

# Approval of Credit Lines for Legal Entities at Banco Do Brasil: An Application of the Multicriteriy Method of Decision Support

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## Research article

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# APPROVAL OF CREDIT LINES FOR LEGAL ENTITIES AT BANCO DO BRASIL: AN APPLICATION OF THE MULTICRITERY METHOD OF DECISION SUPPORT

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**Abstract:** The problem of the decision-making process in the granting of bank credit lines at Banco do Brasil is considered and a proposal for the application of the multicriteria method for its decision is listed. With this, the general objective of the research is the description of algorithm and multicriteria mapping in the offer and selection of credit lines for legal entities at Banco do Brasil. To consolidate these objectives, a methodology based on a literature review of bibliographic references is adopted, in the search for information in the bank's own portfolios in a universe suitable for clients in the modality of legal entity in the universe of Banco do Brasil. The singular production of the research is a proposal for a strategy for selecting credit lines as well as offering recommendations for dealing with the topic and the like.

**Keywords:** Credit lines. Multicriteria methodology. Banco do Brasil.

## APROVAÇÃO DE LINHAS DE CRÉDITO PARA PESSOA JURÍDICA NO BANCO DO BRASIL: UMA APLICAÇÃO DO MÉTODO MULTICRITÉRIO DE APOIO À DECISÃO

**Resumo:** Considera-se a problemática do processo decisório na concessão de linhas de crédito bancário no Banco do Brasil e elenca-se uma proposta de aplicação do método multicritério para a decisão do mesmo. Com isto o objetivo geral da pesquisa é a descrição de algoritmo e mapeamento multicritério na oferta e na seleção de linhas de crédito para pessoa jurídica no Banco do Brasil. Para consolidar estes objetivos adota-se uma metodologia lastreada em revisão de literatura das referências bibliográficas, nas pesquisas de informações nas carteiras do próprio banco em universo próprio para clientes na modalidade de pessoa jurídica no universo do Banco do Brasil. A produção singular da pesquisa é uma proposta de estratégia de seleção das linhas de crédito bem como a oferta de recomendações ao trato do tema e afins.

**Palavras-chave:** Linhas de crédito. Metodologia multicritério. Banco do Brasil.

## 1. INTRODUCTION

The Brazilian banking system has a strong identification with Banco do Brasil, as it was created to encourage credits and support the movement of an imperial Brazil, but in a frank commercial expansion and at present this scenario is no different because it is constituted in the form of mixed capital company and which has a direct participation of the Union itself in around 68.7% of the shares in addition to operating in more than eighteen thousand service stations that are currently distributed throughout Brazil and abroad between branches and various service stations with presence in more than twenty countries with more than one hundred thousand employees<sup>1,2</sup>.

The offer of credit lines is common and in the specific case of Banco do Brasil there is a diversified offer of credit lines that need to be adjusted to the criteria established by the bank so that the choice process is more appropriate and compatible with the demands of the bank. client (individual) is now defined by the Bank, although it is not yet automated and therefore deserves to be considered by management with possible mistakes<sup>3</sup>.

With this scenario in mind, the general objective of this research is the description of algorithm and multicriteria mapping in the offer and selection of credit lines for legal entities at Banco do Brasil and to consolidate this objective, a methodology that uses a review of literature, of historical and documentary nature<sup>4</sup> with a study of the multicriteria methodology of decision support as well as a case study with action research at "Banco do Brasil", thus substantiating a hybrid research focusing on a case study with real data with no exposure of data from the bank or those listed companies, however, the data provided are real and compatible with the current business scenario in Brazil<sup>4,5,6</sup>, it also deserves to consider that the descriptors are constructed through fundamental points of view, so that, the consideration of two-way correspondence for each credit line with a set of fundamental and specific points of view for each of the lines creating im a cardinal scale for each line and thus the deployment of alternative methods and thus following the philosophy and fundamental principles of the MCDA (Multicriteria Decision Support Methodology)<sup>7,8,9</sup>.

Formally, the multicriteria methods of decision support can be defined as an activity, or set of activities, in which the facilitator, in a scientific way, aims at obtaining elements that answer questions raised by decision makers in a decision-making process, so that these elements help in the process of understanding your decision<sup>10,11,12,13</sup>.

There are three types of actors, to mention: decision makers, representatives and the facilitator, and so-called decision makers are those to whom decision-making power has been formally or morally delegated; the representative, who is that actor assigned by the decision maker to represent him in the decision support process; and, finally, there is what is called Facilitator and who is also an actor in the decision-making process, since he will never be neutral in the decision support process and, therefore, influences him<sup>14,15</sup>.

It deserves to be considered that the fundamental points of view (PVF's) represent the facilitator's expertise and that they are reflected in the decision process perceived as being of important construction of what will be at the end, that is, a model for evaluating actions<sup>16</sup> where these properties demand a set of concepts of intelligibility, consensuality, operability and isolability where the characteristics of

PVF's allow it to be reflected in its own way and with the perception of the facilitator in order to reflect its expertise and also with its improvement<sup>12,17,18</sup>.

## 2. RESULTS AND DISCUSSION

The main characteristics that are necessary for each credit line can be classified into classes or categories and the use of them allows to build or map this information based on the questions that are asked interactively between customers so that operators, in general managers, can search for the line or lines that fit the customer's profile, as listed in Table 1, below:

**Table 1 Lines of Credit and their respective purposes**

Credit Line	Purpose
Quick Turn	Reinforcement of Working Capital
Anticipation of Credit to Tenants (ACL)	Anticipation of the net value of sales made with cards.
BNDES Card	Finances machines, equipment, production goods.
Guaranteed account	Reinforcement of Working Capital
Checks Discount	Anticipation of the net sales value.
Business Finame	For the purchase, production or sale of machinery.
Finame Empresarial PSI	Finance the acquisition and production of machines via BNDES.
Finame Modermaq	Finance the purchase of machinery and equipment
Giro Flex Company	Reinforcement of Working Capital and acquisition of goods and services.
Giro Empresa Flex - Structured Releases	Capital strengthening and financing for the acquisition of goods and services, export credit.
Giro Mix PASEP	Reinforcement of working capital
Cash Receivables	Reinforcement of working capital
Proger Turismo Investment	Financial support for working capital associated with projects in the tourism sector.
Proger Urbano Empresarial	Financial support for investments with working capital for micro and small companies.

The proposal to algorithmize the use of this information allows us, with the use of the multicriteria method, where each possible class of credit lines is described with its possible and respective conditions for their adherence as shown in the following mathematical relationship, which, using the TODIM method (Multicriteria Interactive Decision Making)<sup>6,7,8,11</sup>, where the analyzed variables reflect the problem under analysis with their weights and respective normalized values, ie:

$$\text{Punctuation} = \left[ \frac{(F + PA + RC + RO + LCV + LR + CC)^{0,1} + (LL + G)^{1,2,3,4,5}}{5} \right] * 10/9 \quad \text{Eq. 1}$$

where the variables and notation can be understood as being: "F" the purpose, "PA" the target audience, "RC" the client risk, "RO" the operation risk, "LCV" the current credit limit, "LR" the release of funds, and the "CC" the Cielo affiliation, collection or custody, and the "LL" the line limits, and "G" the guarantees. It is also worth considering that the values thus total a maximum score that can

always be renormalized when new items are effectively learned and implemented, however, in this adopted version we have to:

$$\text{Punctuation} = \left[ \begin{array}{l} F = 0 \vee PA = 0 \vee RC = 0 \vee RO = 0 \vee LCV = 0 \\ \vee LR = 0 \vee CC = 0 \vee LL = 0 \vee G = 0 = 0 \end{array} \right] \text{ Esq. 2}$$

This expression then proceeds to determine a weighted average by class and by categories of questioning so that the entire score can be configured and with this maximize the results so that their classification can occur in order of the power of their results, where, the largest will always be the most scored, thus having a scale of priority and optimization of supply for the respective credits under analysis.

### 3. CONCLUSION

The modeling proposal presented is configured in a matrix formation of opportunities associated with the supply matrix of credit lines in banks in addition to the description of the various lines used. It is also worth considering that an algorithmic modeling of how to weigh and normalize the presented credit system was also presented and it is still possible to generate a punctuated numerical scale.

The research objectives were also consolidated with the implementation of credit line modeling and the description of normative instructions associated with a normalizable numerical scale, in addition to the fact that these processes can be implemented in simple software (spreadsheets and even high-level languages). level etc.), in addition, the Manager himself can use this and have an effective tool available for the management decision-making process.

This presents yet another credit assessment instrument with the advantage of being quick to apply and transparent to the investor, the Manager and employees and also the client, and, finally, it is also recommended that similar procedures and spreadsheets be created for other areas while it is recommended, for future work, a deeper use of these credit rules, in their various legal and normative bases, in the analysis of trends and megatrends and in the literature review in the area.

#### List of Abbreviations

- ACL - Advance of Credit to Tenants.
- MCDA - Multicriteria Decision Support Methodology.
- PVFs - Fundamental points of view.
- TODIM - Multicriteria Interactive Decision Making.

#### Availability of data and materials

The transparent texts in this document are available in machine-readable format on the Banco do Brasil website (<https://www.bb.com.br>) and can be used free of charge.

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## **Statements**

### Ethical Approval and Consent to Participate

The authors ratify the ethical aspects in the production of the work at the time they agree with their participation in editing the work.

### **Consent for publication**

The authors agree and authorize the publication of the work.

### **Supporting data availability**

The authors become available to complement data in support of the published and on the results of the research.

### **Competitive interests**

Not applicable.