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# Operational Risk Mitigation in Credit Operations

## ABSTRACT

The process of loan concession requires a thorough knowledge of the credit institution standards and regulations. Complexity of the credit granting process can cause a considerable number of undecided corporate loan proposals due to incomplete information or decided only after several internal incidents have been reported and solved. The objective of this research is to study operational risk failures in the admission process of financing. With a sample of 5900 corporate financing proposals during the second semester of 2019, the ratio of operational risk incidents of 24% detected in the sample hinders the activity of all those involved in the credit risk analysis and decision. There are many exceptions to the institution's internal regulations that make it difficult for users to start the process. The study is intended to provide insights for researchers and practitioners to examine operational risks in financial institutions.

**KEYWORDS:** Financing; Financial Institutions; Risk Management; Operational Risk; Credit Risk.

## INTRODUCTION

Risk acceptance is an important part of bank activity that is inherent to their financial intermediation role in economy. Operational activities are decisive to any institution's financial results. As the banking business becomes more sophisticated the operational complexity and risk also evolve. Regulation, technological advances, terrorism, and financial fraud are examples of factors that have evolved in recent years. These factors may affect financial operations. Effective OR management is therefore essential to minimize expenditure, reduce costs (errors, theft, fraud, legal penalties), maximize profit, and reduce the need for capital reserves. Operational inefficiency slows down product development, has an impact on customer service, and makes expansion difficult. Operations are the range of activities that create, sell, and deliver products and services to customers. Without operations, there is no business (Barnier, 2011).

For (Blunden & Thirlwell, 2013), operational risk management (OR) was a recent discipline that represented a flexible and comprehensive category, difficult to understand, yet too familiar. Recession caused by the 2008 financial crisis illustrated how various sources of systemic risk were triggered or at least propagated by vulnerabilities in OR management (Jobst, 2009). According to (Society of Actuaries, 2010), OR encompasses a wide range of events and actions, including, but not limited to, misconduct, system errors, nature phenomena, policy violations, regulations, and direct or indirect acts of excessive risk-taking.

In the specific case of corporate financing, customer managers and risk analysts are key because of their need to access various sources of internal support information, which regulate the opening of a loan operation, and support the entire underlying procedure. From the first interview with a client to formalization of a credit proposal, the process is supported with information technology. Then follows a chain of procedures previously established in its own regulation. In a digital process the bank clerk will have to analyze and interpret a comprehensive normative, procedure, and credit product, to enable a financing proposal's elaboration. These operations can take several hours.

People and systems are connected and are building blocks of a business's capacity which can be struck by internal and external events. Although the opening of a loan proposal is based on a credit risk analysis, i.e. economic-financial capacity diagnosis, and credibility of the proposer, any necessary organizational procedure involves other risks. Those risks include human failures or for example, errors from the decision systems. Other researchers (Hatzakis, Nair, & Pinedo, 2010) observed that there is a significant reciprocity between operational risk, market risk, and credit risk. We consider it's important to study operational flaws in the process of opening and accepting financing operations to companies in a credit institution. For instances where the existence of incidents are detected and appear to be related to OR events. For reasons of confidentiality, this organization will always be referred to as "Alpha Bank", throughout the body of the remaining project.

Based on these arguments, the project began with the identification and study of OR events and negative consequences within the creation of credit operations to companies. To do this a primary data collection and a respective quantitative study was carried out in a data set of accepted proposals in a credit risk analysis department where the detected OR events were recorded. It is followed by employee questionnaires from different areas of the institution. Simultaneously, throughout the project several literary

reviews were carried out where most significant trends in OR management were explored. We sought to find the source of this high perceived difficult problem and process errors detected in the construction of credit proposals for small and medium companies within a retail bank. It is intended that this study may contribute to the creation of a future solution that provides a viable tool for the analysts' teams who deal with the problem and disseminating it as a support instrument in response to the requests of the commercial department.

## **CONCEPTUAL FRAMEWORK**

In Portugal, retail banking institutions mainly use a universal business model that serves private clients and companies from all economic sectors with a complete range of financial products and services. Therefore, corporate financing is one of their most important activities which allows funding economy investment operations.

The importance of this project to the industry is mainly related to the evolution of OR management in financial institutions and the need to mitigate its negative consequences in the credit risk admission process. Effective OR management is essential to minimize expenditure and maximize profit. Reducing errors, waste, theft, fraud and penalties becomes critical to mitigate unnecessary costs. Capital buffer for OR also reduces the possibility of profit.

Specialists (Gonçalves, 2011) (Santos, 2012) (Maina, Alala, Wabwile, & Douglas, 2014) indicate there is a growing OR importance for financial sector activity and putting this risk at the same level as credit and market risk. While institutions become more proactive in avoiding harmful events they continue to develop their performance in a constantly evolving business environment. Other researchers (Thun, 2014) (Barnier, 2011) underline the efforts made by various lending institutions that have brought to light the still fragmented world of risk management. Responsibilities are separated into organizational silos, systems and applications that are not compatible with multidimensionality of risks. The information is then dispersed across various databases. On the other hand, imposing too many controls has created a fragmented environment complicated by duplication, poor connectivity, unclear rules and responsibilities, and obfuscation of an integrated view of risks (Pourquy & Mulder, 2009).

There are three appointed emerging obstacles to OR management success: (i) a high volume and pace of change in financial services, which can be difficult to understand products and processes (and their failings) well enough to help; (ii) a growing complexity of systems and technologies, and failures in them; (iii) a confusion between compliance and OR management, which defocuses management of this risk (Carter, 2011). Compliance must be done, however, there is a risk that institutions will not sufficiently manage risks because they are more involved in dealing with compliance. Other researchers (Barnier, 2011) (Jobst, 2009) emphasize that OR is multidimensional, complex, and is influencing a new approach to risk management. (Maina, Alala, Wabwile, & Douglas, 2014) conclude by stating that it is important to address marginal relationships between OR and other types of risks in banking institutions, as the lending process is also subject to human error, judgments misconduct, negligence, improper practices, and fraud, just like any other activity.

In financial services, it has been argued (Dickstein & Flast, 2009) (Blunden & Thirlwell, 2013) that a high percentage of bad bank credits are OR losses, obtained through documentation failures that invalidate counter-guarantee and the collateral. However, they are generally recorded as losses arising from credit risk. On the other hand, small failures together (and which give rise to serious problems) are sometimes poorly quantified, that is, their real importance is sometimes poorly calculated.

Therefore, one of the most important activities in OR management is to quantify the real financial impact of OR. In 2001, (Peccia, 2001) argued that in this way it would be possible for management to make right decisions and manage risk more correctly. The influence of OR in the credit risk admission process is one of the themes that we intend to explore with this work.

## **RESEARCH MODEL**

This research is an interpretation where a collection of facts and empirical information were used to make an observation of patterns and the possible causal relationship. The qualitative and exploratory nature of this research, the resolution of a problem in a banking institution, and the lack of explanatory theories require a multiple approach. In this work, the proposed method is the “case study” introduced by researchers (Yin, "Case Study Research, Design and Methods, 3rd Ed.", 2003) (Heath, 2002) (Richards & Morse, 2013) has a vehicle to describe in detail, and learn a situation, social system, or process. The objective of this method in this real context is to build a new theory using an inductive approach based on the paradigm of interpretivism. It assumes the existence of a complex reality that is interpreted by individuals where there are different ways to investigate reality, and it isn't possible to observe this reality only through a unique prism. According to researchers (Yin, "Case Study Research- Design and Methods, 4th Ed.", 2009) (Baxter & Jack, 2008) the case study focuses on a contemporary problem that facilitates a phenomenon, social system or process exploration, in its context, and is used as an approach to make investigation when there are few theories or a lack of knowledge. Inductive approach requires the creation of concepts and theoretical patterns with observable information or empirical facts (Recker, 2013). Other authors (Saunders, Lewis, & Thornhill, 2012) inform that corporate business problems are not only complex they are also unique. They are a function of a set of circumstances and individuals meeting on a specific occasion. The result we intend to achieve is to discover the factors, events and root causes of OR events. Then combine the existing theory with empirical findings and propose a solution that fits the need and objective of credit institutions and its collaborators.

## **METHODOLOGY**

Researchers (Barnier, 2011) (Blunden & Thirlwell, 2013) (Dickstein & Flast, 2009) indicate the first step in OR management should be an initial evaluation of an institution's current situation. Primary information was collected, both qualitative and quantitative in a questionnaire made for the institution's workers, and in a statistical analysis of all the corporate financing proposals that were admitted in the credit risk department. The statistical data was analyzed with an exploratory approach to gather all

possible information, and generate data that allows OR phenomenon's identification and study. This exploratory study is important according to researchers (Saunders, Lewis, & Thornhill, 2012) to clarify the understanding of a situation, and the nature of a problem. The study began with a questionnaire of 33 employees from the studied institution. The questionnaire assessed the operational risk level perceived by individuals who worked daily with the corporate financing process. Data was collected following a bottom-up strategy, collecting basic and detailed information about the opinions from different operators in the process. The information was inserted in their system exploring the origins of the OR events. A study (Society of Actuaries, 2010) suggest that operational loss can be caused by junior employees, but also for middle experienced, or even senior ones, executives and administrators. Sometimes are caused by individuals, in other cases by groups of people working together. In this study the respondent employees have different experience levels and are representatives of the two internal areas involved in the decision process: bank branches and credit risk department. Results were processed with statistical method and software.

### **Data collection I**

The survey was carried out from July 5th to September 13<sup>th</sup> of 2019, with a total of 54 questions. An online survey was designed and sent by e-mail to client managers, risk analysts and directors of the "Alpha Bank". The questionnaire was divided into five groups of questions: i) personal information; ii) level of OR perceived by the respondents; iii) internal regulations; iv) possible solution to the OR perceived; v) other improvements. All the questions followed a semi-structured script, attached to the five-stage process of the credit admission.

### **Statistical analysis of financing proposals**

Proceeding the study, next stage was to find a quantitative measure of OR incidents following one of the main objectives: find OR events within the credit admission process. In the study institution, loan proposals are sent for analysis to the credit risk department, whenever the client's management branch is not able to decide, due to its credit limits. In the study credit risk department, the loan proposal's upper limit is 500.000 euros. A credit proposal with an upper amount is analyzed in another department, which is out of the range of this research. Traditionally, the credit risk analysis focuses on the following factors: i) loan's object and nature; ii) credit typology; iii) credit capacity of proponent; iv) guarantees; v) economic-financial position of proponent; vi) proponent's payment capacity forecast; vii) operation's profitability; viii) appropriate legal structure and conventions. It is important to emphasize the uniqueness of the credit granting activity in which a projection of the future capacity to honor a commitment is made in the initial phase and assembly of the operation. Credit granting is based on a client's economic and financial capacity at that moment. It is at this stage that OR events become more important, since those events are not detected in the credit risk admission phase and can only be observed in the future or probably after the loan has been granted.

### **Sample**

The sample selected was all the 5.984 loan proposals that arrived at the credit risk department during in the second semester of 2019. This semester was chosen because it was the first time this department started making a registration of all the OR incidents detected making the first data set available.

## Data collection II

Data collection was performed inside the credit risk department of “Alpha Bank”, during the second semester of 2019. Every loan proposal submitted to the credit risk team for analysis was registered for this study allowing the analysis of all the OR incidents to be detected. The analysis covered all the 20 types of loan proposals admitted in the credit risk department from a simple credit card to a finance project.

## Data coding

We used a table of mutually exclusive codes to categorize all the detected OR incidents in the corporate financing proposals that arrived for analysis at the credit risk department within the second semester of 2019. Detected incidents were cataloged with the "Dx" specification according to the error that caused them to be returned. The "R2" typology included proposals which were also rejected for analysis and returned in the absence of economic and financial information or basic information necessary for credit risk analysis.

TABLE 1. *Operational risk incidents in financing proposals*

| Code | Incident  |
|------|---|
| D0   | Returned to branch in Decision Committee          |
| D1   | Returned by branch request                        |
| D2   | Missing financial or accounting information       |
| D3   | Requested for Information Without Branch’s Answer |
| D4   | Absence of other basic qualitative information    |
| D5   | Incorrect informatic codification                 |
| D6   | Incorrect decision department                     |
| D7   | Loan proposal within branch decision reach        |
| D8   | Loan proposal with incorrect information          |
| D9   | Loan proposal with informatic constraints         |
| D10  | Loan proposal without branch opinion              |
| R2   | Refused by incomplete information for analysis    |

*Source: Own Research*

After categorizing all the proposals in April 2016, we started the systematic study of the entire data set. Although there were several independent variables in the created data

set, we started by isolating target variables of this study: i) incident code; ii) number of working days each incident takes to be solved; iii) final status of proposal (approved, refused, or returned to branch).

Variable “number of working days each incident takes to be resolved” is proposed (Bonafede, Cerchiello, & Giudici, 2007), to be one method that makes it possible to complete an OR management that traditionally is only measured by frequency and impact. This variable provides information about the impact in time consumed in a credit risk analysis, involving an OR incident. Impact in time of analysis is an important measure in a context of business continuity.

## Calculus

Another objective of this research is to provide information about OR incident’s cost to the target institution. Since direct cost of each incident was more difficult to obtain due to time and logistic constraints, we proposed opportunity cost method to quantify an OR incidents impact in the institution’s profit margin. This approach is proposed by (Moosa, 2008), as a possible measure of OR to provide a tangible value that is necessary to recognize and quantify the level of risk involved, and to evaluate the impacts from an economic perspective. To do this, we start to trial credit proposals sent to the credit risk department for analysis where it wasn't possible to provide a final decision due to cataloged OR failures (Table 1). Calculations were based on the bank economic product, approval rate, and the credit operations formalization ratio.

The first step is to compute the average profit margin expected by loan proposal (APM):

$$APM = \frac{(\sum_{i=1}^n \text{€}) \alpha \beta \mu}{N}$$

where:

€= credit proposals total amount;  $\alpha$  = approval ratio;  $\beta$ = formalization ratio;  $\mu$ = profit margin, in the corporate client segment; N= total credit proposals, in data set.

Continuing, we then compute loss in case an operation is not decided and is subsequently approved and formalized because of a detected OR incident. This is the expected loss in profit margin of an OR incident (ELPM):

$$ELPM = \sum_{n=1}^n \gamma I_n \cdot APM$$

where:  $\gamma$ = Credit operation not decided;  $I_n$ = OR Incident;  $n$ = Incident code (Table 1)

## RESULTS

By analyzing answers from the questionnaires first, the results illustrate that OR perceived amongst 30% of participants was high. 33% of respondents assume credit loss might happen due to operational flaws. And 39% indicate that procedures to build and prepare a loan proposal were complex. 42% indicate it consumes a great amount of



time, 67% of the participants assume model error in the automatic scoring decision system. All answers were gathered into a matrix with correspondent OR failure categories, that take into account a five-stage process to build, analyze and decide on a corporate loan proposal, and the three main root causes for the identified incident classes: people, processes and technology.

The operational risks identified their mitigation plans and correspondent controls are presented below. The risks were evidence of the database that represents all the proposals analyzed in the department of credit risk of “Alpha Bank”, as well as personal questionnaires, in the process of opening a credit operation in medium and small business segment. We will only highlight critical risks detected in the process of opening and preparing a financing operation for this segment of clients. This process was organized in five stages: i) customer information collection; ii) internal information collection, and preparation of operation for analysis; iii) information processing and bid opening; iv) risk and decision analysis; v) elevation to Credit Risk Department. These stages compete in this order to achieve the analysis and approval of credit process. Let us then start from the transcription of initial specific objectives and present the reached conclusions.

**1. What operational risk events contribute to major undecided funding proposals?**

Thus, throughout all steps there are the following critical risks encountered:

1. Insufficient information for analysis;
2. Errors and omissions in customer information;
3. Non-compliance with the internal support regulations;
4. Insufficient preparation of the credit operation for analysis;
5. Errors and omissions in information processing.

**2. What are the main risk factors and root causes that contribute to occurrence of operational risk events?**

In the process of opening a loan proposal, the following risk factors were detected:

1. Procedural deficiencies;
2. Information and internal communication with gaps;
3. Fault-tolerant information system, unadjusted to the requirements of the process with room for improvement in terms of adaptability to the user;
4. Technical and regulatory specifications of the various credit products;
5. Possibility of internal and external fraud at the level of economic and financial information required for analysis;
6. Professional aptitude and corporate culture adapted to the level of complexity inherent to the process;

**3. Estimated frequency and impact in timings for analysis of each OR incidents detected:**

TABLE 2: *OR incidents frequency and average number of days needed to solve*

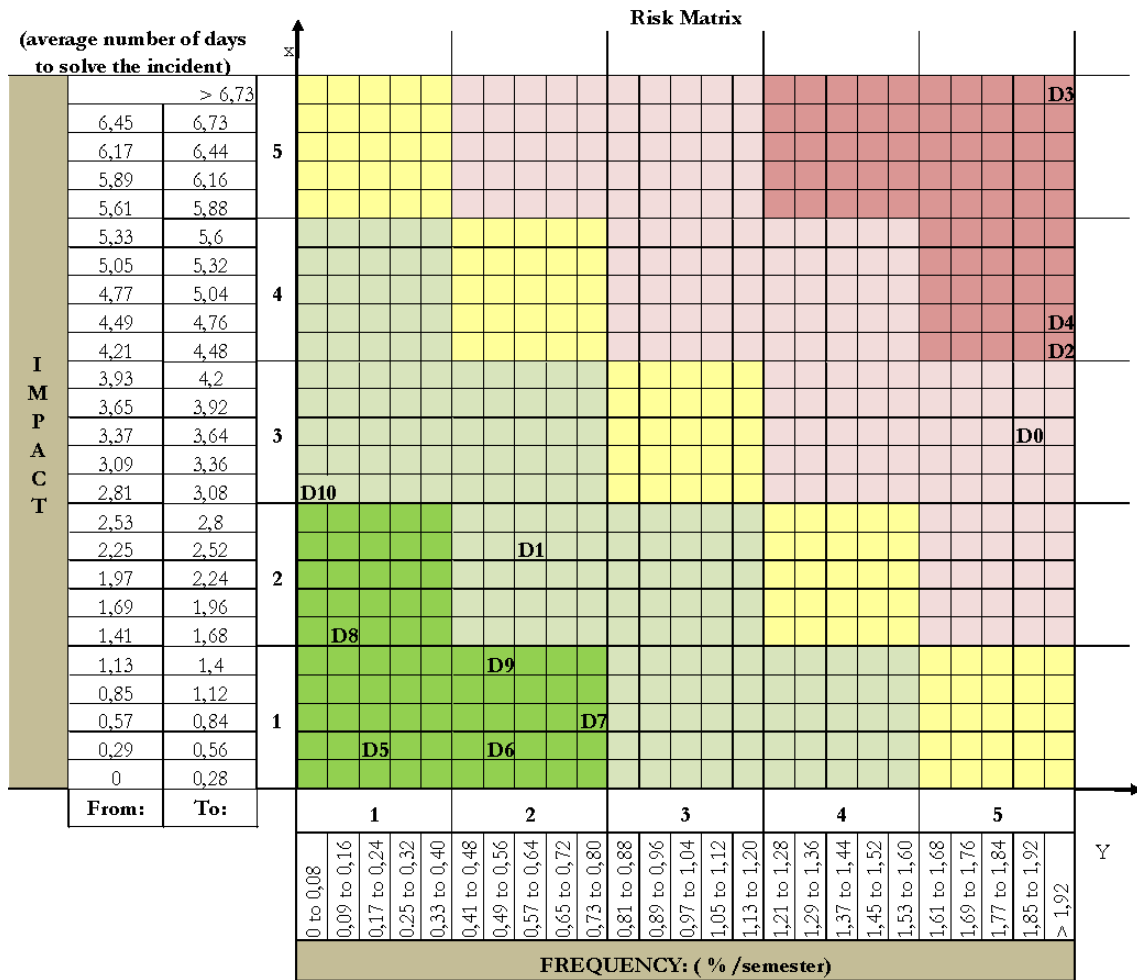
| Incident | Frequenc | Impact: Average |
|----------|----------|-----------------|
|----------|----------|-----------------|

| <b>Code:</b> | <b>y</b>       | <b>number of days needed to solve incident</b> |
|--------------|----------------|--|
| <b>D0</b>    | <b>1,912%</b>  | <b>3,423</b>                                   |
| <b>D1</b>    | <b>0,577%</b>  | <b>2,281</b>                                   |
| <b>D2</b>    | <b>2,598%</b>  | <b>4,236</b>                                   |
| <b>D3</b>    | <b>2,796%</b>  | <b>6,848</b>                                   |
| <b>D4</b>    | <b>13,080%</b> | <b>4,540</b>                                   |
| <b>D5</b>    | <b>0,235%</b>  | <b>0,385</b>                                   |
| <b>D6</b>    | <b>0,541%</b>  | <b>0,300</b>                                   |
| <b>D7</b>    | <b>0,758%</b>  | <b>0,805</b>                                   |
| <b>D8</b>    | <b>0,144%</b>  | <b>1,500</b>                                   |
| <b>D9</b>    | <b>0,505%</b>  | <b>1,250</b>                                   |
| <b>D10</b>   | <b>0,054%</b>  | <b>3,000</b>                                   |
| <b>R2</b>    | <b>1,624%</b>  | <b>N/A</b>                                     |

*Source: Own Research*

The combination of these two independent variables can produce a heat map that shows which OR incidents need more attention from management:

FIGURE 1: Heat map of OR incidents 'frequency and impact in days needed to solve an incident



■ Very Low Risk  
 ■ Low Risk  
 ■ Average Risk  
 ■ High Risk  
 ■ Very High Risk  
 Source: Own Research

In the graph above, the "Risk Matrix" with two axes corresponding to the following variables is shown: x) Estimated impact with each error; y) Frequency with which they occur. Both axes are divided into five levels of importance in ascending order and according to the risks identified and their classification. Levels 1 and 2 are used for OR events that occur with a frequency and impact below the sample's mean, level 3 when those are within the mean, and level 4 and 5 when frequency and impact are above the mean. The incidents highlighted by high and very high-risk areas are the critical ones, namely:

- D4 - Absence of Other Basic Qualitative Information;
- D0- Returned to Branch in Decision Committee;
- D3- Requested for Information Without Branch's Answer;
- R2- Refused by Incomplete Information for Analysis
- D2 - Missing of Financial or Accounting Information;

Those are the operational failures in which resolution is a priority, requiring more stringent monitorization, and implementation of corrective measures, in order to reduce probability of occurrence or to mitigate its impact.

**4. What is the estimated loss in profit margin that these errors can bring to a credit institution?**

We reached an estimate of cost that OR events can entail for an institution, translating evidence found in a measurable way, necessary to recognize and quantify involved risk level, and to evaluate impact from an economic perspective. This dependent variable translates an estimate of expected loss in profit margin and is obtained by the ELPM formula mentioned above. That is, an estimate of loss, from proposals that cannot be decided due to operational failures:

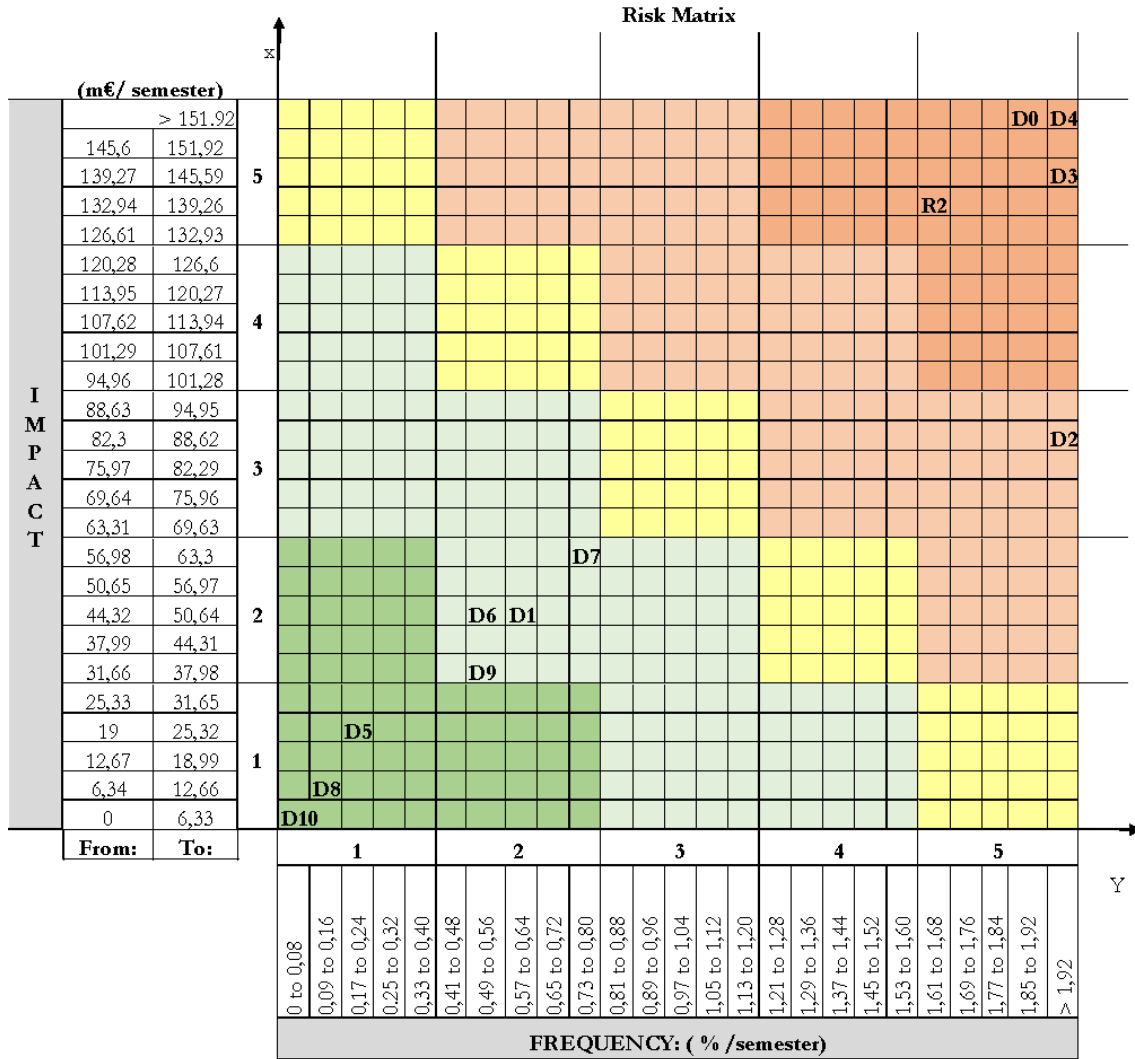
TABLE 3: *OR incidents and profit margin's opportunity cost*

| <b>Incident Code:</b> | <b>ELPM (Expected Loss in Profit Margin):</b> |
|-----------------------|---|
| <b>D0</b>             | € 154.496,57                                  |
| <b>D1</b>             | € 47.537,41                                   |
| <b>D2</b>             | € 83.190,46                                   |
| <b>D3</b>             | € 145.583,31                                  |
| <b>D4</b>             | € 237.687,04                                  |
| <b>D5</b>             | € 19.312,07                                   |
| <b>D6</b>             | € 44.566,32                                   |
| <b>D7</b>             | € 60.907,30                                   |
| <b>D8</b>             | € 7.427,72                                    |
| <b>D9</b>             | € 37.138,60                                   |
| <b>D10</b>            | € 4.456,63                                    |
| <b>R2</b>             | € 133.698,96                                  |

*Source: Own Research*

Combination of the above dependent variables can produce another heat map that corroborates previous findings but from an expected profit margin loss point of view:

TABLE 4: Heat map of OR incidents' frequency, and impact in estimated loss of profit margin



Very Low Risk Low Risk Average Risk High Risk Very High Risk

Source: Own Research

5. Identify and propose a solution hypothesis to mitigate operational risk.

The control and improvement plans identified throughout this work were based not only on statistical data but also on qualitative information and on employee surveys of those who participated in credit granting process. The control and improvement plan is a studied solution that determines what the necessary attributes for users are and to propose a tool that allows mitigation of operational risk. Thus, in view of the above events and risk factors we propose the detailed action plans:

1. Creation of an internal support script to inform how credit proposals should be assembled, documented, and what is the information needed from customers. It is structured by type of operation to avoid common mistakes and omissions. This script should contain a list of frequently asked questions, answers, and mistakes. As a control, we suggest measuring variation on a record of omissions errors in customer information

in a given time interval in order to verify evolution after implementing mitigation measures.

2. This internal supporting script must also contain a chapter where any general credit regulation that supports initiation of a financing process is summarized and simplified. The normative chapter should include and compile all rules and exceptions in a simple and user-friendly way to enable centralization of all information in a single document. It should be organized by operation type and contain a list of answers and frequently asked questions. It should also include a summary of the main internal regulations that usually generate more doubts for users.

3. Elaboration of a list containing all the necessary documents, organized by operation typologies and replacing current list which contain gaps since it was elaborated in a standardized and generalized way without the necessary level of detail that is required for different sort of credit operations. As a control we propose that electronic credit proposal contain a check-list with a verifying box in each compulsory document in which a visa must be affixed by each user who opens a credit process. The informatic system that supports credit proposal should monitor completion of this check-list, and block progress of any proposal if an essential document is missing.

4. Appropriate training plans which can be provided by employees from credit risk areas to “Alpha Bank” colleagues in commercial departments and branch networks to provide a more in-depth professional cultural competence on operational risk inherent to credit risk admission process.

## **DISCUSSION, CONCLUSION, AND IMPLICATIONS**

Identification and control of operational risk framework allows a development of a more rigorous risk selection policy, a structured valuation of risks and an integrating OR management as a systematic concern of management at various levels. This framework makes the it compatible with aggressive commercial policy without losing control of OR. (Coelho, 2013).

This study aims to provide insights for practitioners, identify root causes of operational risk events, consequences, and possible solutions in a target banking institution. It also reveals a measurable effect in profit margin, and on the operational incident recovery period within admission of credit risk. In this sense, it adds insights and detail to the growing importance of operational risk management by developing a calculation methodology, and a more comprehensive understanding on how different operational risk events affect bank returns.

All banks are engaged in reducing operational risk but still are not sure how effective they can be when combining operational risk retrenchment with other sources of uncertainty like credit risk. A recent survey made from Deloitte Development LLC (Deloitte Development LLC, 2015) based on the responses of 71 financial institutions around world indicate that in financial institutions some OR management methodologies are still under development. Only about 33% of respondents say that their institution's loss databases are extremely or very well developed. Only 30% of

participants make the same statement regarding causal analysis of events. Accordingly, this survey indicates that only 56% of respondents claim their institution is effective or very effective managing OR.

Our results intend to provide managerial guidance for banking industry to develop operational strategies in credit risk admission, particularly on corporate financing process. Results presented in this paper were based on data gathered in one major Portuguese banking institution and its collaborators for a limited period. This fact restricts generalization to other institutions and credit risk admission processes.

Given the afore mentioned recommendation for further studies relates to the expansion of the data set to generalize the present results eventually considering: 1) other credit risk departments, and banking institutions to examine differences and similarities on their credit admission process and impact on profit margin; 2) in possession of more data, it could be possible to develop more advanced statistical methods, as Monte-Carlo simulation, and the conditional VaR (Value at Risk) as proposed by other researchers (Resti & Sironi, 2007), (Žiković, 2008), in order to study extreme OR events with more depth, and model a statistic distribution. Additionally, further research should aim to examine credit institutions with different risk profiles and correlations with OR events, seeking for a multidimensional understanding of the problem and different mitigation measures.

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