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**The Application of the Balanced Scorecard in the Operators of Freights Railroad
Transportation**

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Abstract

The Brazilian freights railroad transportation, in the last five years, is achieving a significant growth. Currently, the railroad transport operators uses performance evaluation measures, related to financial and operational aspects, being that in some cases, it doesn't exist a relation of cause and effect between them. According to the Brazilian research, almost 85% of the railroad transport companies use the guidelines management model, originally from total quality management. In this cenary, the work's proposal is presenting a performance management model, based in the Balanced Scorecard, through of the elaboration of a strategical map, typical from this type of organization. The model was constructed through of a case study and approaches four Balanced Scorecard's perspectives (financial, customers, processes and learning and growth), possessing a set of measures for each company's strategical objective, considering as well the stakeholders' satisfaction involved in this environment.

Keywords: Railroad Transport, Balanced Scorecard, Performance Management

Introduction

In a productive system of goods and services the measurement of performance is an instrument of basic management for the taking of decisions and for the establishment of new actions, also serving as an aid for new strategical plans.

According to Lebas [14], performance is defined as the potential for future success in the implementation of actions required to achieve the targets and objectives.

But such performance management tool cannot only acting in a unilateral way, that is, verifying only financial results, or only operational results, nowadays,

management model such as Balanced Scorecard - BSC, is considered harmonization and integration among several organizational perspectives, where there is a relation of cause and effect one with others.

For Eccles [9], to stop of considering the financial indices as the basis for the performance measurement and treat them as just one among a broader range of indicators is a necessity faced with the new competitive environment.

For Drucker [6], in the aspect of the performance is important the strategic scope, in that, it goes beyond internal limits of the company and must leaving the simple vision of costs center and approaching issues of technologies of other companies, changes in the economy, markets, customers and targets and financial world.

Neely, Gregory and Platts [16], defines the measurement of performance as being "the process of quantification of the action, where measurement is the process of quantification and the action is what leads to the performance".

For Neely, Gregory and Platts [16] a system of measurement of performance must contain individual measures, however interrelated among themselves pertaining to certain environment.

According to the authors, when carrying through a project of a system of measuring performances, the following interrogations must be questioned:

Which measurements of performance are used?

Why are they being used?

How much will they cost?

What benefits can they offer?

For Lebas [14], the performance measurement and the performance management are not separated. According to author there is an interactive process between these two issues.

Bititci, Carrie e Mcdevitt [2] understands that the performance measurement system is the information system that is at the heart of the performance management process.

Note, therefore, that is necessary, in the performance measurement, an approach beyond the financial focus. The qualitative factors of process and the stakeholders' satisfaction in the organization, like customers, employees and others are included in the news models of performance management, being linked to issues such as market, news technologies and economy, with necessarily, a connection with the strategic scope of the modern organizations.

The performance measurement must be part of the control process involving the strategic, tactical and operational levels, assessing through of a continual way the planning and the actions implemented under others views beyond the financial.

In regard to the system of performance measurement, Martins [15] believes that this is at the centre of the performance management process, integrating all informations of the relevant systems like development and review of strategy, management account, management by objectives, non-financial performance measures, bonuses incentive structure and individual assessments of performance.

For this author, the news systems of performance measurement must have the follow characteristics:

- In common with the competitive strategy;
- Contemplating financial and non-financial measures;

- Toward and support the continual improvement;
- Identify trends and progress;
- Be clear in the cause-and-effect relationships;
- Be intelligible to the employees;
- Have the scope of the all supply chain processes;
- Informations on time; and
- Evaluate the group and not the individual as well as to influence the employees' attitude.

For Corrêa and Corrêa [5], the systems of performance measurement are part of the planning and control cycle, essential for the operation management, being that, the performance measures are suppliers of the means for the collecting of data about the performance that, having assessed by certain standards supports the decision-making process.

Therefore, the systems of performance measurement offer, through a set of informations, a support to the process of performance management, which has a broader approach. In developing of a system of performance measurement must know the adoption of the measures, in terms of cost to obtain them, the reasons and utilization, being that it must be linked between them, forming part of the control and planning cycle of the organization.

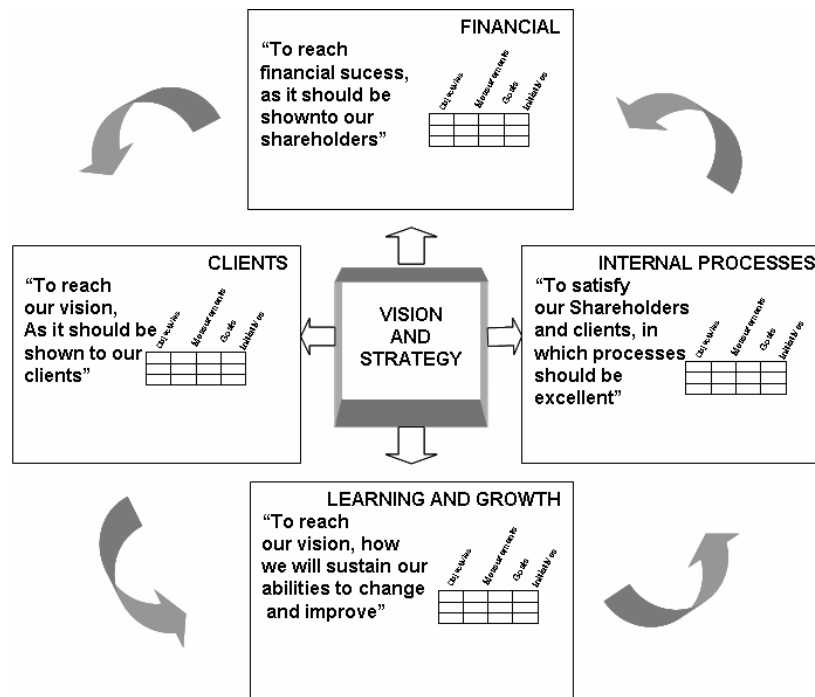
The Balanced Scorecard

The Balanced Scorecard was developed in 1990 from a work group from Nolan Norton Institute, which assisted the KPMG in research and development of new models of management. The objective of the group was to create a model of measuring

performance in organizations of the future, since the existing models until then were already considered obsolete. The leader of the study was David Norton, CEO from the Nolan Norton Institute at that time, being assisted by Robert Kaplan, acting as academic consultant. During the year of 1990, representatives of twelve companies from the sectors of manufacturing, services, heavy industry and high technology were brought together to develop the new model of performance evaluation.

The BSC in Brazil has been very promoted by articles published in Congresses and papers, coming from scientific research. According to Ruy and Martins [18] the Balanced Scorecard has been outstanding but in a disproportionate way through the published scientific articles universe. These authors state it comes from a huge defusion from Balanced Scorecard in many different companies of Brazil and worldwide economy. According to Kaplan and Norton [12], the organizations are contesting in complex environments where the understanding of their goals and methods to reach them, are vital aspects for their own survival. The authors say many service organizations, mainly transports, communications, economy and utilities exist over decades in a non competitive environment. However, the age of information has requested new potencialities for the competitive success.

For Kaplan and Norton [12], "the Balanced Scorecard measures the operational performance through 4 perspectives: financial, business-oriented internal processes, external processes and learning and growth " as shown in Figure 1.



Source: Kaplan and Norton [12]

Figure 1 - The Balanced Scorecard as a structure to transmit a strategy in operational terms

Niven [17] defines Balanced Scorecard as a careful set of measurements derived from the strategy of the organization. According to the authors, the Balanced Scorecard represents a tool which the leaders can use when communicating with employees and external interested parties the results and the direction of performance through where the organization will reach its strategical mission and its objectives.

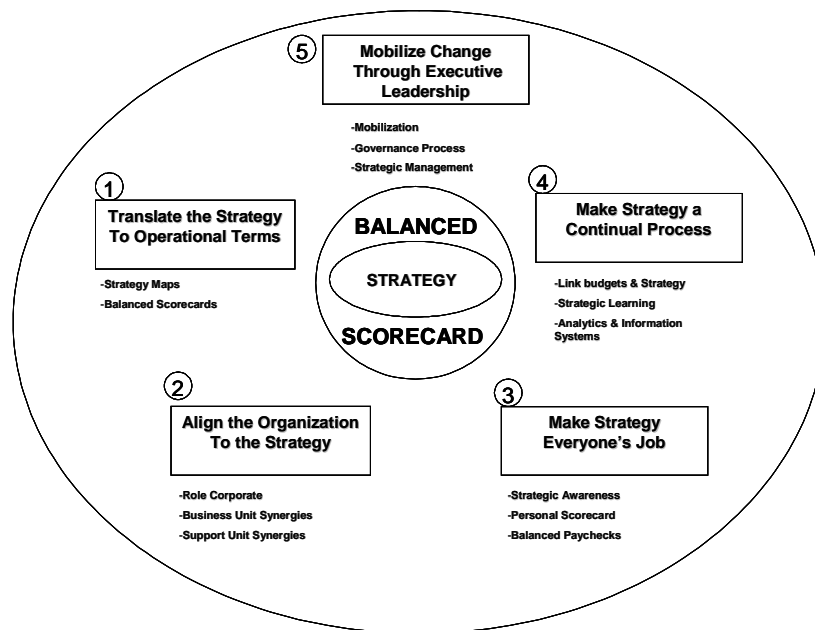
For Niven [17], the BSC is a model that includes three functions:

- System of Measures;
- System of strategic management; and
- Tool of Communication.

For Frost [10], the BSC is a good example of system of performance measurement model that shows a vision of news perspectives, beyond of financial.

For Kaplan and Norton [12], the objectives and measures of performance for the Balanced Scorecard are more than a collection of financial and non-financial measurements of performance. They are derived from of a top-down process application of the united business' mission and strategy.

According to Kaplan and Norton [13], although each organization can achieving the alignment and strategical focus in many ways, in many places and in many sequences, each ossibly use a common set of five principles as presented in Figure 2.



Source: Adapted of Kaplan and Norton [13]

Figure 2 – The Principles of the Strategy-focused Organization

In the first principle, the strategy must be transmitted following a logic architect of a strategic map and a group of balanced indicators, looking for specifying the details, the critical elements for strategies growth. This happens to create a common and understandable reference point through all the units in the business organization, also all their employees.

For Kaplan and Norton [13] organizations are complex, building many times their numerous departments, business unities, specializes departments, having their own knowledge and culture.

For these authors, the functional divisions come and become the biggest obstacles for the implementation of the strategy that many organizations have great difficulties to communicate and coordenate these divisions. For the organizational development be more than the total amount of sum parts, individual strategies must be joined and integrated. By this idea it is presented the second principle of the organization focused on strategy.

The third principle contemplates the realization of the strategy for a daily work of all in between the organization. For Kaplan and Norton [13] the principle requires that all employees understand the strategy and lead on a daily basis into the business to add for the implementation of its success. For these authors, the executives can begin this process using the BSC to communicate and educate the organization about the strategy to be implemented.

The forth principle, for Kaplan and Norton [13], the strategy must be accomplished by a continuum process, they say, many organizations, build their management process through budgets and operational plans. According to them, the organizations introduce by BSC a double continuum process to manage the strategy.

The process integrates the management tactics with management strategies, using three important process which are the strategy link to the budget process, the strategy review process, the learning and the strategy adaptation.

For Kaplan and Norton [13], the four first principles focus on BSC as tool, structure and process to support them. For these authors, the strategy implementation

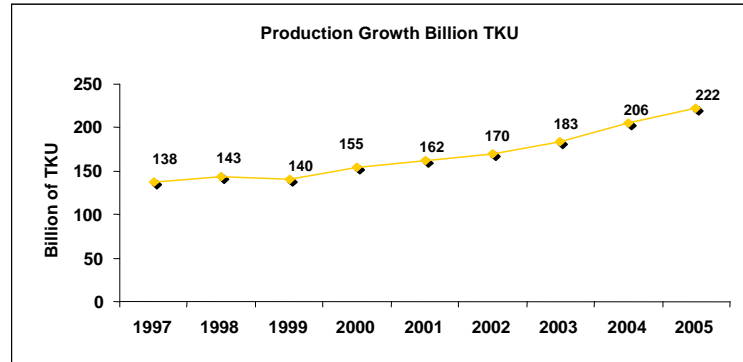
requires changes for each part of the organization. Moreover, it also requires a team to coordinate these changes. For them the Balanced Scorecard program begins on the mobilization and the creation of a moment for the process to be released. Right after, the focus turns to be on the government to implement a new development model. Finally and gradually, a new management system evolves into a system of strategic management which institutionalizes a new culture, values and processes into a new system to manage it.

Then the BSC, in addition to a performance measurement system, is also an instrument of strategic management, aiding in the clarifying and transmission of vision, communication and establishment of goals, planning and definition of the objectives and strategic feedback and learning.

The Brazilian Railroad Transportation

According to the *Earth Transportation National Agency* [8], the Brazilian railroad system has 29,706 Km, focusing in the south, southeast and northeast, also taking part of the central west and north of the country. Currently in concessions are 28.840 Km of the network. As the *Earth Transportation National Agency* [7], there are currently fifteen railroad transportation operators, being that the main are: *América Latina Logística S.A. (ALL Sul, Ferronorte, Ferrobán e Novoeste)*, *MRS Logística S.A.*, *Companhia Vale do Rio Doce S.A.*, *Companhia Ferroviária do Nordeste S.A.*, *Ferrovias Tereza Cristina S.A.* and *Ferropar S.A.* Recalling that the CVRD controls three railroad companies (*Estrada de Ferro Vitória Minas S.A.*, *Estrada de Ferro Carajás S.A.* and *Ferrovias Centro Atlântica S.A.*).

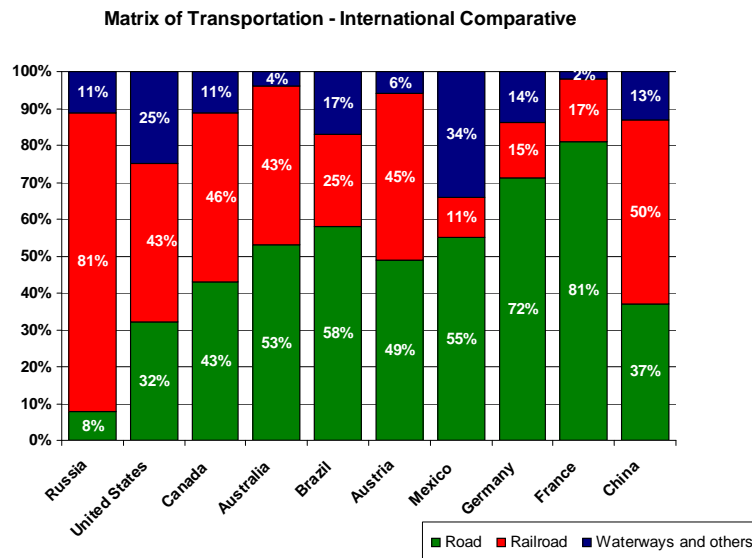
According to the Center of Studies in Logistic [4] from 1997 up to 2005 had a significant increase of 60.2 % in the load transport in Brazil, as shown in Figure 3.



Source: Center of Studies in Logistic [4]

Figure 3 – Production Growth of Railroad Transportation

For the Transportation Ministry [19], with basis of data relative to year 2005, as presented in Figure 4, in countries like China, EUA and Russia, which have large continental dimensions, such as Brazil, the share of railroad modal is between 40 and 80% within the matrix of these countries and in the Brazil the share is only 25%.



Source: Transportation Ministry [19]

Figure 4 – Transportation International Matrix

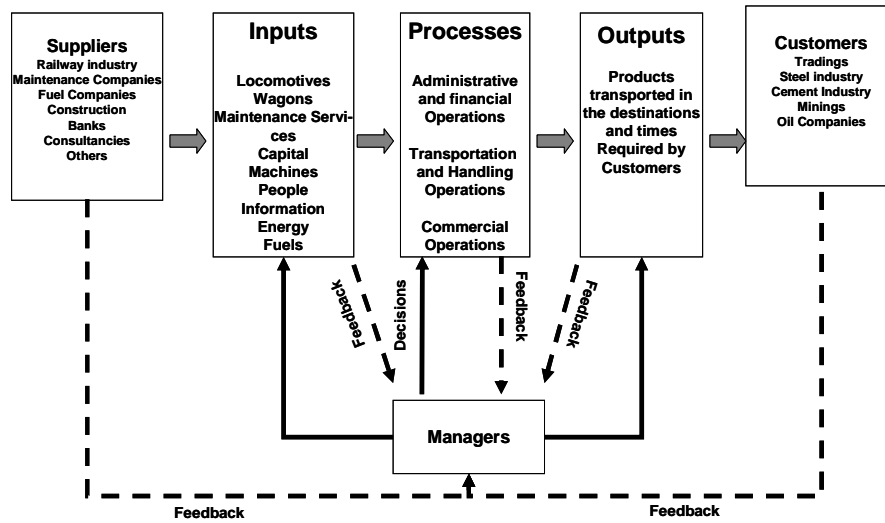
According to Association of American Railroads [1], the railways in the United States made a production in 2006 of 2,852.9 billions of tku (tonne useful x kilometer). This means a production twelve time higher than of the Brazil which was of 238 billions of tku. This shows that Brazil needs to grow in this kind of modal, for that its external competitiveness can increase, allowing the reduction of the overall logistic costs of domestic products.

The Case Study in the Operator of Freights Railroad Transportation

The elaboration for an operator of freights railroad transportation model, involved a case study, realizes inside a Brazilian freight railroad transport operator, with the aim to map typical structures and the environment where these organizations are inserted, allowing the creation of a basis for elaborating the strategic map model to be presented.

For Bryman and Bell [3], the case study implicates onto a detailed an intensive analysis of a simple case. A case study is involved into the complexity and the private nature of the case itself.

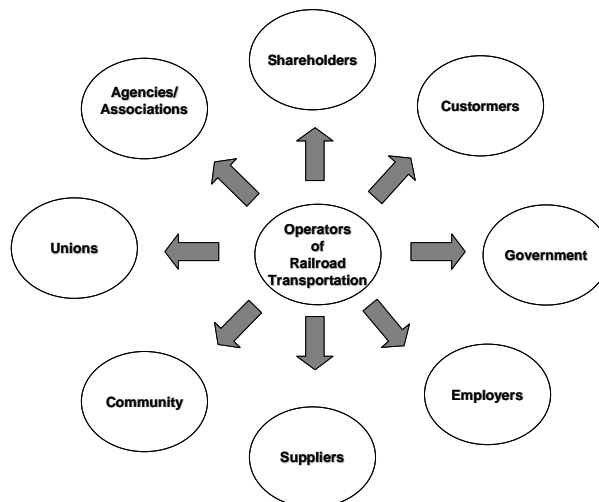
Gil [11] understands that the case study deals with a deep analysis of one or more objects which allows its knowledge whole and detailed. By the case study mean, it was possible mapping the typical structure of a freight railroad transport, considering its main processes which are related to these organizations management departments. However, the context of the management operations responsible for the freight railroad transports, the Figure 5 shows a 3 macro operations division, presenting the main processes references to them, inside a global transformation process scope, typical in these organizations.



Source: The Authors

Figure 5 – The operations of an operator of freights railroad transportation

Regarding the environment, which the operators of railroad transportation are present, the Figure 6 shows the stakeholders that can influence in the performance of these organizations.



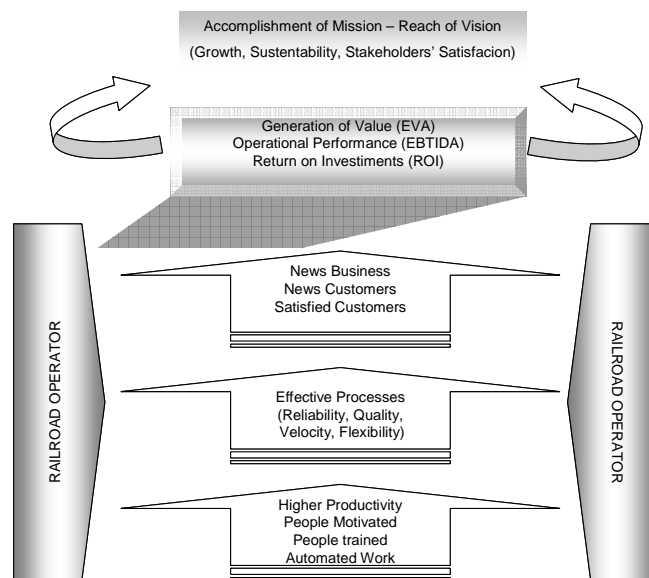
Source: The Authors

Figure 6 – The environment of operators of freights railroad operators

The Figure shows a complex environment in which the forces from of the *stakeholders* may interfere in the performance (positive or negative) of the operator.

From the case study conducted within an operator of freights railroad operator, knowing it is their typical structure, the environment and the common strategic objectives, it was possible to build up a strategic map, from which, built up the model of the BSC for these organizations. The strategic map searches the relationship of cause and effect between strategic objectives of an railroad transportation operator, considering the stakeholders in the environment of these organizations. For each strategic objective, present in the map, it was determined a set of key indicators, which seeks a balanced management in this business environment, considering all stakeholders that can to influence in the performance of these transportation operators.

The Figure 7 shows the logic of the strategic map for the operators of freights railroad operators, from which, it was created a set of indicators that formed the balanced scorecard for these organizations.



Source: The Authors

Figure 7 – Presentation of the strategic map for BSC model

The model present a bottom-up approach, which, from the perspective of learning and growth , maintains processes more effective, which guarantee the satisfaction and retention of customers, seeking up achieving the financial objectives of the organization.

The Balanced Scorecard's Indicators for the Operators of Freights Railroad Transportation

The model's indicators were built from strategic map, considering the four perspectives: learning and growth, processes, customers and financial, as follows in this text. In case of the processes perspective, in this paper will be presented only operational processes perspective, due to its greater relevancy for the performance of the operator of freights railroad transportation.

1) The Learning and Growth Perspective's Indicators

- Index of implementation in Information technology
- Index of implementation of training
- Index of retention in formation programs
- Index of employees' satisfaction
- Turn-over of employees
- Frequency tax (work accident)
- Index of occupational health
- Index of absenteeism

2) The Operational Processes Perspective's Indicators

- Locomotives productivity (tku/kgf)

- Wagons productivity (tku/kgf)
- Rail Productivity (tku/(km.km/h))
- Terminals utilization (%)
- Attendance flexibility to additional demand (%)
- Index of products mix increase (%)
- Locomotives availability (%)
- Wagons availability (%)
- Terminals availability (%)
- Rail availability (%)
- Timeline accomplishment of recovery rolling materials projects (%)
- Timeline accomplishment of construction and recovery of rail projects (%)
- Locomotives reliability (%)
- Transit-time of trains (h)
- Cycle time of wagons (h)
- Utilization of the traction capacity (%)
- Utilization of wagon capacity (%)
- Index of Accidents (accident/million train x km)
- Loading efficiency (%)
- Unloading efficiency (%)
- Permanence time wagons in terminals (h)
- Waiting time of trucks in transshipment (h)
- Production of transportation efficiency (%)
- Commercial average speed (km/h)

- Energy efficiency of transport (l/tkb)
- Accuracy of production monthly planning (%)

3) The Customer Perspective's Indicators

- Index of accomplishment of contracts (%)
- Index of customers' satisfaction (%)
- Index of retention of customers (%)
- Index of prospection of customers (%)
- Index of market share in current business (%)
- Index of entrance in news business (%)

4) The Financial Perspective's Indicators

- Profit per stock (\$)
- EBTIDA – Earnings before taxes, interests, depreciation and amortization (\$)
- ROI – Return on investment (%)
- EVA – Economic value added (\$)
- TSR – Total shareholder return (%)
- Index of reduction of costs (%)
- Flows profitability (\$/tku)

Conclusions and Recommendations

From a strategical map, which demonstrates the relations of cause-and-effect between the strategical objectives, pertaining to each one of the four perspectives (financial, processes, customers and learning and growth) and also considering the

aspect of the satisfaction of stakeholders in the environment, the model Balanced Scorecard was constructed consisting its set of indicators. From the analysis of the presented model, it is verified that:

- It has measures related to the critical processes of an operator of railroad transportation;
- It can be applied any operator, for having been constructed on a typical structure and too by through of the common strategical objectives of this type of organization; and
- Posses a relation of cause-and-effect between the strategical objectives, aiming a result in the financial perspective and searching up attending to all stakeholders in this environment.

Valley to inform that, to if applying the model to other organization, different this that it was object of the case study, some particularities must be considered, for a possible adjustment in the presented model, as for example:

- The structure of the management areas;
- The existence of a critical process that is important in the global performance, with faced the model of operation, influenced for factors as the existing restriction in some point in the network, some additional service to the one of railroad transport and some another existing particularity in the organization that is not contemplated in this model; and
- Some strategical objective important that it has not been contemplated in the research or that appears with the evolution of the time, needing to create indicators pertinent to this.

Important to highlight that the search of synergies with other models of new trends may be appropriate for the improvement and the adaptation of the model in the

attendance to possible changes of the environment in the sector of railroad transport in the next years.

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