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The Importance of Risk Assessment in the Context of Investment Project Management: a Case Study

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Abstract

Risk management is an important component of project management. Nevertheless, such process begins with risk assessment and evaluation. In this research project, a detailed analysis of the methodologies used to treat risks in investment projects adopted by the Banco da Amazonia S.A. was made. Investment projects submitted to the FNO (Constitutional Fund for Financing the North) during 2011 and 2012 were considered for that purpose. It was found that the evaluators of this credit institution use multiple indicators for risk assessment which assume a central role in terms of decision-making and contribute for the approval or the rejection of the submitted projects; namely, the proven ability to pay, the financial records of project promotors, several financial restrictions, level of equity, level of financial indebtedness, evidence of the existence of a consumer market, the proven experience of the partners/owners in the business, environmental aspects, etc. Furthermore, the bank has technological systems to support the risk assessment process, an internal communication system and a unique system for the management of operational risk.

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1. Introduction

Risk is, fundamentally, the possibility of financial loss. It is used as a synonym of uncertainty and refers to the variability of returns associated with an investment project[1]. As the projects may be independent or mutually exclusive, it is crucial the use of analytical techniques in accordance with each specific situation. The existence of uncertainty means that decisions and behaviors are not based on routines. Indeed, financial decisions are taken in environments of uncertainty. Thus, the measurement and management of risks are becoming increasingly important. Decisions taken at the present time have their results conditioned by future events and may influence the later thus they may result in potential gains or losses[2].

Considering these facts, it can be seen that, for the purpose of this analysis, the project evaluator or decision maker can find a diversity of problems, making unfeasible the use of a single mechanical process for the assessment of their viability[3]. In this sense, banks cannot always check if the projects that will be financed will be profitable or not, as well as the degree of risk of financing them. Small businesses are particularly vulnerable and dependent on financial institutions that offer credit because they have not access to capital markets. This situation causes that small businesses have less credit options being subject to financial imbalances and higher levels of financial dependency than bigger companies[4]. Furthermore, small companies are less prepared for risk assessement and project evaluation, and this situation augments their level of financial dependency.

Considering these facts, a case study was conducted in a public institution of credit named Banco da Amazonia S.A., located in the Amazon region. In Brazil, the investors and the bodies in charge for fiscal and financial incentives have been demanding specialized professionals, with good skills in the preparation and analysis of investment projects, in order to ensure the quality of the evaluations. In this context, the introduction of risk evaluation as an important process in the analysis of investments of commercial and industrial projects is absolutely necessary[5].

Thus, in this research project, a detailed analysis of the methodologies used to treat risks in investment projects adopted by the Banco da Amazonia S.A., located in the Amazon Region, Brazil, was made. It was considered the portfolio of investment projects in the years of 2011 and 2012 of the FNO (Constitutional Fund for Financing the North). This fund supports the development of the northern region of the country, located in the Amazon Region, Brazil.

Project and risk evaluation are important initial steps that may contribute to future project management success. A poor quality risk assessment process may compromises the project and will turn risk management more demanding. In this context, not only which metrics but also how and why the process is conducted are important. The case study offers interesting insights and may contribute to understand the role and the relationship of risk assessment and risk management in the context of project management.

2. Assessment and management of risks in investment projects

A risk event can be considered as a discrete occurrence that affects a project for the better or for the worse, while uncertainty occurs when there is no sufficient and clear information available to decision makers, reducing confidence on evaluating alternatives and their risks, thus, complicating decision-making.

Uncertainty is defined as the lack of objective probability distributions associated with the events that may occur[6].

In this context it can be presented in three generic groups[7]: uncertainty about the prices and components of investment, uncertainties regarding the deadlines for implementing the schedule and uncertainties regarding the occurrence of events.

Furthermore, risk, in its basic sense, is the possibility of financial loss or, more formally, the variability of returns associated with a particular asset[8]. Decision-making based on risk (Risk-Based Decision Making - RBDM) is essential for an effective and efficient management of projects[9]. Risks[10,11,12] can be divided into 10 categories:

1) Resources related risks;
2) Technical risks;
3) Business risks;
4) Programming risks;
5) Economic risks;
6) Priorise risks;

7) Enterprise risks;
8) Financial risks;
9) Country risks;
10) Environmental risks.

The process of risk assessment in investment projects can be defined as being composed of five steps[13,14]:estimate the expected future cash flows for the project, determine the discount rate (opportunity cost of capital) to discount the expected future cash flows, calculate the financial indicators, mainly the Net Present Value (NPV) of expected future cash flows, set the cost of the project and compare it with the NPV of the cash flows of the project and make the decision to invest or not in the project.

Furthermore, the process of risk evaluation of an investment project is typically made through a sensitivity and risk analysis. Typically, in the sensitivity and risk analysis, it is possible to measure the impact on financial indicators, such as the NPV and the Internal Rate of Return (IRR), when a certain relevant parameter of investment varies. It is then possible to determine the value of each estimated parameter that redefines the NPV of the project, allowing the acceptance or rejection of the project[15,16,17].

The Break-even point of an investment project is the level of production and sales for which the project produces neither profits nor losses[18]. The Break-even Analysis is a relatively simple method but it is important and should be used for the initial analysis of an investment project in a context of uncertainty[19].

The risk analysis examines various possible scenarios, where a given combination of factors is considered. Typically, the procedure of scenario analysis considers three types of scenarios for the risk analysis of the project: Most Likely, Optimistic and Pessimistic. The first scenario is considered, by specialists in business projects, the one that uses the expected value or the more "representative" value for each of the estimates of the project. In the optimistic scenario, certain parameters of interest on the part of the base scenario are increased in value, while the opposite occurs in the pessimistic scenario, where the values decrease with respect to the base scenario[20].

In the risk analysis it is assumed that the uncertainties associated with the estimates of the parameters are regarded as somewhat subjective. Thus, a more efficient approach consists in the construction of random scenarios, however probable, from the distributions of probabilities of the variables of competing interests[21]. The Monte Carlo method is a sampling technique employed to operate numerically complex systems that have random components[22].

Probability analysis uses Monte Carlo simulation to model the combined effect of numerous risk factors according to their relative frequencies. A possible problem is determining the probability distributions of the different variables, especially in some industries where these distributions are not available, as each project is unique and affected by different risk factors. Another limitation of using probability analysis is that the influence of non-monetary (qualitative) aspects on projects is often not easily quantified[23]. Furthermore, with the increasing popularity of privately financed and operated projects, a systematic evaluation of investment options may be needed, especially if they are competing for the same capital resource. The value of each parameter is affected by a myriad of risks and uncertainties which are often difficult to quantify. In addition, these techniques do not allow for the non-monetary (qualitative) factors to be considered in assessing the investment option. To ignore these aspects can cause the failure of a project despite favorable financial components[24].

One way to overcome the above shortcomings is to use the Possibility Theory where the user needs only to determine a possible range, and perhaps even a most likely value for each investment parameter, without the input of each factor's relative frequency[23]. The possibility theory is based on the concept that all values within a certain range are possible, with the exact value being unknown. Using this assumption, the authors[23,24] developed a system for the integration of monetary and non-monetary factors in investment appraisal, using the Possibility Theory to represent the possible values of each parameter that may affect the overall preference for a particular project. They used the NPV as the monetary evaluation function, combining all possible factors affecting the NPV, and obtaining its monetary distribution. For the non-monetary factors, they also used possibility distributions and define a non-monetary possibility distribution using weights for each factor. Finally, they calculated the overall project ranking using the ranking index method.

Some authors argue that, for the analysis and evaluation of investment projects, such techniques are better suited to cope with operation flexibility and other strategic aspects than traditional capital budgeting methods or discounted cash flow approaches, like NPV[25]. These critiques have led to the emergence of real options analysis (ROA) for valuing managerial flexibility in projects.

The contingent claims analysis approach to ROA uses market-priced securities to construct a portfolio that replicates the payoffs of the project and determines the project value using a no-arbitrage argument. The risk-neutral probability approach is an equivalent method that computes adjusted probabilities that allow valuing the project using risk-free discount rates. Both methods use geometric Brownian motion processes or binomial trees to model the project's uncertainty[26]. The decision analysis can be used for projects that involve sequential decisions. This means, that in many cases, there is not simply a single decision, but several sequential decisions. Thus "blind" acceptance of projects is not necessary, where only the decisions of acceptance or rejection of the project are considered, ignoring the decisions for subsequent investments that can be made[17].

3. Methodology

In this research project, a previous characterization of the Banco da Amazonia S.A. was made, regarding the analysis of the process of approval of investment projects in 2011 and 2012 of the FNO program. Furthermore, the data was obtained following a specific case study protocol.

Most of the information was obtained by means of interviews and questionnaires, prepared by the researchers in three different stages. In a first moment it was conducted an interview with the superintendent responsible for the release of financial resources. In the second phase, a questionnaire was designed and applied to collect information on the characterization of the proponent of the investment project, objectives of the funding, description of the requested amount, types of guarantees and forms of payment of financing among others. The third and last phase was used to understand the process of risk assessment and to study the indices and indicators used by the bank in the risk analysis of investment projects.

Due to the fact that the projects have basically the same pattern of development, the researchers have chosen to observe 20 approved projects, 10 in the year of 2011 and the other 10 in the year of 2012.

4. Case Study

The Banco da Amazonia was created in 1942 with the name of Banco de Crédito da Borracha (i.e. Rubber Credit Bank). Its objectives were to promote the development of incentives for the exploitation of natural rubber, in support of the Allied Forces during the Second World War. In 1950, the bank has been transformed into the Banco de Crédito da Amazónia (BCA) and began to participate in a more comprehensive form in the process of regional development, financing all economic segments of the Region. From 1966, it acts as the Financial Agent of the credit policy of the Federal Government for the Amazon Region, assuming the name of Banco da Amazonia[27].

Through its Environmental Policy, the Banco da Amazonia seeks to incorporate the components of economic, environmental, and social sustainability in the whole spectrum of its activities, aiming to promote the solidification of local innovative productive systems, inserted in projects aligned to the assumptions of sustainable development and articulated to domestic and international markets[28].

Aligned with the Principles of the Basel Accord and the regulations of the Central Bank of Brazil, the risk management of the Banco da Amazonia permeates all units who manage processes/risks, and has the objective to manage the risks in all the activities of the company, in order to maximize the opportunities and minimize the negative effects.

The Banco da Amazonia considers risk assessment fundamental for the decision-making process, because it provides greater stability, better capital allocation and optimization of the risk versus return. In compliance with legal and regulatory requirements and before the stage of maturity of processes and systems available, the Bank has implemented a risk management framework that enables the handling of legal requirements, in accordance with the standardized, simplified and basic methods.

As a technological support to risk management, the Bank has in its structure an internal communication system based on the disclosure of standards for their employees through the intranet and a unique system for the management of operational risk. The management of the credit risk includes the monitoring of the Probability of Default (PD), the Loss Given Default (LGD), Provision for Credit Losses (PCL) and calculation of RWAcpad (plot relative to the exposure to credit risk). In addition to the system that supports the Management of Market Risk and Liquidity, to the management and monitoring of exposures to these risks.

In accordance with its internal guidelines, the Banco da Amazonia invests in the continuous improvement of the processes and practices of risk management, in line with the benchmarks of international market and with the New Basel Accord, known as Basel II, and the adjustments promoted by Basel III[29].

5. Analysis and Discussion

The decision-making process for the approval of a project by the Banco da Amazonia S.A. has the following parameters: the ability-to-pay in proven cash flow projected investment; the financial records and restrictions, level of equity; the financial indebtedness; existence of a consumer market; experience of members/owners in the industry in which they will operate; credit history check with the Banco da Amazonia S.A., environmental aspects required; and the ability to integrate with other local actors. These factors are related to the lack of sufficient information or uncertainty[6].

In the risk analysis, the credibility of the project is analysed, which begins by evaluating the past of the entrepreneurs, the analysis of historical results extracted from the accounts of the company and/or affiliates, etc.[7]

On the other hand, when the bank receives proposals that may have some possibility of risk, they are returned to the client to reformulate the project in order to minimize the risk, and even so there may still subsist risk that should be considered in the project, deciding who will assume it (the client, the bank or other element). This type of situation is in line with the literature[9,30], in which the basis for decision-making is provided by project risk evaluation, which takes into account the possibilities of any risks or uncertainties related with the project. In this sense[9], in decision-making process based on risk, it is vital to ensure a complete and accurate risk evaluation[30].

From 2013 onwards the Banco da Amazonia S.A., necessarily presents information about the indicators that are required by the Central Bank of Brazil (BACEN), in response to Circular no. 3,678 /13, which implies for the disclosure of information relating to risk management, the determination of the amount of assets weighted by risk (RWA or Risk Weighted Assets) and the determination of the Reference Assets (RA), aligned to good banking practice in relation to the new rules of capital and in accordance with the norms of the Institution.

In the analysis of investment projects, due to the fact that financial institutions are dependent on borrowed capital, it was observed that the credit institution analysts use instruments of accounting to check how much the institution used capital to third parties in relation to its own capital available for lending.

As far as the viability indices demonstrated, the evaluators measure the capacity of profitability on the capital invested by the institution itself in projects and other types of financial transactions. On the other hand, the indices of liquidity indicate the capacity to honor the commitments and payments of obligations of the institution. The index of activities refers the revolutions suffered by capital in the sense of how many times the financial resources were employed, how they were recovered, how long it took to recover the investment. It is an operating cycle that reflects the operational reality of the institution.

Investors have several methods for the analysis of investments[9,36,37]. Nevertheless, according to the information obtained from the superintendent of the Banco da Amazonia S.A., the evaluators should give particular attention to the indicators related to profitability and liquidity. From the case study, it was possible to realize that the parameters identified in the analysis of the project fall under 10 types of categories[10,11,12], which may be included in 5 different steps for the evaluation procedure[14,31].

It was also found that the Banco da Amazonia S.A. follows the levels of risk of a project, explained in the Resolution 2682/1999 of the National Monetary Council - CMN/BACEN†, which deals with delays on the liquidity, ranging from AA (low risk), A, B, C, D, E, F, G, to H (high risk). Within these parameters, the Banco da Amazonia S. A., only operates with customers between "AA and C". In this sense, some authors argue that for the analysis and evaluation of investment projects, real option are more suitable for dealing with the flexibility of strategic aspects than traditional methods[25,32].

The approach of risk-neutral probabilities is an equivalent method that computes adjusted odds that let you enhance the project using discount rates free of risk. Both methods use processes of Brownian motion or geometric binomial

† Available at https://www3.bcb.gov.br/normativo/detalharNormativo.do?method=detalharNormativo&N=099294427

trees to model the uncertainty of the project[26]. These irregularities in many situations can be framed in the analysis of sensitivity and risk, verifying the impact on financial indicators, allowing to accept or reject the project[15, 16,17,19].

In this research it was found that the decision-makers of the Banco da Amazonia S.A. make the diagnosis of risks of the viability of financing of a project, based on the analysis of consumer market, existing data on industry, sector organizations and research institutes, as well as by indicators such as Pay-Back, NPV, IRR and discounted cash flow, in terms of sensitivity analysis exchange data of costs or revenues provided, as described in the literature[23,24].

Regarding the warranties, regularities considered inconsistent by the analysis team might leave room for suspicion that the values where overestimated and there was no definition of the criteria used in its calculations, creating the need for reassessment, with additional expenses and deterioration of the relationship with the client.

In the attachments that come with the projects, often occurs lack of several documents like: constituent documents and financial statements of affiliated and/or controlled companies; lease with a term smaller than the requested by the funding and without renewal clause; lack of copies of contractual instruments of the debts listed in the SCR (credit IS); lack of documentation about machinery, equipment or vehicles to be purchased.

After the registration analysis of the project leader and regulatory framework, a market analysis is made for the evaluation of the acceptance of the projected sales, the assessment of the adequacy of the structure of revenues and costs, projected investments, working capital needs, uses and sources and ability to pay and cash flow. Information Systems (IS) are also checked, such as: records SERASA (centralised bank service), SCR, Central Bank IS, Ministry of Labor IS, among others, as well as the system of risk assessment and management. The internal statistics for the evaluation of default rate and performance by activity, region and size are also analysed.

The proposed investment projects submitted to the Banco da Amazonia S.A. are mostly private projects. This is a result of the policy of the FNO administration, whose goal is to contribute to the promotion of economic and social development of the region through funding productive sectors. In this study, the projects are mainly related to the productive activity, in need of investments in fixed assets (replacement, expansion, modernisation, innovation and social investments)[31].

The Banco da Amazonia S.A., is influenced by economic occurrences at international level, the political stability exerts great influence on issues such as inflation, interest rates and international image, which also have an impact in a different way on the investment projects[33]. This can be observed when the bank in 2011 and 2012 had a reduction in the cost of acquisition of resources due to economic policy of the country, which is reflected in lower rates paid by credit borrowers. If there are irregularities, these can be cumbersome to operate with the company, which is one of the strategies of risk management, because the bank has to be careful to run the lowest possible risk[34]. After the feasibility of the project is defined, which concerns the planning and management of long-term expenses investment and fund-raising, the risk analysis of the project is done, whose parameters also indicate its viability or not[35].

From the cash flow, indicators such as IRR and NPV are extracted. Some studies mention that sensitivity analysis allows to separate the ranges of acceptance or rejection of the project[15,16,17]. This diversification forces the evaluators of the bank to have specific strategies for each case under analysis. For this reason, in the literature[3], for project analysis, the evaluator or decision maker may find a diversity of problems, which makes it impossible to use a single mechanical process for viability assessment.

In this process of evaluation of investment projects made by the bank, it also has been found that the steps followed are: project identification; definition of objectives; ability to pay; technical, economic and financial aspects; productive process; income; economic-financial indicators and others, that fall under the five stages of evaluation process of a project[13,14]. Even in this analysis, it has been identified that the bank uses tools of engineering economics in investment decisions by choosing alternatives supported by technical, economic or financial decision making, when there is the ability to pay[36,37,38].

In general terms, it was observed that the evaluators, following the parameters recommended by the Banco da Amazonia S.A., analyse the IRR, the Ability to Pay, etc. Table 1 presents the parameters recommended by the Banco da Amazonia S.A. grouped into indexes (observed in the database and suggested by this research). The indices suggested can increase the effectiveness of the procedures for the evaluation of risk in investment projects that capture financial resources of the FNO.

For supporting new methodologies for the management of risks, since 2013 the bank has in its structure an internal communication system based on disclosure standards for its employees through the intranet; a unique system for Management of Operational Risk, which is used to record risks and incidents and feed databases of operating losses.

Another system for the Management of Credit Risk, which allows the monitoring of the probability of default (PD), the loss given default (LGD), provision for credit losses (PCL), the calculation of RWAcpad (plot relative to the exposure to credit risk), in addition to the system of Management of Market Risk and Liquidity, to the management and monitoring of exposure to these risks.

For this reason, the management of credit risk in the bank permeates the whole process of granting, monitoring, billing, and credit recovery, encompassing the activities of various areas. The construction and development of an environment of risk management in investment projects, requires the participation, commitment and the involvement of the Institution as a whole, because, the effects of risk and instability may arise from facts political, economic, or natural cyclical and may affect the projects in different ways, causing for example, changes in the level of economic activity on the environment in a study, that influence the demand and, consequently, the cash flow of the project.

Table 1. Parameters recommended by the Banco da Amazonia S.A.

Index Suggested	Observed Index	Parameters Recommended
1. Internal Rate of Return	Internal Rate of Return	1. Higher than the SELIC Rate
2. Level of Indebtedness	Ability to Pay	2. Maximum Commitment of 70% over cash flow
3. Final Warranty		3. Equivalent to 130% the value of the resource to be released.
4. Social Capital	Social Capital	4. Value of 30% on the debit balance
5. Financial Records		5. Evaluation of history of the venturer
6. Regulatory Framework		6. Conditions imposed by the institution
7. Payment Deadlines		7. Compatibility as the financing programs.
8. Capital Structure	Capital Structure	8. Relationship Capital to Third Parties/passive total; Relationship capital to third parties/total equity; Relationship banking capital/total equity; for Suppliers/current liabilities; total assets/equity; debt Profile and Immobilisation of resources not circulating
9. Profitability	Profitability	9. Return on assets; PL; Sales and Gross Margin
10. Liquidity	Liquidity	10. General; Current; Drought and Immediate
11. Activities	Activities	11. Asset Turnover and the Stock; Average Term of Storage, Payment and Receipt; Operating Cycle and Financial

These facts verified by the evaluators of the bank are also parameters, which meets the identification of risk, which determines what are the risks that may affect the project and documenting the characteristics of each one, quantify these risks and are looking for alternatives to optimize the exploitation of possible results, and that define steps to optimize the exploitation of the opportunities, as well as control of the risks that may arise during the course of the project.

If there are irregularities, these can be cumbersome if you operate with the company, is one of the strategies of risk management, because the bank has to be careful to run the lowest possible risk[34]. In relation to the projects delivered, it was found that irregularities such as project without the heading of the fortifier or without its number in the council of the category, or without the heading of responsible for company, in all its leaves; projected revenue overestimated without due justification convincing marketable; lack of consistent information on market inputs (origin, sufficiency, etc.) and products (buyers, competitors, etc.); lack of debt service on existing cash flow; deficits of deployment without information on the own resources to cover; deadlines are incompatible with the ability to pay and/or proposed activity.

6. Conclusions

It was noticed that the bank is cautious with the approval of investment projects and uses several methods for the analysis of a project according to its levels of risk, explained in the Resolution 2682/1999 from the National Monetary Council (CMN/BACEN). Each one of these methods is focused on different variables, which can subsidize the decision making for the release of funds with the lowest possible risk, during the implementation of the project. In the evaluation of the methodologies adopted by the Banco da Amazonia S.A., based on their reports, it was found that the institution follows the principles of the Basel accord and the regulations of Central Bank of Brazil, to manage the risks involved in all activities of the institution, in order to maximize the opportunities and minimize the negative effects.

It considers the risk management fundamental to the decision-making process, which provides greater stability, better application of capital and optimization of risk versus return.

Since 2013 the bank is improving the methodologies of risk management, with an internal communication system developed for the management of operational risk, to monitor the Probability of Default (PD), the Loss Given Default (LGD), the Provision for Credit Losses (PCL) and calculate the RWAcpad (plot relative to the exposure to credit risk), in addition to the system of Management of Market Risk and Liquidity, to the management and monitoring of exposures to these risks. Furthermore, it was found that the decision-maker uses several approaches to make a diagnosis of the risks of feasibility of the projects based on the analysis of the consumer market, segment entities and industry publications, the ability to pay, verified by indicators as Pay-Back, NPV, IRR, discounted cash flow, and in sensitivity analysis, by changing cost data or forecasted revenues.

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