

# ON THE POSSIBLE TOOLS FOR THE PREVENTION OF NON-PERFORMING LOANS. A CASE STUDY OF AN ITALIAN BANK

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## Abstract

This work analyzes the contribution of an Information Systems (IS) to the implementation of credit monitoring as a new integrated process to prevent non-performing loans in a small bank. The study focuses on the process of active monitoring of the entire credit portfolio, aimed at guiding the best migration between risk classes. This is understood as a set of integrated activities, in which the quality of information becomes a major determinant of the outcome. Such tools support risk management in the decision-making process and aiding performance evaluation. The purpose of this work is to highlight the possibility of an IS to support this new integrated process of credit monitoring, providing increasingly reliable data, availability on demand and real-time information.

**Keywords:** Credit Monitoring Process, Non-Performing Loans, Information System

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## 1. Introduction

It is known that the regulatory context is essentially constantly evolving through European Union directives and recommendations and through reforms of domestic legislation that are intended to ensure the stability of the financial system, such as improving credit risk control techniques to protect the interests of different stakeholders: shareholders, employees, and creditors. Some of the recent changes emphasize the role of the Risk Management (RM) in the process of producing financial reporting to Asset Quality Review (AQR), to verify “the proper conduct of performance monitoring on individual loan transaction”. Combining the legal requirements regarding RM systems with the benefits offered by Information System (IS), this work analyzes the contribution of an IS to the new integrated process of credit monitoring and considers how this process could guarantee the maintenance of the high quality of the loan portfolio (i.e. to prevent NPLs), the only guarantee of the achievement of satisfactory business performance and the resulting creation of value for shareholders.

Principles and rules to prevent the assessment of the loan portfolio are contained in the European Union directives and National Regulations. The so-

called “phase two” asset quality review (AQR) began in February and was to be completed by July. This involved an examination of asset quality for the implementation of the Single Supervisory Mechanism, SSM as part of the European Banking Authority, EBA (Eba, 2014). The objective of the AQR is the revision of the assets of the bank balance sheet with particular attention to non-performing loans, and the corresponding evaluation of the adequacy of adjustments in order to ensure stability of the system using the principles of “capital adequacy” and disclosure. The SSM applies, in the eurozone, the standard set of rules for the valuation of bank assets, capital ratios and bank risk.

In the national context, the fifteenth update of the Bank of Italy Circular n. 263 of 27.12.2006 (Cir/263), called for banks to carry out a gap analysis in compliance with the requirements of European recommendations and to prepare intervention plans. Limiting our analysis to the issues of the monitoring of loans, one can see that the new discipline aims to eliminate the deficiencies of the role of risk control function; a factor that analysts, researchers and regulators continue to indicate as being one of the major determinants of the increase in NPLs in bank balance sheets.

Information and Communication Technology (ICT) has played an important role in the reorganization of the Italian banking system in terms of the collection and management of information. If ICT was initially applied to the accounting and administrative activities, it was then instrumental in furthering decentralization to the local level of information and responsibility (Berger 2003). The main advantages of the implementation of ICTs in the Italian banks were the slimming down of the chain of corporate control, the introduction of new services, cost containment, but especially the availability of digital information and the possibility to access it also from locations other than the headquarters of the bank (Brynjolfsson, E. & Hitt, L., 2000). In this direction the ability to manage not only quantitative, but also qualitative information is particularly relevant. This is coherent with recent legislative changes and is an important part of the information processed by the banks, especially for small and medium enterprises (SME) (Ho, S. J. & Mallick, S. K., 2010).

The case study presented in this work is a good experimental model for at least two reasons. Firstly, the bank has always maintained a strong presence in an Italian region in support of its social and economic development with remarkable credit intermediation operations. Its cultural emphasis on customer relationships allows us to better understand the elements of innovation that affect the function of credit monitoring with regard to the relationship between the responsibilities of the business unit and risk management. The assessment of credit monitoring requires better information, improved management tools, and the constant use of innovation. For these reasons, over little more than a year, banks have adopted a rating system with a high strategic value for all the stages of the credit processes. Indeed, considered as a basis for the classification of corporate customers, it can assign decision-making autonomy to the branches regarding the credit process (lending autonomy, monitoring, pricing, allocations, portfolio model, etc...).

The second reason is the shift in interest from large to smaller banks, which are actually the backbone of the Italian economy, as they are primarily responsible for wealth and economic growth in that they support the investment initiatives of SMEs, which account for over 99% of all European businesses (Banca d'Italia, 2014). Literature has revealed that SMEs play a key role in innovation and R&D.

This work analyzes the contribution of the IS to the integrated process of credit monitoring, highlighting its implications, through a qualitative case study methodology, which focuses on a banking group that operates in the credit intermediation sector and has strong local roots.

In this context, the questions addressed in this paper are as follows:

(1) How are recent regulatory changes related to risk management and how do they create the opportunity to implement a new integrated process of credit monitoring to prevent NPLs?

(2) How can IS contribute to the verification of the credit monitoring process for the purpose of early warning (real time) of credit quality deterioration?

Using a case study method can yield initial answers to these questions and indicate the possible benefits to banks of implementing available loan performance monitoring processes (i.e., efficiency, better decision making, and cost savings) and to their stakeholders (i.e., more reliable financial reporting).

The remainder of the paper proceeds as follows. Section 2 provides an analytical review of literature, in particular Sect. 2.1 analyses significant studies on the relation of credit risk management and asset quality from a regulatory and operational perspective; Sect. 2.2 examines contributions dealing with the implementation of the integrated IS solution and its managerial, organizational and accounting impacts. Section 3 provides a description of the research method. In Section 4 we present the empirical research, through the description of the case examined: the empirical results underline the weaknesses and strengths of the IT solution and its pivotal impact emerging from interviews. Our conclusions are presented in the last section.

## 2. Literature Review

The literature examined focuses on the impacts of IS technology on the prevention of NPLs in general context without considering specific smaller banks: most of the contributions refer to the IS in large banks and more recently to smaller banks (Seese D., Weinhardt C., Schlottman F., 2008; Gupta U. G., Collins W., 1997, Indian Institute of Banking finance, 2013). A few contributions focus on the implementation of advanced IT solutions in small banks to contribute to loan portfolio management with a view to improving asset quality (Egloff D., Leippold M., Vannini P., 2007; Streff K., 2009).

From 2008 onwards, NPLs have been growing both in Italy and in Europe, according to Reuter's data of April 2014. It is the unanimous opinion of experts and researchers (Mieli S., 2009; Caivano M., Rodano L., Siviero S., 2010; Bini Smaghi L., 2009; UK, 2009; Bernanke B.S., 2009) that the conditions of realizability of receivables should be attributed, firstly, to economic trends. In other words, the economic downturn, both nationally and internationally, is seen as the main cause of NPLs (Financial Crisis 2007-2008) (Banca d'Italia, 2014). In fact, the attribution of the growth of NPLs exclusively to the deterioration of the general economic situation is simplistic.

The strong growth of NPLs is also attributable to the presence of endogenous factors in the credit

process (Islam M.S., Shill N.C., Mannan N.A., 2005; De Bonis R., Silvestrini A., 2013), such as:

1. Lending policies not unrelated to the financial attitudes of appeasement which have allowed and encouraged the indebtedness of companies;

2. Poor awareness of risks by the leadership of the banks and the consequent lack of the role of the control function. In particular, the latter is nowadays indicated by analysts and regulators to be the main driver of the accumulation of the potential for impairment of financial assets. This impairment of financial assets exploded during the crisis of 2008, and is considered to be the main cause of the reduction of performance in bank balance sheets (Basel Committee, 2009; Mieli S., 2009; Banca d'Italia, 2013).

In the latter, many banks, faced with a greater degree of credit risk, preferred to take precautions by using accounting strategies rather than proper capital provisioning policies. This is clear from the latest surveys of national and international supervisory authorities, which, in order to protect the stability of the European financial system, have issued regulations and recommendations to which the latter must conform (E. J. Green, 2001; Banca d'Italia, 2014).

The process of establishing a European Banking Union (EBU) began on 4 November 2014 with the implementation of the first pillar of the SSM, which is a prerequisite for Comprehensive Assessment (CA), an in-depth centralized European evaluation of the soundness of banks. AQR is one of the three pillars of CA. It aims to achieve harmonized definitions of non-performing loans and forbearance; guarantors of the principles of disclosure of bank balance sheets (EBA (a), 2013). The activities of AQR, though involving a small number of large banks, have influenced the choices of credit intermediaries in terms of management and the monitoring of credit risk (EBA (b), 2013; ECB, 2013). The fifteenth update of the Bank of Italy Circular n. 263 of 27.12.2006, entitled "New regulations for the prudential supervision of banks", defining a set of rules intended, among others, to strengthen systems of RM reported by recent empirical evidence as highly vulnerable, introduces important innovations in terms of the monitoring of credit quality, especially for the treatment of migration risk (Banca d'Italia 2013). Such monitoring should be supported by technology and information; these are safe and adequate for the needs of the business, according to the principle of proportionality, so dear to the national authorities (Iannotta G., Nocera G., Sironi A., 2013).

The use of appropriate technologies and a sophisticated information system can be considered a key factor in providing the banking sector with a real source of strength in the current market. The banking information system can be defined as a set of people, procedures, and tools designed to implement the collection, processing, exchange and archiving of data

to obtain an organized flow of information that can be used to plan, execute, and control the business (Resti A. Sironi A., 2007; Petzer D.J., 2012).

From a strategic point of view, a safe and efficient information system makes it possible to exploit the opportunities offered by technology to expand and improve products and services offered to customers, to enhance the quality of work processes, to promote dematerialization of securities, to reduce costs also through the virtualization of banking services. From an operational point of view, an information system provides managers with detailed, relevant and up to date information for taking timely decisions and for the proper implementation of the process of risk management advocated by the new regulations. In a context where the banking business is increasingly dependent on new technologies, an important role in preventing, reducing and controlling operational risk is played by information security in terms of defense against attacks and continuity of service.

The information system has, in addition, the task of recording, storing and correctly representing facts and events relevant to the purposes provided for by law and by internal and external regulations (compliance).

Through an efficient information system it is possible to speed up the transmission of messages relating to transfers of funds between banks; to implement an efficient flow of data and information between the branches and the central offices; to reprocess and reuse data concerning the various operations and for different purposes; to provide customers with an ever wider range of products-computer services, particularly in the area of self-service banking.

A further step in the modernization of the bank sector is the introduction of technologies relating to business intelligence through which realize a further and important change in the approach to data analysis. Indeed, if in the past the software houses tried to predict and define already in the design phase managers' information needs, today's information systems allow the exploration of the heritage of the available data, avoiding for the user problems of regrouping and rationalization of information resulting from their dispersion in different platforms and in large archives. These systems basically make it possible to analyze data without the need to formulate a priori hypotheses, and to research acquire the knowledge necessary to understand and anticipate the most complex phenomena.

Previous studies (Halandy L., Ajeeb A., Ghabban A.A., 2009; Hamdan, A., Abzakh, M., 2010) have concluded that there is a need for effective internal control that keeps pace with developments in the IT environment. In other words, IT controls activity evaluation impacts potential integration with administrative and financial information systems. The use of IT will have a direct impact on internal control

work. (Al-Laith A.A.G., 2012). IT's impact on the efficiency of control does not differ from the traditional objectives of the internal control systems although there are data security and safety risks (Al-Qudat, 2009). In fact, when the information used by financial institution is often entirely IT generated, managed and controlled, the confidentiality, availability and reliability of financial information is crucial (Pavel N., Unchiaşu S. F., 2013).

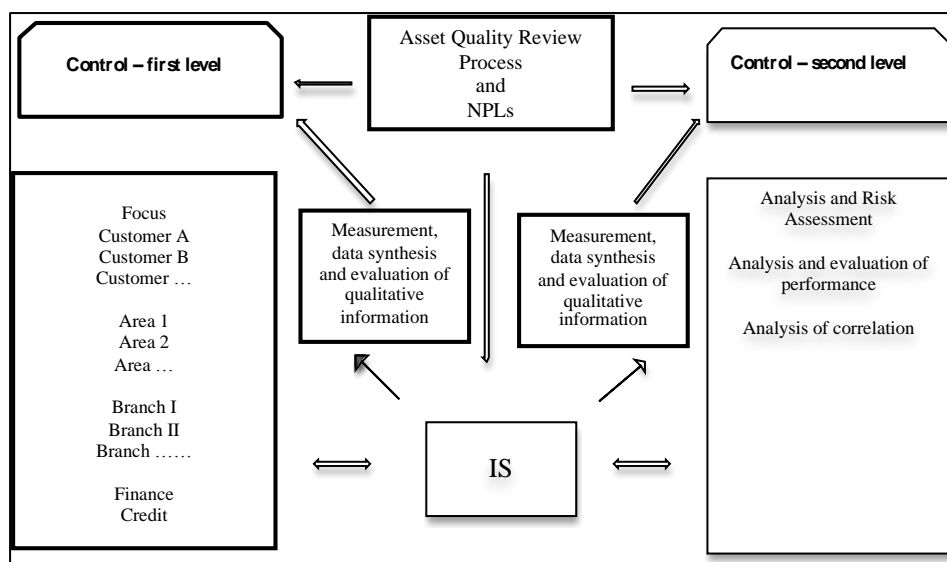
It is obvious that the banking IS is reduced to two subsystems: the operating and the directional. These two sub-systems, while being highly integrated, serve different purposes. The purpose of the office is the administration of essential information for the strategic management of the bank. The subsystem operates at the heart of the "productive" system of the bank. It allows the realization of all investment transactions, collection or provision of services required by customers. The monitoring of business has always been an intrinsic part of the organized credit process. IT is often implemented to manage, control and report credit risk, market risk and other types of core business risk. "However, the IT applications and infrastructure elements are still within the operational risk domain, regardless of their specific purpose. As an example, the failure of a credit risk measurement application is an IT failure and, therefore, a "systems failure" in the sense of operational risk" (IT Governance Institute, 2010). Compliance under the evolving regulatory regime is focused on accurate reporting. While Basel II data quality is a means to an end rather than an end in itself, the deployment of capital based on risks requires high-quality, high- frequency data. Robust information is at the heart of improved risk management. Inadequate data quality is likely to introduce errors in decision making in an environment in which corporate executives must attest to the accuracy of their financial statements and the quality of internal controls.

For a long time the function of RM, within credit risk, had responsibilities regarding the estimation of the Expected Loss (EL) of the loan portfolio, the definition of migration rates between classes of NPLs, the type of collateral and the recoveries for technical forms. Moreover, in the credit process it contributed to the estimate of the impairment and the writing of the portfolio in collaboration with the managers of the business units (BU) (Altman E.I., Saunders A., 1998; Resti A., 2001).

Once credit policies have been defined, the RM has to, ensure that they were correctly applied to the credit process by the operative unit. The RM provides

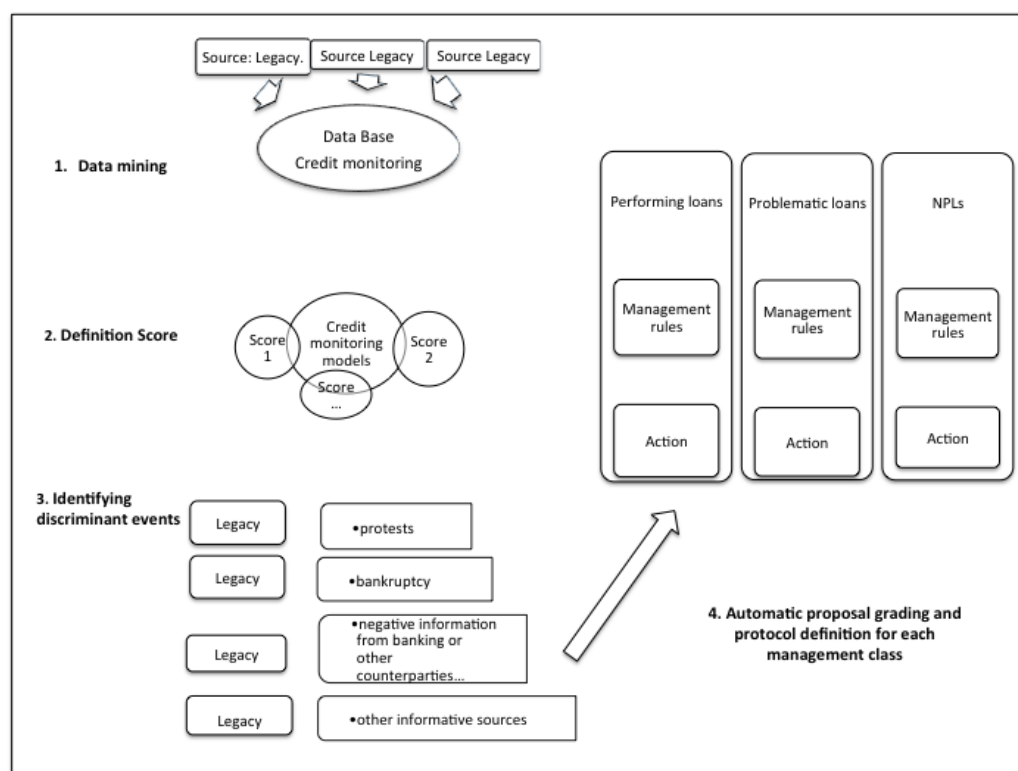
the guidelines to be followed and the intervention policies that are limited to the portfolio of problematic credit, for which, the control activity of the RM limits itself to revealing the possibility of a shift beyond accounting. This moves the operative unit towards the adoption of portfolio models focused on compensating for the lack of information generated by the accounting approach and thereby guaranteeing higher profitability. Regarding impairment, the methods of estimating losses on a loan portfolio are still based on binary logic, so that, for each entrusted individual only two positions are recognized: in default or not in default. It follows that the prospective loss on a loan portfolio in the holding period is expressed as the sum of the product between the PD and LGD of all debit positions classified in the portfolio (Daffie D., Singleton KJ., 2003). This method leads to the determination of the loss by default and not the determination of changes in the creditworthiness of the customer. However, in a particular range of temporal reference, a position is non-defaulted, but might undergo, in a very short time, deterioration in credit quality (Altman H.I., Resti A., Sironi A., 2005; Altman E.I., 2002).

Methods of analysis to determine the variations of risk determined by the migration between rating classes (migration risk) can still see an early application in domestic banking organizations, in which the management of exposures is accomplished using static portfolios. The main objective of the function of performance monitoring, which is separate from the functions of grant and loan disbursement, is the identification of positions in the past due to which you require restatement activities credit. This function is supervised by BU and by specialized figures of RM (ie CRO, Relationship Manager, Monitoring Officer), and is supported by IS technology. This process need the new information which provides a general judgment of the strength of an industry or a segment of the loan portfolio, and are incorporated and transformed into input parameters to be included in the optimization models. A significant contribution in terms of improving the quality of information and processes to support reporting activities is offered ultimately by the IS (Altman E.I., Sabato G., Wilson N., 2010). It is difficult, in fact, to think that the function of IS is a stranger to strategic activities such as those aimed at controlling the quality of credit by consolidating the information heritage and making accessible to most individuals inside (local and central) the amount of diversified information which is useful in decision-making and in the making of operational and strategic choices (Figure. 1).



**Figure 1.** The role of IS for the prevention of NPLs

The function of monitoring credit processes, as highlighted in figure 2, includes the following 4 main elements:



**Figure 2.** The monitoring of loan performance: a proposal for automatic classification of the portfolio

Data mining; periodically (i.e. monthly, quarterly) data entered into the credit monitoring models are extracted from the Legacy Information System; they are then assembled in a database developed using modern technologies and paradigms, and organized in tables, according to the different

areas of investigation. Such tables model the behavior that underpins the business of credit monitoring;

Definition Score; periodically (i.e. monthly, quarterly), the Early Warning System processes the behavioral patterns and computes a proposed classification based on the cut-off defined by top

management. The analysis takes into account the severity, frequency and duration of credit and behavioral abnormalities observed (i.e. protests, bankruptcy, negative information from banking counterparties, and so on);

Identifying discriminant events; such events, which are responsible for the occurrence of each anomaly, are monitored regularly; the frequency with which testing is done depends on the type of anomaly;

Automatic proposal grading; customers are classified into three management macroclasses (performing, in observation, in default), depending on the degree of solvency automatically detected by IS; the outputs of the system are then sent to the RM through a dedicated Web-based tool (SMR); finally for each management class a specific protocol is defined that commercial operators must follow in order to safeguard the quality of credit (Cfr. Table 1).

This level of formalization of credit activity requires a substantially expanded measurement framework in which complex non-deterministic measurements are progressively used to achieve the goals at each level.

The goals and results associated with each level in Fig. 2 allow for control and progressive performance. These basic elements of the empirical relational system are analyzed using the extant information technology (legacy system) from manual to highly automated tools depending on the formalizability and economics of the processes (Albanese C., Lawi S., 2004). The economics of formalization is contingent on the size of the organization and, consequently, the frequency with which a function is repeated. A seldom-performed function cannot be easily automated.

Banks always attempt to carry this out for the loan portfolio in order to limit the expected losses. However, the granting of credit is an activity with an uncertain outcome; in fact, an actual outcome may be better than expected, but this condition requires the activation of appropriate defences to face the possibility that you may experience the opposite outcome. Obviously, the attitude towards this uncertainty differs according to both the type and the quantity of information possessed (Grunet J., Norden L., Weber M., 2004).

To understand the significance of the "new" regulations contained in Cir/263 and its effects on the quality control of credit for the creation of value for an enterprise, we should shift the focus from the control of expected losses, for the establishment of adequate levels of provisioning and of economic capital, to the control of the change in value that loans and receivables could undergo in a holding period.

Recent studies (Resti A., Sironi A., 2008 and 2009; Hibbeln M., 2010) show that the profitability of a portfolio is not directly influenced by the default risk assumed in the process of granting credit, which is defined by the corresponding level of the fair spread, but it is determined by process elements that

are defined in the credit management relationship. This must be taken into account in the adjustment of the ongoing debt position so that the correct dimensioning of the expected loss and the corresponding adjustment of the spread on the price of credit is effected.

We are talking about proactive management of credit exposures, an asset valuation of the loan portfolio, for which a careful diversification of the portfolio is important because it counteracts the deterioration of all portfolio positions (Acharya V.V., Hasan I., Saunders A., 2006): the price differentiation on the portfolio as a function of PD that ensures the coverage of operating costs, of capital allocation costs and of funding operations; the monitoring activity oriented towards the control of migration risk rather than to the management of the loans; the periodic review of the rating of borrower useful for the measurement and prompt management of the risk of migration; the timely and effective action times for the recovery of problem loans.

It is the unanimous opinion of the experts and researchers (Hibbeln M., 2010; Quagliarello M., 2013) that it is in these last two stages of the credit process (performance monitoring and recovery activities) during which the benefits of the control of the second level of RM may emerge, according to the standards of the new legislative system, which assigns to the Chief Risk Officer (CRO) the role of guarantor of consistency in the assessment of claims; a control typically of the second level, and not a mere verification of compliance with rules of management of problem loans, but rather a functional check on the formulation of judgments of consistency of ratings, adequacy and appropriateness of the process with the provisioning policies. The new rules in fact further a dialectical relationship between the CRO and the unit-risk takers. They also enforce the preparation of the document Risk Appetite Framework (RAF), (Banca d'Italia 2013) which identifies all types of risk that banks intend to take and, for each type of risk, the RAF identifies the tolerance thresholds and operating limits both under normal operation, and in terms of stress conditions. The effect of this is continuous interaction between the RM, which defines the tools, and the BUs, which must use the necessary tools. In this way we can define a condition for which the function of the RM is the guarantor of the AQR process.

The stages of the monitoring and recovery of the credit process will be overseen by the BU and the RM, although each will continue to maintain its distinctive expertise, respectively, for the functions at the first and second level. However, in the case of different assessments this will depend upon the opinion of the CRO; a new rule that should not be interpreted as a solution to the discrepancy in evaluations of the loan portfolio, but rather as a stimulus to a virtuous dialectic between the functions

in question, aimed at sharing preventive tools and models proposed for controlling the quality of credit.

Proper management of these steps requires a regular flow of double-way information between the business units and the RM; and qualitative, quantifiable and processable data.

The logic set out above expresses a systemic view of the credit process that is read not as a sequence of steps, but as a set of interrelated activities that take shape as a pattern of relations between the parties (subjects and procedures), and in this scheme the quality of the information in the circle becomes the major determinant of the expected result.

### 3. Methodology

This work analyzes the contribution of the IS on the integrated process of credit monitoring, highlighting its implications, through a qualitative case study methodology, focusing on a banking group, which operates in credit intermediation activities and has strong local roots.

The basis of the work has been formulated on the following hypotheses:

1. The process of AQR needs to adopt tools, additional to the traditional ones that allow the RM to perceive the "migration risk" of the loan portfolio, paying greater attention to the qualitative composition of the receivables.

2 The information systems are a priority in the strategic management of non-performance loans.

In fact, they may allow:

- the impasse that is generated in the global, differentiated, non-linear and non-formalized information management resulting from the close-ratio between the territory and the client;
- the handling of "positions" for homogeneous groups;
- parameterization of the objectives and thus the subsequent measurement and evaluation of performance;
- the timely availability of reliable information.

The choice of the case examined was determined by its specific features: orientation towards the traditional banking business, its being the "reference bank" of the Italian region and, last but not least, the recent implementation of a system of rating of its retail segment. This allows the bank to have a more advanced management of risk of counterparty default using econometric models developed in collaboration with an external consulting company which completes the process of revision of the rating model developed about 2 years ago. These features of the specific operating mode require taking into account several aspects, including the variety of education and culture of the staff, functional relationships, as well as appropriate technological resources. The above features affect the conception, development and

deployment of IS solutions that are adopted in order to reach the business objectives, especially that of improving asset quality, as mentioned above.

## 4. Empirical Research

*(In this work we leave in anonymous the name of the bank)*

### 4.1. Case Study: Cassa di Risparmio Alfa

This case study regards a small size banking group operating in an Italian region.

The Banking Group consists of the following "macro components":

1. The Holding Company (Alfa) which is responsible for: a) the definition of strategic guidelines and the direction and coordination of business activities for the various companies belonging to the group; b) management coordination; c) coordination and operational control.

2. The Service Company one of whose functions is to support lending activity in order to achieve economies of scale and scope and to maximize efficiency.

Alfa, well established in the region, provides their customers with a distinctive service, pursuing the opportunities offered by the market in a context of rigorous management and creating value for its stakeholders. It has a group design, manufactures and sells a wide range of high technology-content products and services in order to satisfy the needs of its customers. It is characterised by a highly dynamic culture, a strong focus on ethics and compliance, and commitment to following market developments and provide advanced technical solutions.

The features of the strategic management of the Group can be summarized as follows:

- operations prevalently in retail banking, with divisions operating in private banking, corporate banking and, albeit marginally, in investment banking. Retail banking, a traditional vocation of the Group, is aimed at individuals and small and medium-sized enterprises with a comprehensive range of products such as debit/ credit cards, online payment systems, home banking services / remote banking and the provision of investment services;
- high quality of services and prudent risk-taking both for the property operations and for those made on behalf of customers;
- stability of ownership, transparency in dealing with the market and shareholders as well as maintenance of adequate capital levels;
- organization and control systems tailored to the specific needs of the Group, systems that have evolved take account of technical-normative changes.

In this context, choices are targeted and aim to follow certain technical principals, professional

resources that are expert and subject to proper and continuous training, with outsourcing for instrumental functions, including primarily those related to information systems. The strategic plan 2013-2017 has a strong orientation towards traditional business even if it includes planned activities in the development of the profitability and the achievement of a more solid capital adequacy through the growth of the gross income generated by the network distribution, the efficiency of the cost structure, refocusing on the core business of the Group, the rationalization of the management of credit and measures to consolidate the asset base.

Correlated to the strategic management of the Group is the traditional system model of corporate governance for administration and control. The latter includes:

- a) an administrative body, i.e. Board of Directors (BD).
- b) a supervisory body entrusted to the Board of Statutory Auditors with regard to the control of organizational, administrative, accounting and effective functioning procedures; the Risk Committee in support of the BD and the Supervisory Board; with the Cir/263 is the Body Control (BC);
- c) an external auditor for the statutory audit.

#### **4.2. Description of the credit monitoring process and IS application**

With particular regard to the system of internal controls, for the process of Credit Monitoring (CM), the current solution replaces a former architecture based on a highly diversified range of custom applications developed over the years without a unified vision. The process of verification of the loan performance monitoring is carried out by the Monitoring and Problem Loan Management (MPLM) and the RM on the basis of the mapping of control activities to be carried out within the scope of responsibilities of control for first-and second-level. Firstly, the function of RM becomes a second-level function only in the post-crisis period. Previously it was part of the control function of management and as such did not have the ability to report directly to top management and information flowed into the Asset and Liability Management Committee. From the "insurance" of risk there has been a switch to the management of risk and the subsequent growth of the information flow from Risk Management to the Board of directors and other corporate bodies.

In compliance with the Cir/263, the control functions (internal audit, compliance and risk management) were re-examined radically within the Group; in particular, the function of RM has acquired independence from other control functions and cooperates with SSB for the definition of the Risk Appetite Framework (RAF), a document which identifies all types of risk that the Group intends to take and, for each, identifies both the tolerance

thresholds and operating limits in normal operating conditions and in stress operating conditions.

The starting point of our research is an analysis of the credit processes; the aim is to demonstrate whether it is possible to reach the final objective of the highest quality of the credit portfolio, keeping under control all the phases involved in the process and, for each, to highlight those key variables which indicate a progressive worsening of the credit merit. This makes it possible to respond quickly by eliminating the anomalies identified.

The monitoring of credit is based on the classification of positions as "performing loans" and "NPLs". In the course of the use of credit, the position of the client can pass to an "anomalous" state due to the occurrence of new events (i.e., behavior that differs from those provided for by contract or representative of a downgrading in economic and financial positions). The knowledge of these events is linked to the bank's ability to intercept and to prepare the tools (including organizational aspects), to systematically monitor positions, in order to bring out the "anomalies" responsible for the deterioration of credit quality.

MPLM and RM are responsible for the monitoring of loan performance. What is the perimeter of the operations of each, since they are control functions respectively of first and second level? How can they contribute to the implementation of an efficient IS to contain the deterioration in credit quality? We will try to verify these questions through our case study.

With reference to the control of credit risk, the rules contained in Cir/263 recognize an innovative feature within the RM service, namely that of "arbiter" of the activities carried out by the BU, relative to monitoring credit risk. RM defines the tools of the policy for granting, monitoring, dispensing and recovery; the RM then checks that the credit conditions offered by the bank are respected and, in the case of conflicting estimates, the decisions applied by the function of the RM are applied. This innovation is very important, as the RM has to assess whether those responsible for the business unit comply with the credit policies, which the bank is given in the RAF. In the process of granting credit the policy of acceptance can be shared. This happens at the stage of granting credit, the technical component of the formalization of the guarantee; therefore the activity of credit risk control performed by the RM assumes its full importance in the last two stages of the credit process: the monitoring in which trend anomalies are emerging and on which quick action can taken to restore the initial situation, and the recovery phase, which, though important goes beyond the scope of our analysis. RM has identified some early warning indicators that represent possible abnormalities with respect to the process of monitoring of the first level, which is carried out by MPLM. These indicators refer to the following stages



of the process of managing and monitoring credit: 1) classification of positions; 2) adequacy of capital amount; 3) adequacy of the recovery procedure. The results of the checks are subject to periodic reporting to the SSB, MFB and BC.

In this context, RM checks that the transactions under investigation are classified in accordance with the regulations of the Bank of Italy and with the rules established by internal regulations, also regarding the time spent in the temporal range.

The Alfa loan portfolio is therefore split into two main categories of credits: performing and NPLs. The first class includes positions that are performing and positions that are showing signs of being in trouble: loan positions observation; loan positions observation-recovery, loans in near past due. The other class of credit includes NPLs: past due; objective substandard loans; substandard loans; restructured loans and NPLs. In this context, MR performs a quarterly-monthly check only for the passage of position from past due to past due-on training, in compliance with the maximum time fixed for each class in the credit policy, with reference to the last two subclasses, state transitions of deterioration are performed manually.

The bank, in accordance with Cir/263, has developed tools for the monitoring of credit shared by the organization, in order to make the control mechanism of the deterioration of credit quality more objective. Of course, the process of asset quality review cannot totally exclude the qualitative elements of the customer relationship, which represents the core variable in the management of credit for which, at least for the foreseeable future, the quantification and standardization of information is neither necessary nor possible. And this is a difference between smaller and larger banks; the latter need quantitative information which is necessary for the development of forms of remote monitoring as well as statistical tools useful for the identification of anomalies; in addition, they need detailed data; all of this justifies the need for standardization of information. The smaller banks, such as the Alfa, with close links with the local area, establishes credit relationship also on qualitative elements of customer relationships that do not fit in the IS due to the complexity of the data and the cost associated with information processes.

In order to ensure that the deterioration of the loan portfolio is detected promptly, the bank should undertake a periodic review of the receivables (i.e six months, annually) and a verification of the quality of the loans whenever those who control them have indications of a significant decline relative to the

portfolio or part of it. A judgment concerning deterioration focuses on the ability of the borrower to repay the amounts due, as set out in the loan agreement; the analysis of this ability to repay is the most important element of the bank-customer relationship. It is upon this aspect that small banks build their history.

The monitoring system of the bank in our case study should be based on a reporting system that is capable of measuring the previously identified indicators. The management of the position in observation-recovery is reserved for the exposure of enterprises that have abnormalities that require a timely revision of the credit line and a continuous monitoring of movement to establish whether, within three months, it is possible to bring them back from performing positions or if it is necessary to downgrade. The classification of substandard loans can be automatic or of its own motion. In the first case this regards objective substandard loans. The Service Credit Monitoring can downgrade the positions manually, when the anomalies found are detrimental to the successful completion of the financing position. Therefore, in cases of substandard banking carried out automatically within the procedure, the Credit Monitoring Service decides the downgrading.

The management of objectively substandard loans, the treatment of which is assimilated into that of substandard loans, consists of the preparation of plans for the restructuring of the debt, even in part, or the repayment of the outstanding debt. Where the requirements are not met, the conditions occur for the classification of non-performing loans. This type of monitoring is therefore not carried out at the last stage of the credit process, where it has to be decided "when" and "how" to establish procedures to recover the credit, but rather concerns all stages of the credit process. As such, this could lead to a virtuous cycle that would in turn lead to an increase in the quality of the loan portfolio.

If the conceptual framework at the macro level (fifteenth update of the Bank of Italy Circular n. 263 of 27.12.2006) should be shared, then at the micro level (territorial unit of analysis) common factors can be identified; they will be calculated with shared indicators as well as indicators able to capture the specificity of the context. This contributes to the identification of different, but comparable, systems of measurement.

Table 2 indicates that in Alfa some controls can be effectively done automatically and others manually with respect to the positions observation-recovery and past due training of troubled loans. In the last column, we indicate the frequency of the checks.

**Table 1.** Segmentation of the bank's loan portfolio

Credit positions	Definition	Early warning	Method of downgrading	Frequency of the checks
Performing	Troubled loans: Positions with anomalies signals, split into: observation-recovery	remaining over 90 days in this range;	manually	monthly
	near past due	remaining over 90 days in this range and exceeded 5% of used on the loan;	manually	monthly
NPLs	Past due	exceeded 10% of used on the loan;	Automatic	quarterly
	Objective Substandard loans	loans over 100.000€ and remaining over 60 days in this range; loans under 100.000 € and remaining over 120 days in this range;	Automatic	quarterly
	Substandard loans	remaining over 18 months in this range;	Manually	quarterly
	Restructured loans	changes in the original terms of the loan;	Manually	quarterly
	NPLs	discrepancy between adjusted doubtful loans blacklist of Central Risk	Manually	monthly

The monitoring system should be based on a reporting system that is capable of measuring the previously identified indicators. The purpose of reporting within information systems is to provide analytical documentation of meaningful activities. Such disclosures should be as up-to-date and correct as possible and therefore should not generate inconsistent interpretations.

After the above activities have been completed, the aim is to redesign the IT system. In this way, for “every point in time,” it can identify the contribution to RM of the operating results in all phases of the process, taking into account deviations, the causes of variations, and the impact on the npls.

The bank must consider the following questions:

- What database (DB) should be used? In Alfa, the bank uses a transactional database that can, in turn, be used to develop an analytical DB or ERP system, possibly supplemented by external data sources and processes;

- What tools provide the information? The continuous monitoring of credit processes requires a

group to use the reports prepared by the transactional database as well as new forms of communication through reports, direct conversation with customers, qualitative questionnaires.

Data can be extracted from the mass; these extractions can be highlighted where there are exceptions to the norm; in this case there is a phase of analysis of the reasons for these differences.

- What systems for guaranteeing security and reliability should be used for the data? Data security is a significant challenge: more information generates more value for those who use it, but confidential data also generate risks and have legal implications. The role of continuous monitoring is to ensure the reliability of the data; the monitoring of credit must be supplemented by data validation mechanisms that can provide an adequate level of privacy.

The group has adopted an ERP solution; however, it relies on a management reporting system that is based on database processing according to the information needs of the individual management areas.

Since the questionnaire contains mainly qualitative information, the IS has a marginal role.

The ratios and the results of choices cannot be extrapolated because the analyses are made on a judgemental basis and also aim to include examples of good practice.

Alfa deals with each case based on its own merits rather than applying general rigid rules: this is because the projects selected for monitoring are established not on a statistical basis, but rather on a relational capital basis.

The definition of the rules requires that the data be:

- complete (it must be possible, for example, to export them from the branches on-line and off-line and integrate and aggregate them with other qualitative information and spread transmit? them over the net);
- primary (digital assets must be presented in a granular so that they can be integrated and combined with other data in a digital format);
- timely (users must be enabled to access and use data on the network quickly and promptly);
- accessible and available for both the first level control and for the second-level control;
- reusable (to create new resources)
- permanent (to generate value).

In essence, the refinement of the control will be followed by the need for an information system, essentially making the action of risk management more effective.

As other studies have shown (Montoya M.M., Massey A.P., Khatri V., 2010), the consequences of the expansive role of IT tasks and base technology will be that the bank will have to regularly implement and manage complex and expensive IT systems at an integrated level of organization. This will include the planning of company resources (ERP) and global collaboration platforms. The bank has an IS in full out-sourcing (in accordance with the rule of Circ. 263).

## 5. Conclusion

In addressing the contribution of IS to credit monitoring activity to control the quality of assets we have focused on three main issues: a) the new provisions of the Bank of Italy regarding Internal Control Systems (Cir/263, 2013), b) the increase in the responsibility of a Risk Management System for the actual functioning of risk control and c) the relevance of IS to support the asset quality process and its potential benefits as well as the main key risk indicators useful to the RM to promptly identify the deterioration of asset quality.

Overall, Alfa shows the relevance of the new provisions of the Bank of Italy to Internal Control Systems to understanding the role of RM and IS in supporting credit monitoring and asset quality control and its potential benefits as well as the main key risk

indicators relating to operations management. Looking ahead, a regular exchange of information between the business units and the risk control function could potentially benefit the implementation of a monitoring activity. This would not be limited to the management of non-performing loans, but would support managers in the overall control of migration between risk classes. The balancing of roles will tend to promote dialectic between the two functions of first and second level, which will share ex-ante the evaluation criteria of receivables ("tools"), and which will be used by the business unit managers in the review process of asset quality. In this sense, the issue of monitoring the quality of credit by the RM function probably points to the area of greatest innovation introduced by the new regulations.

The case study confirms that the AQR process could help to reduce the deterioration of the asset quality of financial statements to the extent that it is able to activate a careful analysis of migration between risk classes. An examination of the mechanisms through which migration between risk classes changes the margins in lending highlights the benefits arising from monitoring from a risk control perspective. For these purposes the following are relevant: 1) allocative efficiency, defined as the ability to diversify the loan portfolio, which could achieve a reduction in the risk of deterioration of the joint debts; 2) the revision of the rating and the value of collateral; 3) the timeliness and effectiveness of recovery of non-performing loans.

Currently, IS is not a strategic priority; the information available is not structured in a system, but is useful for the so-called "phase two" asset quality review (AQR). Our second hypothesis was rejected, but in the future IS could be necessary for supporting risk management in the decision-making process and in aiding performance evaluation.

As this research is in its initial phase, this subject will require further analysis. Indeed, this work contributes to an initial discussion of the potential implementation of AQR processes in smaller banks given the Italian legal framework; it discusses the control management tools implemented in smaller banks and their possible benefits, as well as how a culture of continuous credit monitoring and performance measurement can be generated within Alfa; it also provides evidence of the possible benefits to the bank's performance and thus encourages government policies that would incentivize the use of new IT tools by smaller banks in management and control processes of asset quality review.

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