Data Quality and Data Management in Banking Industry. Empirical Evidence from Small Italian Banks

Elena Bruno, Giuseppina Iacoviello, and Arianna Lazzini

Abstract This chapter addresses the problems created by fragmentation of performance management systems, i.e. having different systems for storing, reporting and analysing data for different business functions, locations and units. These problems are the result of organizations focusing IT investment on systems that support the efficient day-to-day operations, making it difficult to access and use data to support management decision-making. Relevant data is likely to be spread over multiple databases in different systems, in multiple formats and even over multiple organizations.

Keywords Information technology • Credit quality • Standardization report • Credit risk • Asset quality

1 Introduction

With the rapid evolution of information and communication technologies (ITC), information systems (IS) have assumed a central importance in the organizational and functional structure of all kinds of business. The spread of technologies linked to the use of the Web has, moreover, favoured the redesigning of the very boundary lines of the company [1] which today appears increasingly open and connected with other entities and information systems.

In this context, the implementation of information systems capable of managing a plurality of information types coming from various information sources as well as

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the adoption of effective policies of information security assumes a crucial importance. The continuous and rapid changes in technologies, on the one hand, and the considerable operational, organizational and financial commitment, on the other, make this process extremely arduous. This is particularly important for banks which today have to meet new needs and challenges. On the supply side, it can be observed that, if the guarantee of secure and reliable services has always constituted a factor of primary importance, today it becomes one of the main components of competitive advantage.

From an operational point of view, the regulations require increasingly strict controls and the implementation of standardized, automated processes in order to manage better and reduce the various components of risk to which a bank is subject. The measurement and management of credit risk have in recent years assumed increasing importance in the process of risk management for financial institutions, also in the light of the recent crisis that has involved economies of many countries. Credit quality impairment has mainly affected small and medium-sized enterprises which constitute the life blood of the Italian productive system. The negative economic cycles that have involved Western economies in the last few years have made it very difficult for businesses to comply, in the agreed times, with the terms of finance contracts signed with financial intermediaries. In this context of credit risk aversion, there are important new developments of a regulatory character regarding the correct representation of impaired credit information.

The first concerns the introduction by the Bank of Italy of the "archive of the losses historically recorded on default positions" which requires the annual notification of losses suffered on non-performing loans (non-performing receivables, substandard, doubtful, restructured loans and expired and/or over-limit impaired exposures). Objects of detection are the exposure at the moment of default, any variation in the exposure, the value of the recoveries obtained, the costs connected with the recovery activities and information details relating to aspects such as technical form and system of guarantees. The second innovation regards the recent provisions of the International Accounting Standards Board (IASB) on the subject of the impairment test. Taking up again the cornerstone of prudence, which has always been central in the Italian system of financial reporting, but in the past underestimated in the international approach, there will be a change from the incurred loss model to the expected loss model with the aim of predicting losses in advance and avoiding their manifestation only in moments of crisis.

The activity of credit risk control is a critical and complex process that involves management at several levels and a multiplicity of business functions, primarily the function of risk management. As well as technical-quantitative skills, the employees performing the functions must possess transversal knowledge of the operating processes of the bank and soft skills such as independent judgement, critical spirit, authoritiveness and flexibility. The IS must perform a decisive role in ensuring that the process of risk management is prompt. Indispensable goals are the integration at group level of the information systems, the safeguarding of data

quality and the structuring of the information flows and of the reporting activity so that important information reaches, promptly and at the appropriate time, the desk of whoever has to decide. The comparability of the data in time and space constitutes a critical aspect. It requires an activity of standardization which, today, cannot but be based on computerized processes and languages (see the paragraph 3).

Up to a decade ago, there had been very little standardization of regulatory reporting across the European Union. Standardized electronic formats and data models such as XBRL and Data Point Model (DPM) were only introduced by the Committee of European Banking Supervision in 2004 and the European Banking Authority shortly after. These standards, however, remained nonbinding until the introduction of the Single Supervisory Mechanism at the European Central Bank (ECB) in 2014 [2]. It is crucial to note that this is no longer just "the next step" in reporting, but rather represents a radical change in regulation and supervision. This is because prior initiatives to standardize regulatory reporting focus on how organizations exchange data (and thus mainly resulted in requirements for the need for Information Technology function). The enforcement of standards such as XBRL and DPM, however, affects functions of organizations' data collection and data compilation chains (and thus mainly results in requirements for business departments). This represents an example for the continuously growing demand for regulatory reporting within the financial industry.

Some recent regulatory changes that emphasize the role of the Risk Management (RM) in the process of producing financial reporting of credit monitoring are moving in the same direction (see the fifteenth update of the Bank of Italy Circular n. 263 of 27.12.2006). The monitoring of organized activities was mainly "visual and manual" until the progressive introduction of computer technology into business operations. 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" [3].

On the basis of the above remarks, the aim of this present chapter is to analyse the effects that the enhancement and modernizing of information systems are having on credit portfolio quality, in the light also of the recent regulatory changes that have taken place in the banking sector.

A limitation of actual research concerns the lack of studies that analyse the issue of IT in the process of quality credit risk in small banks, while more surveys that have been conducted refer to the IS in large banks and more recently to smaller banks [4, 5]. 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 [6].

The remainder of the chapter is organized as follows: paragraph two outlines the background and literature review, paragraph three the application of the new model to activities of credit risk control and paragraph four discusses the research

objective and method and the final paragraph presents evidence and conclusion providing a critical review of alignment between theory and practice.

2 Literature Review

Progress in the technical-scientific field, and in particular in information and communication technologies (ICTs), has generated significant effects throughout the entire entrepreneurial system and, in particular, on the banking information systems that are today totally permeated by them.

The information system, in the sense of a dense and complex network of element whose aim is to support the manager's decision-making process through information inputs [7, 8], if it is analysed in its objective dimension, appears entirely based on the computer component in its hardware and software dimensions. The communicative flow, the number of variables considered to be deserving of attention, the importance attributed to them and the number of stakeholders with which the bank interacts have progressively increased together with an increase in the information flow required by both management in support of the decision-making process and supervisory bodies [9, 10]. The need, increasingly felt by banks to deal with events characterized by unpredictability, the frequency of which is growing, the reduction in the times required for carrying out the different activities and the new rules and procedures imposed by the regulations have rendered obsolete both the traditional decision-making processes often based on values such as trust and knowledge of the counterparty and the traditional organizational structure.

ICT, in its various forms of application, plays an active and decisive role within a bank, thanks, in particular, to the subset of its applications, whose functions are collection, memorization, processing, analysis and recovery of data and information aimed at the rapid dissemination among those involved in the operational activities.

The subjective and objective dimensions of the business information system acquire a decisive role in the current competitive context. Moving in real time, being able to count on prompt and accurate but never redundant information and having available decision-makers with highly professional skills and the ability, on the one hand, to capture weak signals originating in the surrounding environment and, on the other hand, to evaluate appropriately the importance of the information to be subjected to close analysis and interpretation are essential requirements.

Such management requirements imply the need to be able to count on an adequate information system, on an organizational structure that is able to meet fully the new needs, emphasizing the possibilities linked to technical-scientific progress, and on a solid and competent management, supported effectively by the presence of systems based on the most modern computer technologies.

Information procedures become therefore an essential part of the system, their task being to define what has to undergo analysis, the type of data to be recorded, the selection, classification and processing according to which the business

reporting is constructed. Computerization presupposes an activity of standardization and therefore a process of measurement, based on the translation into quantitative terms of the phenomenon being analysed. Such an operation leads to the identification of measurements, that is, entities expressed numerically and defined by quantities constructed on the basis of predefined magnitudes that are variable according to the designated objectives.

The activity of standardization and therefore measurement represents, today, a particularly critical aspect in the management of a bank. This is particularly true in the context of the supply and monitoring of credit where the greatest difficulties found lie in the difficulties of the standardization, and therefore of measurement, of variables of a qualitative kind [11].

Banks, especially small and medium sized, today face a trade-off between the need for standardization in compliance with the directives of the national and international supervisory authorities [12] which require increasingly automated, and therefore objective and traceable, processes, and the need to preserve their own particular characteristics and sources of competitive advantage [13].

The exchange and sharing of information (visibility) by actors in the process of credit supply and management becomes fundamental [14, 15], being considered, in the literature, a central element in the achievement of results [14, 16], in guaranteeing transparency in the processes and in the prompt indication of possible anomalies [17].

With respect to the question being examined, it would be interesting to look briefly at the meaning that should be attributed to the concepts of number, datum, magnitude, quantity and measurement, interrelated but not coinciding concepts.

The concept of number has changed over time, from being a constitutive element of that part of reality that is accessible, not to the senses, but to reason, typical of the school of Pythagoras, to being perceived today by modern philosophy of mathematics perspectives a set of signs defined by a given system of axioms. From a spatial-temporal point of view, in addition to the above-mentioned perspectives, we can trace a third according to which number is defined on the basis of the concept of class. Such an approach implies the identification of two dimensions of inquiry: the extensive and intensive dimensions.

With respect to the first dimension, number is definable as "the class of all classes, similar to the given class". From the definition, we deduce the extensive dimension of the phenomenon referable to the enumeration of the members belonging to the class. In the intensive meaning, class is described, on the other hand, on the basis of the characteristics of its members falling therefore outside the concept of number *stricto sensu*.

Number, an important part of the language through which the business economy "speaks", is used by it for the representation of facts and of real trends regarding the life of the company, ascribing to number an instrumental role with respect to a subsequent, necessary activity of analysis and interpretation of the same.

Company representations contain within them a meaning that transcends the mere mathematical expression generally used. Measurement is indeed not limited to the sole activity of enumeration with the relative assignment of numbers to

objects on the basis of predefined conventions but implies a subsequent, important activity of interpretation and evaluation of the trends on which the decision-making process is founded.

The quantitative expression of business phenomena enables the scholar to conduct first of all an analysis based on a process of a rational kind, founded on a rigorous and therefore scientific method, and secondly to carry out spatial-temporal comparisons in order to express judgements of past performances and to outline possible trends for future ones.

In business economics, the numbers on the basis of which an appropriate representation of the particular facets of the polyhydric phenomenon of the company is provided, and on which is founded the activity of choice proper to any decision-making process, are denominated data.

The two concepts seem to be interconnected but never coincident, the concept of number being included in that of datum, but the second characterized by a broader application and greater depth.

The concepts of number, quantity and measurement can be analysed in the light of the three dimensions of semiotics: syntactic, semantic and pragmatic.

While the syntactic aspect is present and intrinsic to the concept of number used in the various branches of knowledge, dealing with the "study of syntactic relations between signs, abstracting from the relationships of signs with objects or with interpreters", the semantic and pragmatic aspects, characteristic of contexts in which it is essential not only to attribute a precise meaning between the object of representation and the means used but also to consider the cognitive value assigned to the first, prove to be of little significance for it.

Applying to the notion of number, the concept of magnitude, that is, of unit or index of measurement on the basis of which to express the result of the activity of measurement, the notion of quantity is obtained. The concept of quantity conforms therefore to the numerical representation of a given phenomenon and is characterized by the possibility of applying to it the syntactic and semantic dimension of language. While what has been observed for number is valid for the first dimension, the semantic dimension is ascribable to the link existing between the quantitative expression underlying it and the phenomenon whose representation it is intended to provide. In accounting, language quantities are numerical representations of facts and events expressed using currency as index of measurement.

The last logical category is understood as the final result of the process of measurement. The concept of datum contains all the dimensions of language including pragmatics. The datum appears in fact as a number with which a magnitude is associated, and therefore a quantity, referring to a given, precise phenomenon. The datum proves, therefore, to be the element underlying every process of evaluation. It is with the managerial activity of interpretation that the datum becomes information, and, by means of its stratification, knowledge, which gives rise to decisions which are translated into actions that lead to results.

The Dikar model [18], represented in Fig. 1, has this orientation:

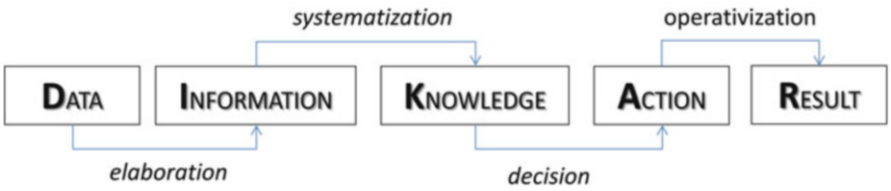


Fig. 1 The Dikar model

Systems of measurement are not generalizable or absolute: they vary in time and space according to the environmental, social and cultural contexts in which they are applied and used.

With respect to the time variable, such systems are changeable to the extent that the object it is intended to represent by means of them appears is variable, as are changeable the means and the techniques used in the same representation; with respect to the spatial variable, the latter differ to the extent that aspects considered important, and therefore worthy of measurement and consequent interpretation, and the tools used for such purposes, appear changeable. The increase in the level of environmental turbulence and the consequent increase in the degree of business complexity have brought about changes both in the aspects considered important in the decision-making process and in the modes of measurement of the performances achieved. The systems of measurement are characterized, furthermore, by the lack of objectivity in an absolute sense being based on activities of measurement carried out by man who, starting from the observation of a given phenomenon, tries to translate the qualitative aspect intrinsic to it into quantitative terms on the basis of certain assumptions. This determines the first limitation that leads to the impossibility of "true and precise" determinations in absolute terms and therefore to not being able to speak of totally objective systems of measurement since "the observer disturbs the observed" [19].

3 Dikar Model and Credit Risk Control

It is said that the ICT structures in banks have very different physiognomies, each one characterized by strong and weak points and considerably dependent on the sourcing model adopted. The sourcing models are differentiated according to the size of the bank; thus, some banking groups preferred to assign the management of information infrastructure to an instrumental company in the perimeter of consolidation large-scale banks or banks belonging to banking groups decided to resort to a so-called mixed model, keeping control of the application portfolio inside and outsourcing the technological management; indeed, the smaller banks have opted for a model of full outsourcing to external services companies [20].

The sample of banks analysed in this work, defined by the Bank of Italy as small-sized banks, is oriented towards a mixed model; this requires them to find the

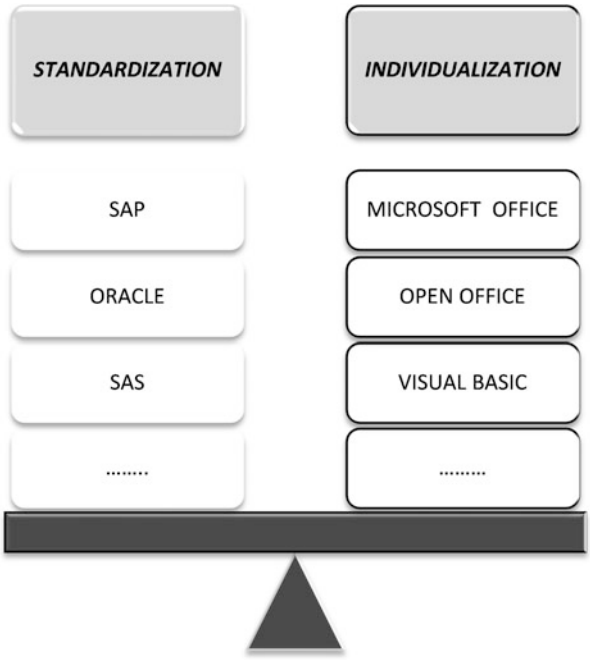


Fig. 2 Standardization versus Individualization

necessary balance between IS standardization, that is, a centralized IS according to consortium logic, and IS individualization, that is, an IS internal to the bank for application portfolio control. We define report standardization as the convergent process of unifying multiple reports [21] and report individualization as the divergent process of adjusting reports to individual preferences [22–24]. The users often supplement standardized IS with individual spreadsheets or develop entire workaround systems (Fig. 2). Unfortunately, these supplements represent several threats to standardize IS, such as data redundancy and limited reuse of existing reports. Consequently, it is important to understand how organizations may balance standardized IS with individually developed supplements [25, 26]. This assumes particular importance in times when governmental organizations continuously introduce new regulatory and supervisory reporting requirements [27].

The main information of a qualitative nature is extracted from centralized score systems (Centralized and Standardized Information System), for example, the Credit Bureau Score of CRIF or of the Risk Central—CR, which are fed by Rating models able to assess the probability of default (PD) by a customer generally over a period of 12 months. Such models use different types of information linked to the socio-economic characteristics of lenders to profession, to geographical location, to available financial assets and wealth, to family status, to external information entered into the databases of the Chambers of Commerce and to other prejudicial events. Finally, the organizational structures responsible for rating assignment supplement the same with other assessment elements, such as, for example, whether

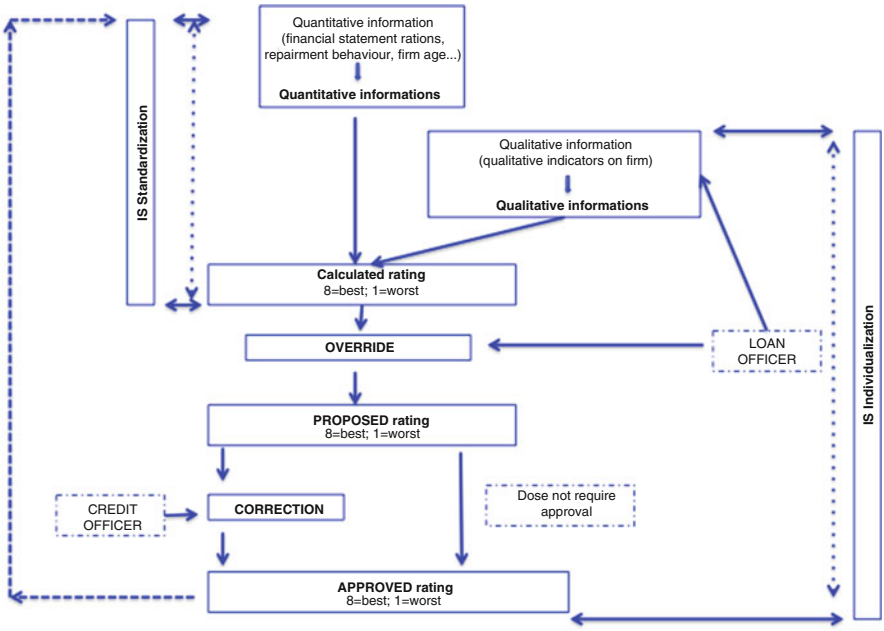


Fig. 3 IS and the rating review process

a business belongs to groups, strategic vision and management quality, the presence of investments in R&S, which feed the bank's internal (Individualized) information system. The integration of quantitative and qualitative information, generated by the centralized IS (IS standardization) and from the bank's internal system (IS individualization), supports the review of the statistical rating and therefore the definition of the customer's final rating (Fig. 3).

As shown by Fig. 3, the periodic use of quantitative and qualitative information generated by the centralized and individualized information system makes possible the continuous refinement of the rating. It is in this phase that there takes place the credit monitoring process which, by means of the constant control of the evolution of the probability of default (PD), makes it possible to highlight any anomalous risk trends and therefore the prompt implementation of politics of mitigation aimed at the reduction of the bank's incurred losses. This process is part of the broader issue of the credit risk control [28–31] and has acquired an important function with the Circ/263 of the Bank of Italy that gives new responsibilities to risk management, including that of performance monitoring credit.

The rating revision rules are differentiated according to type of customers, subdivided into classes, as suggested by the ECB in the operational framework [12], whose aim is to make comparable the models of loan portfolio quality analysis in the various European banking institutions. The framework indicates the criteria of segmentation of customers into more detailed classes of risk with respect to the criteria used in balance sheet practice (in bonis, past due, loans restructured,

substandard loans and non-performing loans—npls), and the modes of standardization of data, qualitatively and quantitatively, (Triggers) for the evaluation and monitoring of credit exposures. Thus, the customers are classified into three macroclasses of management (performing, risk cured, in default), depending on the degree of solvency automatically detected by IS standardization; the qualitative information heritage is in fact held by the sector managers (MPLM function), who in turn liaise with the RM for the performance monitoring of credit risk. On the basis of the instructions of Circ/263, the criterion of integration of rating methods adopted by small and smaller banks is the override (discretional modification of the rating itself). The statistical system of rating assignment is not able to process all soft information; the activation of override on the basis of predefined soft information processed by individualized IS can determine upgrading or downgrading variations in the rating assigned to the debtor by the statistical system: in the first case, the proposals for improvement (upgrading) are subjected to a validation procedure by the RM; vice versa, in the case of downgrading variations the validation is automatic.

With reference to the role of the IS in producing data knowledge, the reporting system of the Credit office provides analytical documentation on meaningful activities. Such disclosures should be as up to date and correct as possible and therefore should not generate inconsistent interpretations. Once the above activities have been completed, the aim is to redesign the data in the IS individualization. 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 non-performing loans.

3.1 Data and Information in Credit Risk Management

From a strategic point of view, a safe and efficient information system (IS) 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 and to reduce costs also through virtualization of banking services.

From an operational point of view, an IS enables managers to have information that is detailed, relevant and up to date 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, information security in terms of defence against attacks and continuity of service plays an important role in preventing, reducing and controlling operational risk. The IS has, in addition, the task of recording, storing and correctly representing facts and events relevant to the purposes provided 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 many times and for different purposes and to provide customers with an ever wider range of products-computer services, particularly in the area of self-service banking. Today banks require complete and reliable information and an overall integration of different applications, database and documents. In this perspective, a comprehensive and integrated IS able to capture all customer data, risk management and transaction information including trade and foreign exchange is fundamental to the proactive management of loan portfolios in order to minimize losses and earn an acceptable level of return for shareholders [32–34]. In the analysis of the customer, a substantial number of parameters are necessary. Qualitative evaluations, historical and not, such as industry scenarios and a supply chain analysis, are today required to be combined to standard information. It's clear that the presence of an integrated information system able to give a dashboard to monitor in real time with alerting parameters is nowadays a critical aspect for banks. In the analysis of information flows of particular significance is the concept of process visibility factor defined by Balasubramanian and Gupta [35] as the factor that "measures the extent to which process states are visible to specific process stakeholders through process information reporting or recording". The concept of visibility is therefore referable to the possibility of access to, sharing and use of information in real time, relative to a given process on the part of different individuals involved in the decision-making process [36]. On the basis of the paradigm of Information Processing View (IPV), an accurate and transparent management of information would determine a significant reduction in both the level of uncertainty linked to lack of sharing and to information asymmetries [37] and the possibility of errors in carrying out tasks and activities due to different interpretations or the assigning of a different meaning to the same phenomenon [38]. The IPV approach seems particularly interesting if applied to credit management process implemented by the bank in which the standardization of the credit monitoring process requires full sharing, access, analysis of data and information. There is no doubt that banks, on the one hand, are faced with the need for a redefinition of processes that are increasingly based on information technologies and, on the other hand, have to cope with the need to increase their IT budgets. Indeed if visibility requirements can be considered high in the case of the credit decision process, banks seem to establish only low visibility capabilities. An increase in investments dedicated to the strengthening of visibility is necessary today for increasing the performance of the organization as a whole making it possible to increase the speed of throughput and reduce the frequency of errors, thus increasing the objectification and automation of the process. As a result, banks have to prioritize IT investments carefully.

4 Methodology

This chaper starts from the conviction that banks of whatever size must develop information systems and standardized procedures for supporting the manager in operational activities also in the light of the recent regulatory provisions issued by national and international supervisory bodies. This chapter aims to analyse one of the components of the banking risk system: the credit risk.

In credit risk management, it is necessary to coordinate the various control functions, whether first level—line controls—or second level—risk management and compliance—for the purpose of an overall improvement in the quality of the process.

In constructing our theoretical framework, we have to consider the Dikar model (Fig. 4). The model identifies four main phases. The first phase is data elaboration—data that initially are only numbers are elaborated into information. In this phase, the semantic and pragmatic dimensions of the language are added to data.

The 2second phase is systematization. During this phase, the information produced is linked with the system of knowledge of each manager and of the firm as a whole. The third phase is related to the decision-making process and the fourth to the operativization. In the last phase, decisions became actions which produce results.

While the first phase is mainly related to information system stricto sensu, the second, third and fourth are related to the risk management. The last phase, during which results are produced and measured, is related to the system of reporting in its two components internal and external.

Starting from these premises, the main assumption is that an improvement in the quality and quantity of the data processed should increase the level of business information and therefore determine the enhancement of the knowledge system. The enhancement of the knowledge system would create the conditions for improving the decision-making process which should lead to choices and decisions of greater efficiency and therefore produce an improvement in the final results.

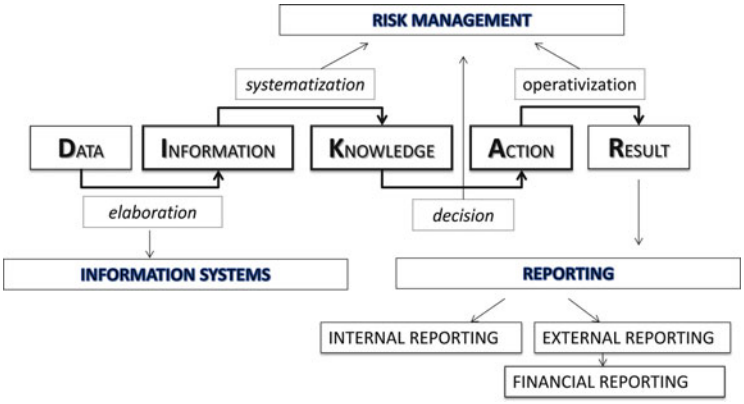


Fig. 4 The theoretical framework

From an operational point of view, the chapter is the second step of a broader research project [39]. The quantitative analysis will be carried out on banks with registered office in the province of Pisa. Such banks can be included in the logical category of small-sized local banks [20] and, operating in the same area, have in common a clientele with the same characteristics. Such an element is fundamental in the study of the npl.

The choice of focusing the analysis on small-sized banks derives from their particular features with respect to peculiarity of the business information system. Small-sized banks today use the full outsourcing approach using external databases to obtain quantitative information. They are significantly affected by the effects of the recent operational changes having a fairly extensive catchment area, but not having at their disposal the economic resources of the large banks.

The subdivision into size classes was made on the basis of the composition of the banking groups in December 2014 and of the total of non-consolidated intermediate funds in December 2008. The "small" banks category includes institutions belonging to groups or independent banks with a total of intermediate funds of between 3.6 and 21.5 billion euros.

The banks analysed are Banca Popolare di Lajatico, Banca di Cascina, Banca di Pisa e Fornacette, Cassa di Risparmio di Volterra and Cassa di Risparmio di San Miniato.

The empirical analysis will be carried out on the financial reporting of the 3-year period 2012–2014. The changes in the systems of controls and the expansion of the data and information processed should have increased the effectiveness of the activity of credit monitoring.

The greater effectiveness of the monitoring activities should have determined changes in the composition of the credit portfolio (Fig. 5).

5 The Impact of Credit Monitoring on Financial Reporting: Evidences

The starting point of our research is to analyse the role of data quality and data management in supporting credit processes to prevent the impairment of asset quality in the balance sheet; the aim is to demonstrate whether it is possible to

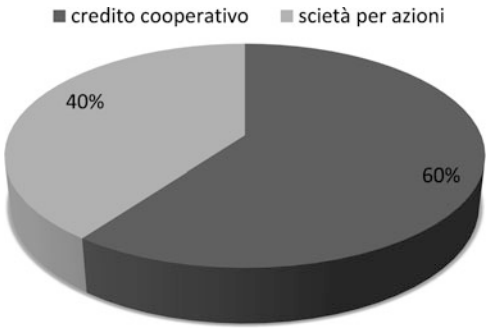


Fig. 5 The sample: structure

achieve the highest quality of the credit portfolio, exercising control over all the phases involved in this process and, for each of them, to highlight the key variables which indicate a progressive worsening of creditworthiness.

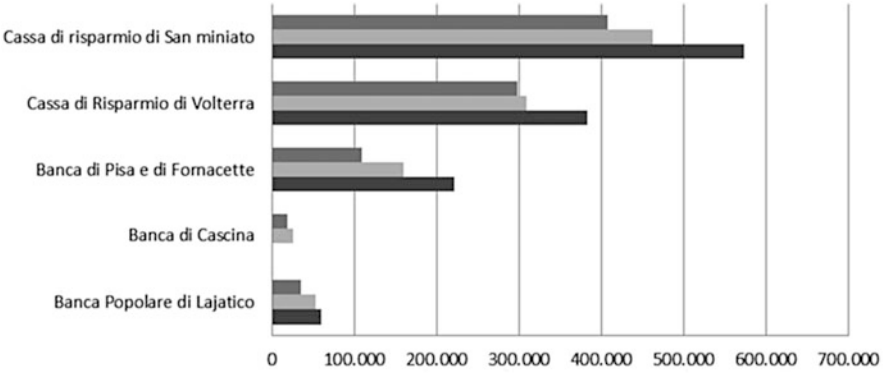
With reference to the first question, the Risk Management (RM) function has undergone a process of regulatory revision that for some scholars [40] represents a driving force for the implementation of effective monitoring of debt positions, for purposes of control of asset quality. The monitoring of credit, in fact, is based on the structuring of the processes that takes into account the models proposed by EBA. The classification of customers includes therefore two positions: "performing loans" and "npls". While using credit, the position of the customer can become an "anomalous" state due to the occurrence of new negative events. Knowledge of these events is linked to the bank's ability to intercept and prepare the tools (including organizational aspects) for monitoring positions systematically, in order to identify "anomalies" responsible for the deterioration in credit quality. The change of state occurs as a consequence of forbearance, applying the technique of override, a tool that is provided by the regulations that allow "modification" of the rating attributed to the debtor according to automated procedures in the context of creditworthiness assessment. This process is carried out by the Monitoring and Problem Loan Management (MPLM) and the RM function 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 (the function of RM becomes a second-level function only in the post-crisis period).

Such a kind of innovation is very important; the RM has to assess whether those responsible for the Business Units (BUs) comply with the credit policies, which the bank has defined in the Risk Appetite Framework. Thus, RM identifies some early warning indicators able to represent possible abnormalities compared 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.

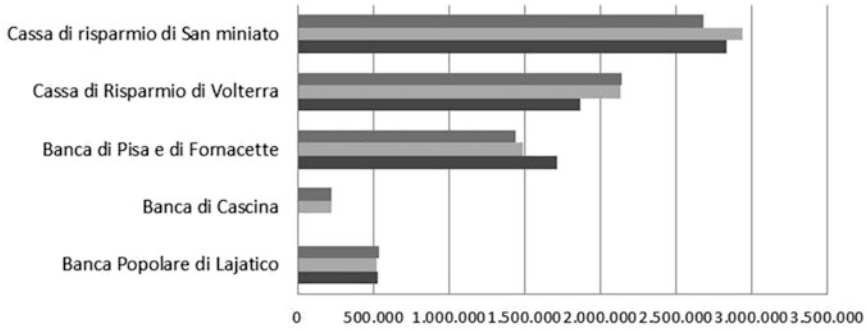
The results of the checks are subject to periodic reporting to the business units and to the business structure. In this context, RM checks that the transactions under investigation are classified in accordance with the regulations of EBA and with the rules established by internal regulations, also regarding the time spent in the range.

As seen in Fig. 6, the period 2012–2014 has been characterized by an increase in the percentage of problematic loans. Such a trend seems to be coherent with the ratio of the Asset Quality Review Process. A more objective and austere process in the evaluation of the credit portfolio concomitant with a severe economic and financial crisis seems to have produced, in the banks, a more prudent approach in managing their credit portfolio. A more prudent approach in the asset evaluation seems to be in line with the news rules elaborated by the IASB which will carry in the next year to renew the centrality of the principle of prudence in the preparation of the financial statements (IAS 9).



	Banca Popolare di Lajatico	Banca di Cascina	Banca di Pisa e di Fornacette	Cassa di Risparmio di Volterra	Cassa di risparmio di San miniato
2012	35.133	18.401	108.867	297.884	407.710
2013	52.417	25.891	159.716	309.474	463.004
2014	59.496	0	221.048	383.334	573.922

Fig. 6 The Problematic Loans

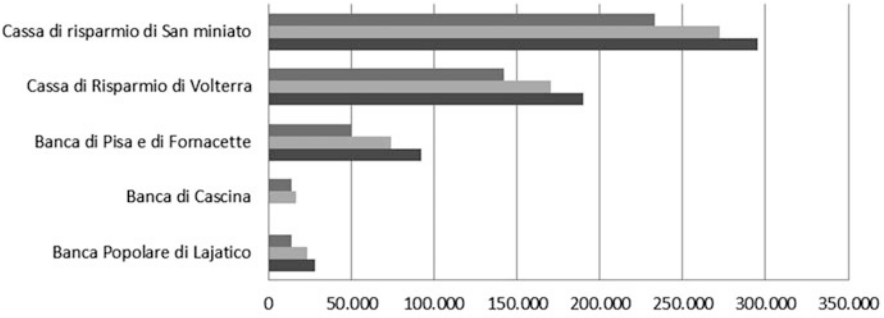


	Banca Popolare di Lajatico	Banca di Cascina	Banca di Pisa e di Fornacette	Cassa di Risparmio di Volterra	Cassa di risparmio di San miniato
2012	539.378	226.892	1.442.713	2.144.191	2.679.903
2013	524.550	225.630	1.489.328	2.135.949	2.942.245
2014	531.047	0	1.715.482	1.869.101	2.836.049

Fig. 7 The Performing Loans (PL)

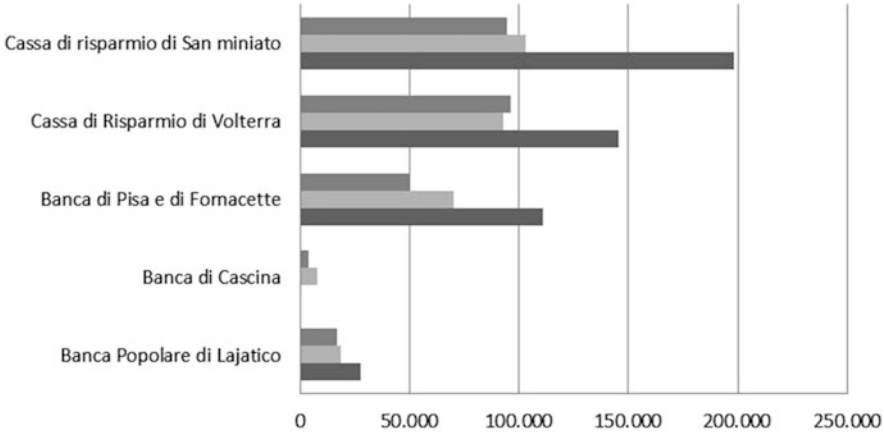
Figure 7 highlights an opposite trend for performance loans which, coherently with the previous data, seems to decrease in 2014 except for Banca di Pisa and Fornacette.

Analysing the problematic loans adopting the riskiness buckets classification proposed by the ECB, we notice a sort of deterioration in the composition of the credit portfolio. The credit quality seems to be significantly decreased in 2014 with



	Banca Popolare di Lajatico	Banca di Cascina	Banca di Pisa e di Fornacette	Cassa di Risparmio di Volterra	Cassa di risparmio di San miniato
2012	13.984	14.035	50.277	142.356	233.151
2013	23.493	16.916	73.836	170.785	272.439
2014	28.216		91.992	189.748	295.192

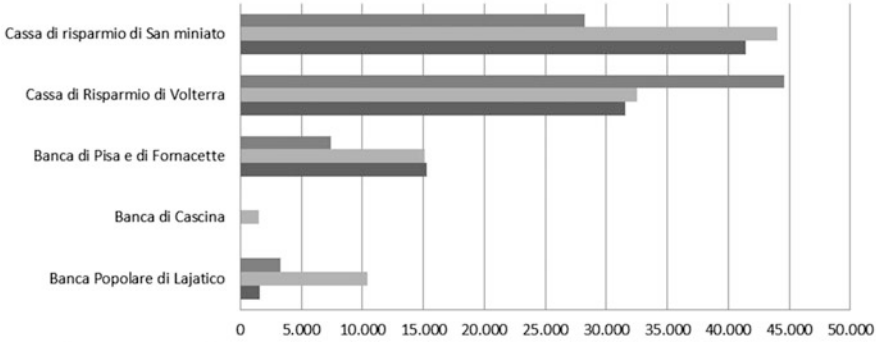
Fig. 8 The non-performing loans (NPLs)



	Banca Popolare di Lajatico	Banca di Cascina	Banca di Pisa e di Fornacette	Cassa di Risparmio di Volterra	Cassa di risparmio di San miniato
2012	16.778	3.931	50.271	95.920	94.637
2013	18.499	7.490	69.899	92.764	103.134
2014	27.838	0	110.727	145.348	198.381

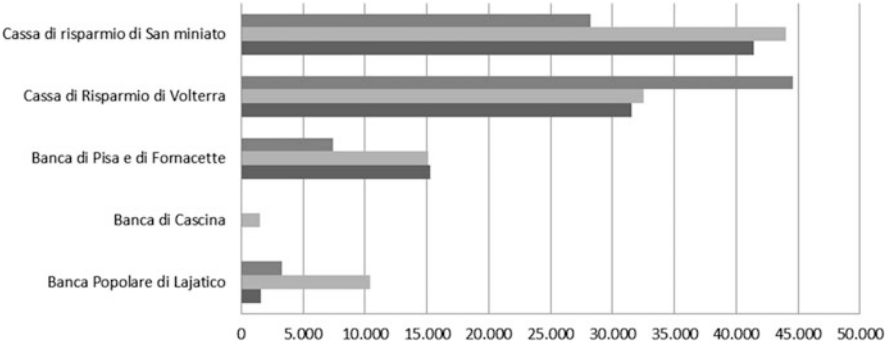
Fig. 9 Substandard loans

an increase in the percentage of non-performing loans and substandard loans (Figs. 8 and 9). At the same time, the categories of Past Due and Restructured loans have suffered a reduction in 2014 (Figs. 10 and 11).



	Banca Popolare di Lajatico	Banca di Cascina	Banca di Pisa e di Fornacette	Cassa di Risparmio di Volterra	Cassa di risparmio di San miniato
2012	3.283	0	7.430	44.622	28.211
2013	10.425	1.485	15.141	32.543	44.001
2014	1.598	0	15.275	31.585	41.388

Fig. 10 The restructured loans



	Banca Popolare di Lajatico	Banca di Cascina	Banca di Pisa e di Fornacette	Cassa di Risparmio di Volterra	Cassa di risparmio di San miniato
2012	3.283	0	7.430	44.622	28.211
2013	10.425	1.485	15.141	32.543	44.001
2014	1.598	0	15.275	31.585	41.388

Fig. 11 The past due loans

Such a trend seems to confirm the success of the policy of the European Banking Authority and of the Bank of Italy in the review of the methodologies and criteria used in the asset evaluation. The 2014 has been the first year in which banks have adopted the new rules. A decrease in the quality of credit seems to be coherent with the main objectives of the rules. Surely, we expect an improvement in the credit portfolio quality, with a reduction of the problematic loans and a better composition of the riskiness buckets, in the coming years. A careful credit position performance monitoring activity will make it possible to identify the downgrading position of

lending customers before reaching an irreversible state of insolvency, which feeds the npl entry.

In this direction, the rules contained in Circ/263 (cap. VIII) recognize the important role of data management systems for banking organizations in that the automation of the processes and monitoring of data security will make it possible to meet the growing expectations of rapid and accurate responses. The monitoring system should be based on a reporting system that is capable of measuring the previously identified creditworthiness indicators. The purpose of reporting within IS is to provide analytical documentation on meaningful activities. Such disclosures should be as up to date and correct as possible and therefore should not generate inconsistent interpretations. Once 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 migration of positions in the various riskiness buckets makes visible debtor downgrading and, therefore, the prompt intervention of the MPLM, before the position reaches the irreversible state of npls.

In conclusion, the data provided by the banks analysed seems to show the opening of a virtuous process of change in the banks' portfolio management which accompanying with an increase in the level of business information will determine the enhancement of the whole knowledge system.

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