
Applying knowledge management to enterprise risk management: Is there any value in using KM for ERM?

Received (in revised form): 1st May, 2009

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Abstract In many organisations, there is no clear relationship between risk management and the practice of knowledge management. By adopting knowledge management processes, organisations can improve enterprise-wide implementation of risk management. This paper considers the application of processes to enterprise risk management (ERM), concentrating in the first instance on knowledge sharing. Within a cluster, the results show a possible relationship between the quality of knowledge sharing and system integration and the perceived value of ERM. In general, the relationship between the perceived value of ERM and knowledge sharing is significant but low.

Keywords: *knowledge management, enterprise risk management, risk management information system, knowledge management system, banking*

INTRODUCTION

Business models in banking are changing. Banks are affected by internal and external changes and the consequent accommodation of new business models and policies in risk management. Both

enterprise risk management¹ (ERM) and knowledge management (KM) take a holistic view of the enterprise. Together, these disciplines can handle the risks affecting banking as a whole. However, the disciplines have developed separately,

and methodologies for an integral analysis of risk do not include KM.

Banking is a business based on information and knowledge,² where once new risk is identified it implies that new knowledge is required.³ A small number of employees are aware of KM benefits, the value of ERM and the link with business processes.⁴ There are examples of KM implementation, as Kubo *et al.*⁵ have shown, with many open questions about the use of the top management team's knowledge for making decisions⁶ and the importance given to the knowledge management system (KMS) in ERM.

Some of the risk management (RM) questions in banking are related to the pursuit of profit maximisation,⁷ which can expose expected profits to variability that can potentially transform them into losses. However, 'Risk Management is frequently not a problem of a lack of information, but rather a lack of knowledge with which to interpret its meaning'.⁸ Banks now have a wider risk exposure, which has created doubts about the integral view of risk and the capacity for managing potential losses.

Knowledge sharing plays an important role in meeting the demands of Basel II, particularly as regards consulting activities.⁹ The banking business currently considers consulting to be a key piece in business development. Equally, Dickinson introduced knowledge as a factor to reduce risk.¹ Knowledge contributes to control, business strategy and underwriting processes because they depend on human actions. People share explicit knowledge more easily than tacit knowledge, and knowledge transfer is more internal than external.¹⁰

The aim of the present research is therefore to contribute to answering the

question: how can KM processes contribute to ERM? This has a direct effect on banking because of the changes in business models, the new regulations and the competition of big players around the world with different levels of risk appetite. For the reasons outlined above, the research will also look specifically at knowledge sharing.

The paper uses the diverse literature on banking, RM/ERM and KM to develop two hypotheses about the relationship between KM, knowledge sharing and ERM, and presents the analysis of data gathered from 100 risk management practitioners in banking.

WHAT DOES THE LITERATURE SAY ABOUT THE PROBLEM?

This section presents the concepts applicable to banking, ERM and KM. This review of concepts is required in order to understand the orientation of the research and the space where the results will be analysed.

Earl has written about the evolution of organisations looking to adapt their capacities to business in an information age.¹¹ The transformation of the organisation is the final stage of the evolutionary process, with the organisation having developed from external communications to e-commerce, e-business and e-enterprise. A critical factor of the transformation stage is that it entails continuous learning and change under a dynamic model or mindset with higher coordination and consolidation. Banks currently appear to be preparing themselves for this stage. The present research regards KM as a piece of this transformation and aims to understand how KM can help banks to manage risk and to reach the

transformation level. Particularly, information systems have to be more efficient and effective in order to help people to make more complex decisions in the transformation process.

The concepts of risk, RM and ERM

Risk is defined here as ‘uncertainty of the performance of a system (the world), quantified by probabilities of observable quantities’.¹² In other words, it is the study of the variance of expected results conditioned to previous knowledge.

Risk management (RM) comprises ‘the overall process that a financial institution follows to define a business strategy to identify the risks to which it is exposed, to quantify those risks and to understand and control the nature of the risks it faces’. RM should not be confused with risk measurement. Risk measurement ‘entails the quantification of risk exposures’.¹³

RM is considered important in the strategic management process¹⁴ because there is the potential to create value from an integral view of risk management^{15–17} in order to develop a competitive advantage.¹⁸

Some authors, such as Brown,¹⁵ Lam¹⁹ and Sharman,²⁰ have identified RM processes. This research adopts Brown’s approach, given his clear identification of the processes and a possible identification of the relationships to KM through risk control. The question is whether the risk control process can be associated with the quality of risk knowledge sharing.

The competitive advantage of the organisation can be limited due to the risk of potential losses, caused by expansion, cultural pressures, reduced controls, communication of business

values, learning systems and concentration on information.²¹ Additionally, business complexity and the cost of knowledge show the need for providing more meaning to the risk information and better KM²² in order to build actionable answers to risk threats. However, the exposure to more risks and the losses in previous years have introduced doubts about the practice of RM.²³

The RM concept has evolved into ERM. ERM has been defined as ‘a systematic and integrated approach to the management of the total risks that a company faces’.¹ ERM takes a holistic view by considering three elements: the people involved, processes and scope.²⁴ These three elements represent the need for work coordination among risk areas and it is not clear how the capacity of work coordination is associated with the improvement of risk knowledge sharing.

Organisations incorporate ERM practices, taking into account objectives, organisational responsibilities and the strategic planning process. The relationship of the implementation, feedback and experience to the strategy is crucial for developing risk analysis and control. Knowledge, experience and feedback in an organisation flow from both the top down and the bottom up; however, ERM requires a top-down policy for developing and implementing the ERM processes and bottom-up analysis in order to identify enterprise risk and establish an accurate solution of risk mitigation. The enterprise risk is the risk observed across the organisation including financial, operational, strategic risks and hazards. In summary, the main difference between RM and ERM²⁵ is in the enterprise view of risk analysis for the whole organisation.

The implementation of ERM is a dynamic process and new methods of risk control identify new risks to analyse. Additionally, sharing experience is a factor influencing ERM implementation.²⁶ Therefore, ERM implementation can require risk knowledge sharing in each step of the proper integration of enterprise risk analysis. This leads to Hypothesis 1:

H₁: The perceived quality of risk knowledge sharing is positively associated with the perceived value of the ERM implementation.

The risk management processes need to be supported by a risk management information system (RMIS), the attributes of which are described in the next section.

Risk management information system

Information systems are understood in this paper as a means to provide analysis and solutions to the decision-making process and as a step in transformation. The following system definition is used: 'an interaction of components that together search to accomplish a purpose in particular the business processes that people follow in order to add value to internal and external users'.²⁷

To design an information system, organisations have followed two approaches: the technical and the behavioural, which include social sciences, operations research and computing.²⁸ Both approaches consider the following main phases for building a system: initiation, development, implementation, operation and maintenance.²⁷

The above phases are associated with the design purpose of the system: making

decisions and taking actions. From the results of these decisions it is possible to accumulate knowledge in order to use it later across the organisation. Additionally, a multitude of concepts are available to aid the search for enterprise-wide answers. These concepts include principles of integration and consolidation; developing capacity to manage multiple business units; and gaining synergies and sharing experience in order to provide better answers, service and products to customers. As well as ERM, other examples are: enterprise resource planning,²⁹ enterprise architecture³⁰ and enterprise content management.³¹

From this enterprise-wide evolution of information systems and enterprise integration appears the question: does an integrated information system exist for managing risk management information in a bank? And how can an integrated management information system affect the perceived value of an enterprise-wide programme such as ERM? This leads to Hypothesis 2:

H₂: The perceived integration of the information systems is positively associated with the perceived value of the ERM implementation.

Crouhy *et al.* identified the technology attributes necessary to build the RMIS.³² The required attributes comprise technology for integration and the way to address the solutions through 'information collection and normalization, storage and dimensioning, analytics processing, information sharing and distribution'.

There are four main requirements to implementing an RMIS: first, management of the project cost and

competing priorities;³³ secondly, technological attributes, such as a flexible architecture, data model and risk measurement capability; thirdly, an overall view of different factors and controls rather than solutions in individual sections of risk; and fourthly, data management, structure of documents and reports, and data mining in knowledge discovery.³⁴ These requirements show a wide spectrum of functional attributes for RMIS is required and its capacity to support risk knowledge sharing among different areas can be affected.

KM, KM strategy and KMS as an enabler of KM

Nonaka and Takeuchi³⁵ concentrate on the interaction between two knowledge types, namely tacit and explicit knowledge. Tacit knowledge is represented by experience, beliefs and technical skills accumulated in people's minds. Explicit knowledge is the knowledge expressed in documents, data and other codified forms. The interactions among people correspond to the movements from tacit and explicit knowledge to tacit and explicit knowledge on the individual and organisational level. The dynamic is expressed through the processes described below, which contribute to knowledge creation (see Table 1).

In this paper, knowledge is understood as a process of applying expertise and

knowledge flows.¹⁰ Additionally, the organisation is considered as the vehicle for knowledge creation³⁵ and the environment where the knowledge is processed.³⁶ Furthermore, this paper adopts the definition of KM as a management technique to maximise the coordination and organisation of knowledge.³⁷

KM implementation is based on four processes: creation, storage and retrieval, transfer, and application of knowledge.¹⁰ From these processes, knowledge sharing has an important influence in KM implementation because it provides connection between people and the organisation, producing dissemination, collaboration, innovation and acquisition of knowledge.³⁸ Knowledge sharing and effective communication depend on the knowledge bases, overlap and amalgamation among people. Knowledge sharing requires more than IT; it requires the creation of a means to share. This means that it takes into account the differentiation of knowledge sharing between and among groups, such as the knowledge adapted to be communicated among individuals and groups.

The KM processes and KM implementation require a KMS, where IT supports the integration of knowledge to directives, organisational routines and self-contained task teams. The KMS¹⁰ is based on the subsystems of technology and organisation. The KMS includes the information system that can help in many tasks of knowledge recovery, networking and accessing knowledge. For knowledge sharing, the KMS has different means of support. For example, in banking at the World Bank, communities of practice are used.³⁹ However, the communication capacity

Table 1: Four types of knowledge creation process

FROM/ TO	Explicit	Tacit
Explicit	Combination	Internalisation
Tacit	Externalisation	Socialisation

of the organisation can influence risk knowledge sharing more generally. ERM communication is influenced by the difficulties of language spoken and the application of expertise for solving different problems.^{1,40,41} The quality of the knowledge sharing channels is affected by the organisation, the method and the informality.

RESEARCH DESIGN

A survey was applied to a random sample of full-time employees in the risk management area of banking. The unit of analysis is the RM employee who is involved in RM activities in any of the RM processes in banking. To generalise the results to the population, a random sample was selected from the RM employees. The sampling method was based on proportions and a cross-sectional design of the research. The random sampling method is appropriated⁴² because there is a homogeneous population in the sense of the activity in the field of RM in bank institutions. The groups of RM employees are exposed to the KM processes, reducing the variance in the estimation of the population's proportions for perceptions relative to the attributes analysed. This project only intends to investigate RM employees as a whole, not any subdivisions within the banking industry.

VARIABLES

The study includes a review of the factors that can affect the perceived risk knowledge sharing quality, perceived integration of information systems and perceived ERM implementation quality. The factors use a Likert scale from 1 to 6, where 1 = n/a, 2 = strongly

disagree, 3 = disagree, 4 = neutral, 5 = agree and 6 = strongly agree. The variables used the aggregated Likert values of the factors of each variable (see Table 2):

- perceived integration of information systems;
- perceived risk knowledge sharing quality;
- perceived value of the ERM implementation.

DATA ANALYSIS AND DISCUSSION

Statistical software was used to manage data, to test the hypotheses and to identify relationships among the variables. Exploratory analysis was performed between the variables and the factors that conform each variable. The variables were ranked and assigned a score to the rank on the basis that the larger the number the better. The level 1 is low, level 2 is medium, level 3 high and level 4 very high in the analysis.

Exploratory data analysis is a set of statistical techniques for analysing data.^{43,44} It includes graphical and quantitative techniques without assumptions. Cross-tabulation, Spearman correlations and clustering were used to find variable and data relationships.

Cross-tabulation of the scores (see Table 3) shows that 40 per cent of people who rate system integration very high also rate ERM very high. Similarly, the combination of a very high knowledge sharing rating and very high ERM value represents 41 per cent of answers. In contrast, 53 per cent of people who assign a low value to risk knowledge sharing also assign a low value to ERM. For low system integration, 37 per cent

Table 2: Variables and factors that describe the variable in the survey

Variables	Factors
Perceived value ERM implementation	ERM improves collaboration ERM promotes our experience sharing ERM reduces the number of times we reinvent the wheel ERM improves the quality of data ERM improves our interdisciplinary work ERM improves our interdepartmental work ERM improves our understanding of model results ERM improves our problem solving process ERM improves our capacity of mathematical modelling
Perceived information system integration	The same standards are used A common data structure is used A common datawarehouse is used A common user interface is used A common report system is used A common application access is used A common report system is used
Perceived risk knowledge sharing quality	People are willing to share risk knowledge The availability of documentation is good The access to experience is good There is an appropriate environment to discuss results interdepartmentally There is an appropriate environment for the creation of shared solutions

assign a very high value to ERM. Correlations between variables were calculated by Spearman test and a cluster analysis was performed using the SAS fastclus algorithm which uses the K-means model.

To complement this observation, the correlations between scores were analysed. The significance level used was $\alpha = 0.5$ (see Table 4) and there was low significant correlation between perceived ERM value and risk knowledge sharing

Table 3: Cross-tabulation with percentages by column

Crosstabulation						Crosstabulation					
Score ERM	Score knowledge sharing					Score ERM	Score knowledge sharing				
	1	2	3	4	Total		1	2	3	4	Total
1	10 52.63	8 32	5 14.29	2 11.76	25	1	5 20.83	7 30.43	8 34.78	5 20	25
2	1 5.26	7 28	8 22.86	4 23.53	20	2	3 12.5	2 8.7	7 30.43	7 28	19
3	5 26.32	3 12	12 34.29	4 23.53	24	3	7 29.17	7 30.43	7 30.43	3 12	24
4	3 15.79	7 28	10 28.57	7 41.18	27	4	9 37.5	7 30.43	1 4.35	10 40	27
Total	19	25	35	17	96	Total	24	23	23	25	95
Frequency missing = 4						Frequency missing = 5					

Table 4: Spearman correlation

Scores	ERM	Knowledge sharing	System integration
ERM	1	0.27	not significant
Knowledge sharing		1	0.28
System integration			1

and no significant association with system integration.

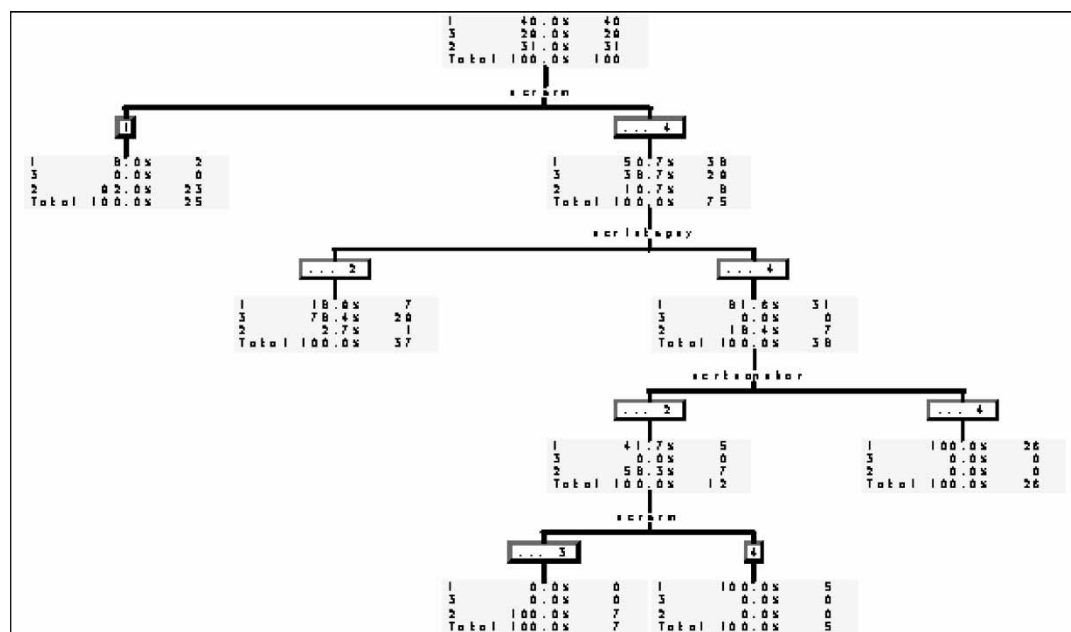
To identify a classification of the sample points, a cluster analysis was performed using three clusters (Figure 1). Cluster 1 has 40 members; of those, 26 have all three scores at high and very high level. Cluster 2 has 31 members; of those, 23 have a low ERM score. Cluster 3 has 29 members with a medium, high and very high ERM score and low and medium system integration score. These results suggest that only cluster 1 was classified based on the three variables and there is a

possible relationship among the variables for this cluster.

CONCLUSIONS

Banking as a knowledge and risk-based business requires coordination and alignment of actions in order to achieve the expected strategic results. This study argues that considering risk and knowledge management together gives a much stronger basis for the organisation in order to implement ERM. The KMS and RMIS can then be defined and structured in order to connect people and to develop the capacity for sharing risk knowledge.

Two hypotheses have been developed, relating to these beliefs and concentrating on risk knowledge sharing. A survey was applied to risk management staff in banking. In the first hypothesis, the data suggested that the null hypothesis ($\rho = 0$) can be refuted and the formulated Hypothesis 1 can be accepted. In the

**Figure 1:** Cluster analysis tree

Scrm, ERM score; scrintegsy, system integration score; scrkshar; knowledge-sharing quality score

second hypothesis there is no evidence for refuting the null hypothesis ($\rho = 0$) and the formulated Hypothesis 2 cannot be accepted. In addition, one of the clusters suggests a positive relationship among the three variables of perceived value of ERM implementation, knowledge sharing quality and perceived value of system integration.

This paper opens a set of questions for new research in order to find more and clearer relationships between ERM and factors affecting KM.

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