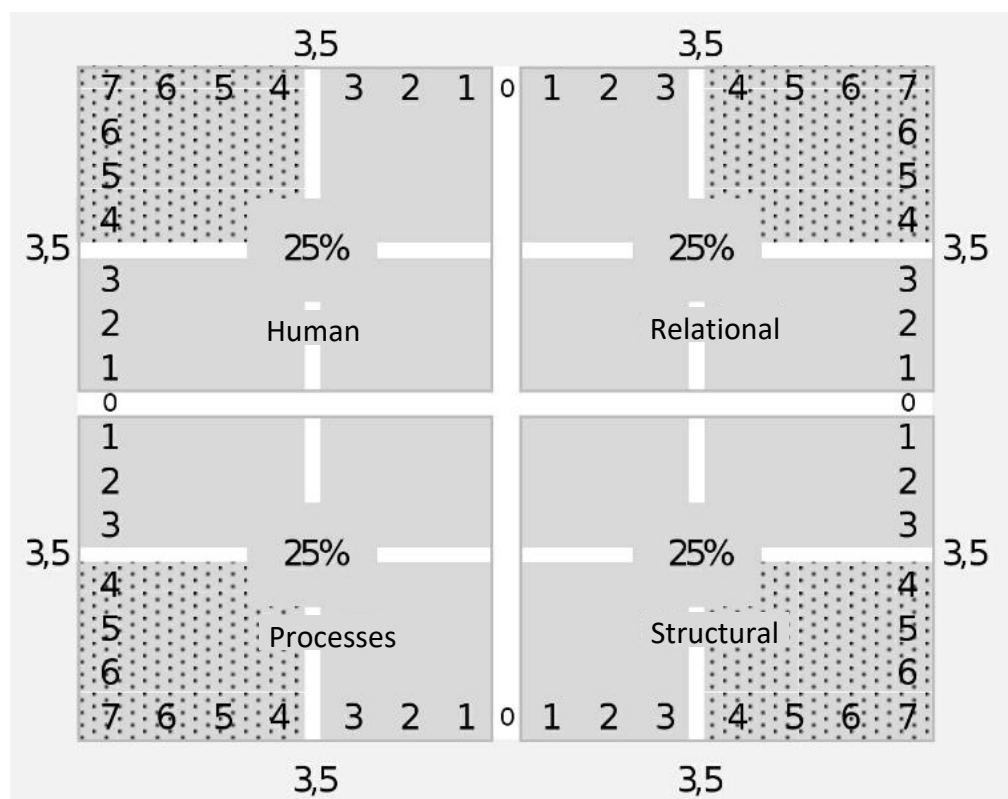


Figure 07 - Quadrant Scale.
Source: Hoss (2018).

The questionnaire was prepared by the authors using the *Google* forms creation platform and made available for internal and external *players* so they could answer anonymously.

There was no direct contact between the authors and the company's employees, only an email was sent to the company's corporate account, to which everyone could have access, providing some basic explanations about completing the questionnaire and the intention of the research. The questionnaire was answered within a period of three weeks and obtained a response level of 70%, being answered by 31 *players*. These are divided between customers, suppliers and employees of Ferroeste. They are directly or indirectly linked.

5.5.1 DIC - determination of the intangible coefficient - human quadrant

The company's critical variables were identified by the committee of experts, being judiciously substantiated by the committee for a precise identification of the organization's wealth aggregation.

Human quadrant	Assessments					Average	DIC
	1	2	...	30	31	(a)	
Accessibility to the information system	4	2	6	6	6	5.0484	0.110600
Senior management or corporate governance	3	3	6	6	6	4.9839	0.105991
Alignment of business strategy	4	2	5	6	5	4.5000	0.071429
Autonomy and flexibility of human resources	3	3	6	7	5	5.1935	0.120968
Work Conditions	4	2	5	6	5	4.8226	0.094471
Competitive Intelligence, formulation and application of strategies	3	2	6	7	6	4.5161	0.072581
Employee satisfaction	3	4	5	6	6	4.3871	0.063364
							0.639405

Table 29 – Ferroeste Human Quadrant Coefficient.
Source: Author himself (2021).

It is identified that, in the Human Quadrant, the highlight is on the variables of Accessibility to the information system and Autonomy and flexibility of Human Resources. The first is related to the service via the website, while the second is directed to the Human Resources sector of the organization and the measures applied in the department.

It should be noted that one of the variables, even being identified as essential to the company, is destroying value. Once the item “Employee satisfaction” was below average.

5.5.2 DIC - determination of the intangible coefficient - processes quadrant

Using the same premise as the questionnaire, the *players* assigned scores from 0 to 7 to the critical variables below:

Processes Quadrant	Assessments	Average	DIC
--------------------	-------------	---------	-----

	1	2	...	30	31	(a)	
Control structure and flow	3	3	5	7	6	4.2833	0.055952717
Product/service innovation process	2	2	5	6	6	4.1833	0.048809817
Quality process	4	3	5	6	5	4.3333	0.059524167
Cost reduction process	1	3	5	6	5	4.3667	0.061905133
Operational process	3	3	5	6	6	4.5667	0.076190933
Processes via the internet	4	3	4	6	5	4.6667	0.083333833
Processes to Higher Administration	3	3	5	6	7	4.9333	0.102381567
DIC (p)							0.488098

Table 30 – Ferroeste Processes Quadrant Coefficient.
Source: Author himself (2021).

Note that, in this quadrant, there are four variables that are destroying the company's value. The low grades are linked to the history of the company that has innovated little and still maintains bureaucratic procedures inherited from public management.

On the other hand, the last three items were positive, since operational procedures are more agile, processes via the internet work and the processes of the Higher Administration have been recognized in the face of decisions and positive changes in recent years.

5.5.3 DIC - determination of the intangible coefficient - structural quadrant

The following Quadrant will demonstrate the variables linked to the essential elements for the structure of Ferroeste. It is directly connected to the image that the organization sends before its tangible image.

Structural Quadrant	Assessments					Average	DIC
	1	2	...	30	31	(a)	
Equipments	2	3	4	5	5	3.9500	0.032143
Physical space	5	3	4	6	7	5.2667	0.126191
Production structure	4	2	4	6	7	4.7167	0.086905
Maintenance and conservation of physical facilities	3	1	4	6	6	4.1167	0.044048
Maintenance and conservation of equipment	3	2	4	5	5	4.0667	0.040476

Work stations	3	2	4	5	5	4.4333	0.066667
Structural projects	4	2	4	6	6	4.0500	0.039286
							0.435717

Table 31 – Ferroeste Structural Quadrant Coefficient.
Source: Author himself (2021).

The quadrant was not well evaluated, it presented results below the average in five variables: Equipment, Maintenance and conservation of physical facilities, Maintenance and conservation of equipment, Work stations and Structural projects. Ferroeste has had the same equipment and structure for years. Thus, it was evident that the research brought to light the reality of the organization. Only the Physical Space and the Productive Structure obtained data above the average. The terminal areas are large, well located and provide benefits to users. The productive structure is connected to the performance that the company provides in generating wealth through it.

5.5.4 DIC - Determination of intangible coefficient - relational quadrant

Finally, the Relational Quadrant will detail the resources that the company provides to generate wealth in its relationship with the *players*.

Quadrante Relacional	Avaliações					Média	ACI
	1	2	...	30	31	(a)	(d = c x d)
Aquisição/Manutenção de Clientes	2	2	4	6	6	4,3000	0,057143
Direitos	4	2	5	6	6	4,7667	0,090477
Inteligência Competitiva	2	2	4	6	5	4,3500	0,060715
Missão Institucional	2	3	5	6	6	4,7833	0,091667
Redes de relacionamento	4	2	6	6	7	4,7000	0,085715
Ambiente regulatório e restrições legais	4	3	4	6	6	4,7167	0,086905
Visão e objetivos organizacionais	4	2	4	7	6	4,7000	0,085715
							0,558337

Table 32 – Ferroeste Relational Quadrant Coefficient.
Source: Author himself (2021).

Regarding Customer Acquisition/Maintenance, it was understood that the company has had the same customers for years, and it was below average. The Competitive Intelligence variable was also lower, as it does not include market competitiveness. Starting with the variables that presented data above the average, we can highlight the institutional mission with a value of 2.2833.

5.5.5 Determination of intangible coefficients (DIC)

Each quadrant presented a validator total with the sum of the individual scores for each variable. It was thus related to the value given by the *players* in relation to Ferroeste under the added value generated. At its core, such qualitative research is intangible in nature. The values are attributed by a series of results from the *players* that have ties to the company. This qualitative foundation strategy allows managers to analyze the railroad's opportunities and threats. It is also possible to identify its strengths and weaknesses, which contribute to the company's evolution, decision-making and a critical look at weaknesses (Hoss, 2018).

DIC - Determination of the Intangible Coefficient	
	Coefficient
DIC (h) - human quadrant	0.639405
DIC (p) - processes quadrant	0.488098
DIC (e) - structural quadrant	0.435717
DIC (r) - relational quadrant	0.558337
DIC (h + p + e + r)	2.121557
1 + DIC	3.121557

Table 33 – Determination of the Intangible Coefficient - Ferroeste.
Source: Author himself (2021).

6 ANALYSIS AND INTERPRETATION OF THE RESULTS

Even though accounting presents real and useful information in its statements, it is evident that there are flaws, such as cases that do not measure intangible values, since these could

present future results to the company. Thus, there is a need to expand the study of its financial statements and indices, in addition to quantitative information, in order to complement the data provided by traditional accounting (Hoss *et al*, 2018).

As can be seen in Table 02 below, the Value of Intangible Assets was calculated based on the systematic proposal of VIA. The formula used to arrive at the value that Ferroeste's Intangible Assets represent is given by: $VIA = (AIR + VIA) * (1 + DIC)$.

VIA - Value of Intangible Assets					
	AIR	DIC	Subtotal	1 + DIC	VIA (/1000)
VIA -s	-517.547,76	31.682,75	-485.865,01	3.12	-1.516.655,08
VIA	1.962.499,14	39.010,70	2.001.509,84	3.12	6.247.826,06
VIA +s	4.442.546,04	46.338,64	4.488.884,69	3.12	14.012.307,21

Table 02 – Value of Intangible Assets - Ferroeste.
Source: Author himself (2021).

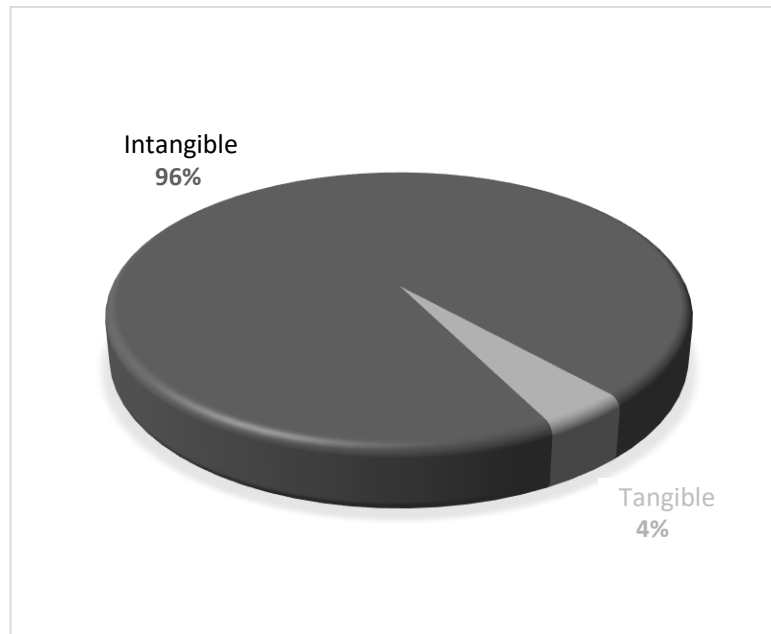
Finally, the total value of Ferroeste's intangibles is R\$ 6,247,826,063.00.

In addition, a comparison of Ferroeste's tangible assets was carried out to identify, in percentage, the value that each one of them represents. The value of tangible assets was observed through the financial statements, duly recorded in accordance with the new accounting standards of deed adopted by Brazil. Table 02 shows the total tangible value of Ferroeste of R\$ 275,839.09. After reviewing all the procedures performed, the actual amount worth the Ferroeste company was presented: R\$ 6,523,665.15.

	VIA	Tangibles	Ferroeste Value	Relation
Ferroeste Value -s	-1.516.655,08	275,839.09	-1.240.816,00	
Ferroeste Value	6.247.826,06	275,839.09	6.523.665,15	
Ferroeste Value +s	14.012.307,21	275,839.09	14.288.146,30	
Percentage	96%	4%	100%	22.65

Table 03 – List of Tangibles and Intangibles - Ferroeste.
Source: Author himself (2021).

Table 03 and Graph 01 present the ratio in percentage terms of how much intangible assets and tangible assets represent for the company of the case study. While intangibles account for 96% of the total value, intangibles have only 4%. The relationship between them is that intangibles are 22 times higher than tangibles.



Graph 01 – Intangibles versus Tangibles ratio- Ferroeste.
Source: Author himself (2021).

Graph 01 reveals an important ratio that intangibles have in the organization and in the generation of wealth arising from them. This added value information, together with the projected expectation for future potential, will have a direct impact on the decision-making process of the company's management. The data corroborate the theory of Hoss (2018), Caluimbi (2019), Lev (2017), Indicibus (2004) and Kaplan and Norton (2000) from the moment they show the amount of non-tangible information capable of generating financial returns.

The opportunity generated through the research highlights the alternatives and, mainly, the indicators with the greatest potential for return to the entity. Demonstrated by the people and groups involved, whether internal or external. In order to confirm the relevance of the State Railways of Paraná, Table 03 is presented to compare it with other railway companies operating in the country. The survey was carried out at Bovespa (2021), in November 2021, with the companies MRS Logística SA and Rumo SA. The first railroad has a net worth of R\$4,946,429.00 and has a market value of R\$6,261,278.00, representing 78.80% of its value.

Subsequently, Rumo SA has a total equity of R\$15,431,526.00 and its market value is R\$1,216,056,103.00, which represents 78.80% of its value. Ferroeste's net equity totals

R\$278,430,606.03, and its market value was valued at R\$6,523,665,151.41, representing 23.43% of its value in relation to its Net Equity. The information is useful for a possible initial public offering and future investors.

Intangible Assets versus Net Equity Ratio

	NET WORTH	Market value / calculated value	Relation
MRS Logística S.A.	4.946.429,00	235.376.122,08	47.59
Rumo S.A.	15.431.526,00	1.216.056.103,00	78.80
Ferroeste	278.430.606,03	6.523.665.151,41	23.43
	4%	96%	

Table 03 – Ratio of Intangible Assets versus Net Worth - Ferroeste.
Source: Author himself (2021).

The percentage data that Ferroeste presents in relation to net worth x market value contribute to the strategic management of the administration and possible open market actions, as they provide the return on investments of realized profits and future profits.

7 FINAL CONSIDERATIONS

As presented in the problem of the study, the evaluation of the company object of study was proposed with a focus on its intangible assets and on the generation of wealth that these intangibles could provide. It was possible to show that, in the measurement process of Ferroeste's *Valuation*, Intangible Assets are key pieces in the evaluation of this criterion, being presented as practical utility: a) investment opportunity at market value; and b) impact on managerial, financial and investment decisions. The Hoss model permeated the research into applied scientific knowledge, along with the research tools used to find the discovered data. The Adjusted Intangible Result (AIR), complemented by the Determination of Intangible Coefficient (DIC) that based the creation of value considering the past, present and future temporal levels, analyzing internal and external factors, allowed to demonstrate concrete research by evidencing the Value of Intangible Assets (VIA) of Ferroeste.

The generation of wealth through its intangible assets, such as the qualitative quantification of the value-aggregating variables presented in the DIC, are important from a managerial point of view, being interpreted as essential values to their reality. The decision-making of managers, shareholders and the Government of the State of Paraná needs to carry out a global analysis of the company for the next decision-making regarding the railroad. Assertive decisions will contribute to the future of the company that could be privatized. In addition to the care taken to maintain its tangible assets, it was possible to identify the total intangible value it has.

For business companies to provide positive performance, it is essential that they are aware of their resources, skills, investments, as well as the generation of wealth. The issue related to intangible assets comes to the surface when the value of the company can be negotiated, however, the knowledge of the global value of a company can be much better explored with studies, in this way, in order to arrive at valuable managerial decisions. Even being a state-owned company, Ferroeste depends on itself to continue operating. Therefore, its relational quadrant must be given due attention, since the relationship with its customers and partners is an essential part of achieving positive financial results.

The relational quadrant scored high precisely because it is the essential basis of the company's institutional mission: to provide affordable freight to the region. The researches that has the Ferroeste entity as its object of study needs to pay attention to the reason for its creation and existence, which is linked to providing benefits and economy to the region and the State;

offer direct or indirect jobs and socioeconomic development. Therefore, these factors are consistent with the literature on value creation through intangible assets.

Another finding was the importance of verifying the classification of intangible assets according to their nature, identifying them as cost or investment, which implies dumping them as an expense for the period or capitalizing them in the company's equity. Furthermore, the quantitative variables represent the institution's effort in terms of wealth applied to maximize the business, while the qualitative variables show the institution's effort to achieve its objectives, mission, efficiency and effectiveness. It is important to emphasize that the intangible assets were analyzed through the dynamics established between the four quadrants taken based on the Hoss model. The interrelation of the human, relational, structural and procedural quadrants permeates the assessment of the intangibility of the assets by the qualitative performance criterion and the measurement of the coefficients destined to the global value of the studied entity. The work achieved its objectives, in addition to proving the company's real value, well above book value. According to the research analysis, Ferroeste presented a market value much higher than the book value due to the generation of value from its intangibles.

Given the global market scenario, the processes of mergers or acquisitions of companies are increasingly essential, as well as their periodic reviews of their evaluation. In parallel to this scenario and the possible changes in the Paraná railroad, the work proves to be current and essential with the survey of market value information, providing more data to decision makers and reducing the possibility of losses. The vastness of the topic related to intangible assets, as well as the amount of research related to the subject, allows us to affirm its importance in the business and academic environment. It is worth noting the historical construction of the subject and the amount of studies worldwide, research and studies intensify the contribution in the scientific field, in the face of the business context by the numerous theories and interpretations of the propositions of valuation models of intangible assets.

The limitations throughout the research were related to difficulties in interviewing all the *players* belonging to the relational quadrant. Since there is no direct contact with them. Also, the limitation of decision-making interference at the management level will be restricted to Ferroeste's board, which still depends on decisions jointly with the Government of the State of Paraná.

In future works, carried out with the company Ferroeste, it is recommended to deepen the evaluation of intangible assets and research with an emphasis on Due Diligence, which seeks to investigate the risks of a transaction, purchase or sale of an organization.

It is suggested a research related only to the human quadrant, directed to the intangibles applicable to individuals, focused on their professional competitiveness or even other works with depth to the other quadrants - relational, structures and processes. Each with its specificity.

Another interesting research on Ferroeste would be the deepening of the relational quadrant, including a questionnaire with the population that indirectly uses the organization analyzed in the case study, and the macroeconomic region that can have significant benefits with the exposure of a large state-owned company. Or even delve into the issues addressed to those interested in purchasing the company, performing an analysis of the return on investment in a possible acquisition of the organization, need for improvements and payback – return on the amount invested after the acquisition of a certain project.

The practical and theoretical professional learning throughout the work was immeasurable, the experience obtained through the organization of data, studies, research, exchange of information and professional experiences in the interviews, and mainly, the relevant findings to be shared here make the dissertation a study relevant to the current moment of Ferroeste. The same research objectives can be applied to future works, using analysis models different from the Hoss model. All can contribute to complementing the results.

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APPENDIX A- RESEARCH QUESTIONNAIRE APPLIED

Vínculo com a FERROESTE *

Colaborador(a)/Diretoria

Cliente

Fornecedor(a).

Este questionário avaliativo é destinado aos clientes, fornecedores ou colaboradores que possuem alguma relação com a entidade Estrada de Ferro Paraná Oeste (FERROESTE).

As informações serão utilizadas APENAS para fins acadêmicos, assim como será mantido o sigilo de quem responde este questionário.

Todas as perguntas deste questionário estão relacionadas ao SEU entendimento que a Ferroeste possui em cada questão.

Desde já agradeço sua disponibilidade para contribuir com esta pesquisa tão importante para a conclusão do trabalho.

- q.1 **Quadrante HUMANO**
Grau de entendimento 1 até 7 (sendo "1" como valor mais baixo e "7" como valor mais alto)
- q1.1 **Acessibilidade ao sistema de informação: ***
- q1.2 **Administração superior ou governança corporativa: ***
- q1.3 **Alinhamento da estratégia empresarial: ***
- q1.4 **Autonomia e flexibilidade dos recursos humanos: ***
- q1.5 **Condições de Trabalho:**
- q1.6 **Inteligência Competitiva, formulação e aplicação de estratégias:**
- q1.7 **Satisfação dos funcionários:**
- q2 **Quadrante PROCESSOS**
- q2.1 **Estrutura e fluxo do controle:**
- q2.2 **Processo de inovação de produtos/serviços**
- q2.3 **Processo de qualidade:**
- q2.4 **Processo de redução de custos:**
- q2.5 **Processo Operacional:**
- q2.6 **Processos via internet:**
- q2.7 **Processos a Administração Superior:**
- q3 **Quadrante ESTRUTURAL**
- q3.1 **Equipamentos**
- q3.2 **Espaço físico**
- q3.3 **Estrutura Produtiva**
- q3.4 **Manutenção e conservação das instalações físicas:**
- q3.5 **Manutenção e conservação dos equipamentos:**
- q3.6 **Postos de trabalho:**
- q3.7 **Projetos estruturais:**
- q4 **Quadrante RELACIONAL**
- q4.1 **Aquisição/Manutenção de Clientes**
- q4.2 **Direitos adquiridos e Contratos**
- q4.3 **Inteligência competitiva:**
- q4.4 **Missão Institucional:**
- q4.5 **Redes de relacionamento**
- q4.6 **Ambiente regulatório e restrições legais:**
- q4.7 **Visão e objetivos organizacionais**

APPENDIX B - FERROESTE BOARD OF DIRECTORS MEETING RECORDS - RESEARCHER

Curitiba, Paraná. November 4, 2020 at 11:00 am.

Participants:

Ferroeste: Fabio Vieira (Administrative and Financial Director); and

Unioeste: João Lucas Marques Coelho (researcher).

Student João Lucas Marques Coelho, student of the Graduate Program in Administration (PPGA) - Professional Master's Degree held in the city of Cascavel, Paraná, at the State University of West Paraná (UNIOESTE), bearer of CPF: 053.662.129-28, called a meeting on the date and time above with Mr. Fábio Aquino Cesario Vieira, CPF: 962.556.689-91 director of the company Ferroeste.

A meeting was scheduled in the unit's meeting room, address Avenida Iguaçu, 420, seventh floor, where the study that would be carried out was presented. Even before this meeting, a face-to-face conversation was held with the company's CEO, Mr. ANDRE LUIS GONÇALVES, CPF: 014.715.659-98. Project, theme and objectives were presented. At the same meeting, an interview was carried out in order to find possible indicators related to Intangible Assets.

Meeting ended at 12:05.

ANNEX A - FERROESTE BALANCE SHEET 2017 AND 2018



ESTRADA DE FERRO PARANÁ OESTE S.A.

CNPJ nº. 80.544.042/0001-22
Curitiba - PR
BALANÇO PATRIMONIAL
(valores expressos em Reais - R\$)



	2018	2017
ATIVO		
CIRCULANTE	4.838.706,62	5.667.080,71
Caixa e equivalentes de caixa	108.263,03	857.969,48
Clientes e operações a receber	375.736,13	616.344,65
Impostos a recuperar	195.245,61	186.376,56
Estoques	3.648.139,04	3.785.481,61
Outros direitos realizáveis	506.643,50	215.951,62
Despesas antecipadas	4.679,31	4.956,79
NÃO CIRCULANTE	289.601.459,80	296.102.451,62
REALIZÁVEL A LONGO PRAZO	2.159.798,81	1.742.225,65
Depósitos judiciais	1.853.081,81	1.735.508,65
Bloqueios judiciais	287,31	287,31
Aluguéis, arrendamentos e subconcessões	43.458.342,94	43.458.342,94
(-) Provisão para perdas	(43.458.342,94)	(43.458.342,94)
Outros direitos realizáveis	306.429,69	6.429,69
IMOBILIZADO	287.441.660,99	294.360.225,97
Terrenos, edificações e benfeitorias	9.364.820,95	9.493.845,91
Equipamentos e instalações de escritório	773.050,29	772.302,74
Veículos	77.636,45	77.636,45
Equipamentos de processamento de dados	462.759,11	454.867,07
Benfeitorias em material rodante	1.464.000,00	1.464.000,00
Outras immobilizações	4.362.388,02	4.158.373,06
Leito de linha, obras e superestrutura	344.831.667,46	344.831.667,46
Material rodante - locomotivas e vagões	7.076.035,37	7.076.035,37
Depreciação acumulada	(80.970.696,66)	(73.968.502,09)
TOTAL DO ATIVO	294.440.166,42	301.769.532,33
(As notas explicativas integram o conjunto das demonstrações financeiras)		
PASSIVO	2018	2017
CIRCULANTE	13.122.963,89	14.179.733,32
Fornecedores	2.428.122,35	3.711.259,07
Obrigações fiscais	1.462.517,69	1.521.422,53
Obrigações trabalhistas e previdenciárias	3.056.487,89	3.077.342,53
Outras obrigações	5.562.532,28	5.294.528,76
Férias a pagar	613.303,68	575.180,43
NÃO CIRCULANTE	5.718.560,49	6.298.732,67
Fornecedores	931.647,73	837.518,97
Depósitos judiciais	980.858,11	980.858,11
Obrigações fiscais	1.120.985,82	1.333.411,67
Obrigações trabalhistas e previdenciárias	2.685.068,83	3.146.943,92
PATRIMÔNIO LÍQUIDO	275.598.642,04	281.291.066,34
CAPITAL REALIZADO	406.813.156,67	406.813.156,67
Autorizado	451.000.000,00	451.000.000,00
A emitir	(44.186.843,33)	(44.186.843,33)
ADIANTAMENTO PARA FUTURO AUMENTO DE CAPITAL	32.111.225,54	24.111.225,54
PREJUÍZOS ACUMULADOS	(163.325.740,17)	(149.633.315,87)
TOTAL DO PASSIVO	294.440.166,42	301.769.532,33

ANNEX B - FERROESTE INCOME STATEMENT YEAR 2017 AND 2018



ESTRADA DE FERRO PARANÁ OESTE S.A.

CNPJ nº. 80.544.042/0001-22

Curitiba - PR



DEMONSTRAÇÃO DO RESULTADO DO EXERCÍCIO

(valores expressos em Reais - R\$)

	01/jan./18 a 31/dez./18	01/jan./17 a 31/dez./17
RECEITA OPERACIONAL LIQUIDA	<u>18.671.011,64</u>	<u>15.962.334,63</u>
CUSTOS DOS SERVIÇOS PRESTADOS	<u>(30.042.712,40)</u>	<u>(25.977.827,29)</u>
PREJUÍZO BRUTO	<u>(11.371.700,76)</u>	<u>(10.015.492,66)</u>
DESPESAS/RECEITAS OPERACIONAIS	<u>(1.974.519,19)</u>	<u>(3.333.640,97)</u>
Despesas comerciais, gerais e administrativas	(3.166.051,67)	(4.435.459,32)
Outras receitas e despesas operacionais líquidas	1.191.532,48	1.101.818,35
PREJUÍZO OPERACIONAL	<u>(13.346.219,95)</u>	<u>(13.349.133,63)</u>
DESPESAS/RECEITAS FINANCEIRAS	<u>(346.204,35)</u>	<u>(432.319,42)</u>
Receitas financeiras	114.025,53	157.308,04
Despesas financeiras	(460.229,88)	(589.627,46)
PREJUÍZO DO EXERCÍCIO	<u>(13.692.424,30)</u>	<u>(13.781.453,05)</u>
Por lote de mil ações do capital social final	(0,20)	(0,20)

ANNEX C - FERROESTE CASH FLOW 2017 AND 2018



ESTRADA DE FERRO PARANÁ OESTE S.A.

CNPJ n.º. 80.544.042/0001-22

Curitiba - PR



DEMONSTRAÇÃO DOS FLUXOS DE CAIXA

(valores expressos em Reais - R\$)

	01/jan./18 a 31/dez./18	01/jan./17 a 31/dez./17
FLUXOS DE CAIXA DAS ATIVIDADES OPERACIONAIS		
Prejuízo do exercício	(13.692.424,30)	(13.781.453,05)
Ajustes por:		
Depreciação e amortização	7.002.194,57	6.458.789,03
Ajuste de exercícios anteriores	-	(2.144.310,00)
Provisão com créditos de liquidação duvidosa	-	500.294,46
Diminuição/Aumento dos Ativos Operacionais	(338.905,52)	(2.335.750,07)
Contas a receber de clientes	240.608,52	(96.511,01)
Outros direitos realizáveis	(590.691,88)	238.126,13
Estoques	137.342,57	(2.389.659,42)
Despesas antecipadas	277,48	(472,53)
Depósitos judiciais	(117.573,16)	(58.181,96)
Bloqueios judiciais	-	(25,33)
Tributos a recuperar	(8.869,05)	(29.025,95)
Diminuição/Aumento dos Passivos Operacionais	(1.636.941,61)	1.194.367,82
Fornecedores	(1.189.007,96)	640.983,10
Salários e encargos sociais	(482.729,73)	(638.818,20)
Impostos, taxas e contribuições diversas	(271.330,69)	(289.211,89)
Férias a pagar	38.123,25	(1.318,19)
Outras obrigações	268.003,52	1.482.733,00
Caixa líquido aplicado nas atividades operacionais	(8.666.076,86)	(10.108.061,81)
FLUXOS DE CAIXA DAS ATIVIDADES DE INVESTIMENTOS		
Aumento (redução) nos ativos imobilizados e intangíveis	(83.629,59)	(756.766,50)
Baixa no diferido	-	4.550.331,29
Caixa líquido aplicado nas atividades de investimentos	(83.629,59)	3.793.564,79
FLUXOS DE CAIXA DAS ATIVIDADES DE FINANCIAMENTO		
Recebimento de adiantamento para futuro aumento de capital	8.000.000,00	7.097.823,00
Caixa líquido das atividades de financiamentos	8.000.000,00	7.097.823,00
AUMENTO/REDUÇÃO NO CAIXA E EQUIVALENTES	(749.706,45)	783.325,98
CAIXA E EQUIVALENTES NO INÍCIO DO EXERCÍCIO	857.969,48	74.643,50
CAIXA E EQUIVALENTES NO FINAL DO EXERCÍCIO	108.263,03	857.969,48

ANNEX D - FERROESTE BALANCE SHEET 2019 AND 2020



ESTRADA DE FERRO PARANÁ OESTE S.A.

CNPJ n°. 80.544.042/0001-22

Curitiba - PR


BALANÇO PATRIMONIAL
(valores expressos em Reais - R\$)

ATIVO	2020	2019
CIRCULANTE	8.737.812,94	7.565.942,27
Caixa e equivalentes de caixa	542.383,61	1.803.326,15
Clientes e operações a receber	346.041,58	704.704,75
Impostos a recuperar	1.792.657,93	229.264,77
Estoques	2.970.932,19	3.741.492,53
Outros direitos realizáveis	3.082.538,91	1.043.263,83
Despesas antecipadas	3.258,72	43.890,24
NÃO CIRCULANTE	278.666.618,75	283.816.013,83
REALIZÁVEL A LONGO PRAZO	2.827.530,36	2.809.604,86
Depósitos judiciais	2.362.336,34	2.348.936,34
Bloqueios judiciais	458.764,33	454.238,83
Aluguéis, arrendamentos e subconcessões	43.458.342,94	43.458.342,94
(-) Provisão para perdas	(43.458.342,94)	(43.458.342,94)
Outros direitos realizáveis	6.429,69	6.429,69
IMOBILIZADO	275.839.088,39	281.006.408,97
Terrenos	5.130.445,70	5.130.445,70
Aparelhos e Equip.de Telecomunicações	478.955,30	478.955,30
Infraestrutura	215.469.421,80	215.469.421,80
Superestrutura	130.264.496,29	130.264.496,29
Material rodante - locomotivas e vagões	7.076.035,37	7.076.035,37
Maquinas e Equipamentos	1.011.514,81	1.005.520,66
Instalações, Edifícios e Dependencias	7.081.540,29	7.051.290,99
Veículos	77.636,45	77.636,45
Móveis e Utensílios	266.038,12	265.098,12
Equipamentos Eletrônicos de Dados	625.468,73	469.327,73
Benfeitorias em Material Rodante	1.481.562,82	1.464.000,00
Benfeitorias em Instalações, Edifícios e Dependencias	78.408,46	78.408,46
Depreciação acumulada	(93.202.435,75)	(87.824.227,90)
TOTAL DO ATIVO	287.404.431,69	291.381.956,10


ESTRADA DE FERRO PARANA OESTE S

 CNPJ nº. 80.544.042/0001-22
 Curitiba - PR

BALANÇO PATRIMONIAL
(valores expressos em Reais - R\$)

PASSIVO	2020	2019
CIRCULANTE	12.869.625,03	12.386.431,45
Fornecedores	1.284.676,08	2.125.512,07
Obrigações fiscais	1.378.780,92	1.220.848,82
Obrigações trabalhistas e previdenciárias	3.184.886,38	3.226.074,98
Outras obrigações	6.183.875,79	5.077.240,79
Férias a pagar	837.405,86	736.754,79
NÃO CIRCULANTE	4.213.829,93	4.809.889,25
Fornecedores	182.069,49	400.552,65
Obrigações trabalhistas e previdenciárias	2.141.756,35	2.413.412,59
Obrigações fiscais	909.145,98	1.015.065,90
Depósitos judiciais	980.858,11	980.858,11
PATRIMÔNIO LÍQUIDO	270.320.976,73	274.185.635,40
CAPITAL REALIZADO	406.813.156,67	406.813.156,67
Autorizado	451.000.000,00	451.000.000,00
A emitir	(44.186.843,33)	(44.186.843,33)
ADIANTAMENTO PARA FUTURO AUMENTO DE	37.111.225,54	37.111.225,54
PREJUÍZOS ACUMULADOS	(173.603.405,48)	(169.738.746,81)
TOTAL DO PASSIVO	287.404.431,69	291.381.956,10

ANNEX E - FERROESTE INCOME STATEMENT YEAR 2019 AND 2020



ESTRADA DE FERRO PARANÁ OESTE S.A.

CNPJ nº. 80.544.042/0001-22

Curitiba - PR



DEMONSTRAÇÃO DO RESULTADO DO EXERCÍCIO

(valores expressos em Reais - R\$)

	01/jan./20 a 31/dez./20	01/jan./19 a 31/dez./19
RECEITA OPERACIONAL LIQUIDA	<u>18.955.290,70</u>	<u>28.427.450,64</u>
CUSTOS DOS SERVIÇOS PRESTADOS	<u>(20.673.533,50)</u>	<u>(32.380.345,37)</u>
PREJUÍZO BRUTO	<u>(1.718.242,80)</u>	<u>(3.952.894,73)</u>
DESPESAS/RECEITAS OPERACIONAIS	<u>(2.075.573,07)</u>	<u>(2.294.644,43)</u>
Despesas comerciais, gerais e administrativas	(4.945.425,53)	(4.079.733,42)
Outras receitas e despesas operacionais líquidas	2.869.852,46	1.785.088,99
PREJUÍZO OPERACIONAL	<u>(3.793.815,87)</u>	<u>(6.247.539,16)</u>
DESPESAS/RECEITAS FINANCEIRAS	<u>(70.842,80)</u>	<u>(283.179,50)</u>
Receitas financeiras	157.901,43	77.227,75
Despesas financeiras	(228.744,23)	(360.407,25)
PREJUÍZO DO EXERCÍCIO	<u>(3.864.658,67)</u>	<u>(6.530.718,66)</u>
Por lote de mil ações do capital social final	(0,09)	(0,09)

ANNEX F - FERROESTE CASH FLOW 2019 AND 2020



ESTRADA DE FERRO PARANÁ OESTE S.A.

CNPJ nº. 80.544.042/0001-22

Curitiba - PR



DEMONSTRAÇÃO DOS FLUXOS DE CAIXA

(valores expressos em Reais - R\$)

	01/jan./20 a 31/dez./20	01/jan./19 a 31/dez./19
FLUXOS DE CAIXA DAS ATIVIDADES OPERACIONAIS		
Prejuízo do exercício	(3.864.679,67)	(6.530.718,66)
Ajustes por:		
Depreciação e amortização	5.378.207,85	6.853.531,24
Ajuste de exercícios anteriores	-	117.712,02
Provisão com créditos de liquidação duvidosa	-	-
Diminuição/Aumento dos Ativos Operacionais	(2.450.738,71)	(1.681.978,58)
Contas a receber de clientes	358.663,17	(328.968,62)
Outros direitos realizáveis	(2.039.275,08)	(236.620,33)
Estoques	770.560,34	(93.353,49)
Despesas antecipadas	40.631,52	(39.210,93)
Depósitos judiciais	(13.400,00)	(495.854,53)
Bloqueios judiciais	(4.525,50)	(453.951,52)
Tributos a recuperar	(1.563.393,16)	(34.019,16)
Diminuição/Aumento dos Passivos Operacionais	(112.865,74)	(1.645.203,68)
Fornecedores	(1.059.319,15)	(833.705,36)
Depósitos Judiciais	-	-
Salários e encargos sociais	(312.844,84)	(102.069,15)
Impostos, taxas e contribuições diversas	(105.919,92)	(347.588,79)
Férias a pagar	100.651,07	123.451,11
Outras obrigações	1.264.567,10	(485.291,49)
Caixa líquido aplicado nas atividades operacionais	- 1.050.076,27	- 2.886.657,66
FLUXOS DE CAIXA DAS ATIVIDADES DE INVESTIMENTOS		
Aumento (redução) nos ativos imobilizados e intangíveis	(210.887,27)	(418.279,22)
Baixa de Bens do ativo imobilizado	-	-
Baixa de bens do ativo imobilizado	-	-
Baixa no diferido	-	-
Caixa líquido aplicado nas atividades de investimentos	(210.887,27)	(418.279,22)
FLUXOS DE CAIXA DAS ATIVIDADES DE FINANCIAMENTO		
Integralização de capital	-	-
Recebimento de adiantamento para futuro aumento de capital	-	5.000.000,00
Integralização de capital	-	-
Caixa líquido das atividades de financiamentos	-	5.000.000,00
AUMENTO/REDUÇÃO NO CAIXA E EQUIVALENTES	(1.260.942,54)	1.695.063,12
CAIXA E EQUIVALENTES NO INÍCIO DO EXERCÍCIO	1.803.326,15	108.263,03
CAIXA E EQUIVALENTES NO FINAL DO EXERCÍCIO	542.383,61	1.803.326,15