

Abstract:

The direction of our research aims in essence, to propose and build some modern systems (based on decision expert systems decision, neural networks, etc.) to estimate the risk of bankruptcy of enterprises, considering the economic models already known. Made simpler, we propose that certain non-quantifiable components of the value of the business of an organization (the knowledge held, the amount of management applied, etc) to be captured and / or included in the structure of economic models aimed at predicting the risk of bankruptcy of companies.

The basic idea of the research focuses on the synthetic analysis regarding the risk of bankruptcy of firms in terms of current realities that characterize the competitive environment of businesses at a global level. Today, the knowledge society and / or the knowledge economy has become a kind of vector of reporting for both business organizations and policy makers, opinion leaders and even every citizen. The so-called intangible assets of a company determine in an increasingly measure the market value of the firm but instead they are not reflected or very little reflected in the accounts entity. Acquisition and processing of new knowledge, while organizational learning have now become major directions of action for all business organizations. New knowledge are transformed by trained / qualified employees in inventions and innovations of various types that subsequently value in all markets. Otherwise, knowledge has become today an essential resource for companies, but including this asset in the structure of accounting indicators reflects major difficulties under methodological report.

Key words: knowledge classes, bankruptcy risk, knowledge, innovation

JEL classification: D83, M15, M29

Introduction

The conception of the Japanese teacher Nonaka regarding the classification of knowledge (in explicit and tacit) generated over the past three decades, a small "revolution" in the management of business organizations (Nonaka, 1998); although the proposed classification is one extremely general since it splits *knowledge* into only two classes of knowledge, the impact of this approach has been and remains major in management and related fields (creative thinking, stimulating innovation, scientific research, etc.). Explicit and tacit knowledge classes, respectively the classification proposed by Nonaka, does not present a notable interest from the perspective of systems engineering; however, this line of research could lead to new elements in the construction of expert systems on economic issues. For the reason given, we think it is useful to return to the typology of explicit and tacit knowledge; in the same effect, we will endeavor to decipher, explain and understand the underlying knowledge structure on which models Altman, Conan-Holder and Rating is based.

Description of the problem

The explicit knowledge according to Nonaka are types of knowledge that accumulate, process and exploit through rational thinking mechanisms of organizations; they are found in manuals, instructions, databases, regulations and hundreds of social / organizational rules that are applied by individuals in everyday life. By their very nature, explicit knowledge can be learned, taught, communicated both between different individuals and within organizations.

The tacit knowledge, according to Nonaka are defined as the knowledge derived from experience, intuition and imagination of individuals who are called to solve problems in an organizational framework; each employee performs and accepts the fact that organizational performance makes, largely appeal to experience, intuition and creative imagination, but we cannot express how exactly

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this mechanism scrolls in real life in the organization, since its operation reflects aspects of non-rational thinking (this type of thinking is called *intuitive knowledge*).

Whether it is about complex economic problems that are solved by some models applied in the real economy, or other fields of knowledge (chemistry, medicine, physics, etc.), we realize and accept somewhat automatically, as some kind of postulated the idea that we exploit appeal, mix constantly, explicit and tacit knowledge to achieve better performance in the organization - is relevant the conversion spiral of knowledge in organizational context brilliantly argued by Nonaka and other researchers (Nonaka, Konno, 1998). Finally, an important note for the interest focused on structuring this theme is that individuals possess and exploit both types of knowledge, but also *business organizations* (also true for any other type of organization), own and operate permanently with explicit and tacit knowledge (Brătianu ș.a., 2011):

- in majority, **explicit knowledge** owned by organizations take the form of innovations, inventions, patents, licenses, trademarks, commerce marks, appellations of origin, production rules, management rules, principles of consultancy etc.

- in majority, **tacit knowledge** owned by organizations take the form of what we call generically **know-how** or **savoir faire** respectively the part of a patent, a license or something similar that cannot be transmitted through sketches, drawings, application instructions, etc.; this part of the general knowledge held by the organization can be transmitted, rent or sold only when contact is made directly between the employees representing the two entities, respectively can be transmitted only through unmediated, direct experience.

Methodology and data sources

In the process of transmission of knowledge are often used demonstration simulators, using in parallel explanations using natural and / or conventional language, orally, in writing or by gestures. If the knowledge engineer proves the ability to reproduce exactly what was shown by words, in writing and gestures, it means that he has acquired **explicit knowledge**, but it is not sure that he has learned the **tacit knowledge** that have been sent by default.

Tacit knowledge have two dimensions of embossing / viewing (Iancu, 2011):

- **The technical** dimension, which includes the type of skills and abilities indefinite and informal and often included in the term "know-how"; for example, the experts quickly create a lot of expertise, having a lot of years of experience, but they often have trouble in explaining, communicating, technical or scientific principles behind what they know, very subjective judgments and personal thoughts; intuition, senses and inspiration resulting from the experience of each individual belongs to this dimension;

- **Cognitive** dimension, which is in its own view, consists of perception, ideals, values, emotions and mental models rooted in the expert that are taken "for good", so they can not be easily transmitted; this dimension of tacit knowledge shapes the way we perceive the world around us.

Table 1

Several characteristics of explicit and tacit knowledge according to Polanyi

Implicit/tacit knowledge	Explicit knowledge
Non cognitive	Formally articulated
Derive from the individual's perceptions	Elucidated
Unconscious	Conscious
Cannot be played through explanations, writing, etc	Fixed
Based on experience	Coded
Transferred through conversion	In documents (written, printed, etc.)
Delivers immediate observation	Can be seen or heard
Kept in the "mind" of entity	Can be shared with others
Presumed to be true	Can be learned
Take the form of rules, postulates, axioms, etc.	Take the form of reports, lessons, etc

Source: After (McInerney, 2002), according to (Polanyi, 1962, 1983)

Again, without relating to a particular field of knowledge (economics, medicine, chemistry, etc.) we present in the table no.1 some of the **main features** that imposed in the literature on the two major classes of knowledge analyzed.

As deduced from the characteristics that differentiate tacit knowledge from explicit knowledge, we understand that ***this class of tacit knowledge reveals the essential qualitative part, which is used by an expert or an organization to solve the problems faced in time***; we are fully aware of the appeal to tacit knowledge and the benefits they provide to a human expert, but it is extremely difficult, sometimes impossible, to quantify them precisely, to measure their "volume", to shape them into mathematical language.

From the perspective of economic, financial and management problems that are already solved acceptably in business practice by appealing to different types of methods or analysis models it can be observed that ***all these theoretical constructions rely predominantly on processing of explicit knowledge, knowledge that is taken from various areas of accounting firms***, including accounting information which are "fingerprinted" by the participation of tacit knowledge, albeit in a more modest rate (Iancu, 2014). On the other hand, it is useful to note that the implementation and operation of these models, and the entire design and construction process prior to them, ***included and include the appeal to a certain volume, relatively modest in size, of tacit knowledge***. Statements are argued by their nature and the way it is organized the accounting function of the company, and through the fact that tree processing of accounting information to reach a finished version, relevant and useful in the decision process, requires the intervention of experts on accounting issues. Obviously, all the work done by accountants to process and synthesize data from a firm's balance sheet is based by default on the use of different types of tacit knowledge available to each employee. Based on empirical observations, experiments and direct contact in the business organizations, we further consider the following (Iancu, 2011):

a) whenever we refer to accounting information, we consider that about 94% of the entire volume of knowledge processed, handled and summarized for top management are ***explicit knowledge***;

b) Similarly, in direct connection with the operation of accounting information, other interventions of human experts, we believe that about 6% of the total volume of processed and handled knowledge is ***tacit knowledge***, in the sense that they simultaneously meet the specific characteristics of this class as they were described in Table 1.

Finally, other aspects of the nature of knowledge underlying economic and financial models, explicit-tacit distinction more clearly, may result in a tree description of economic models incorporated by an expert system designed to address this problem of major complexity.

Results obtained

Since from the pragmatic perspective it is impossible to mix / process simultaneously 'n' economic models applied on a case (given the complexity of accounting information and the minimum number of years to be taken into account), in the applied case, the argument is limited to the aggregation of three economic models Altman, Conan-Holder Rating.

Based on the requirements imposed by the type of information application of management (the accounting of a firm gives us a true picture of the economic and financial situation), taking into account the situation in the past and at the time of analysis, we can shape the future of the entity; the expert system concept designed took into consideration the three models of analysis mentioned above. Currently we only recall the basic facts about each model:

a) The score function developed by Altman is based on five cause variables, noted from X1 to X5 which through summation and weighting yielded a certain amount of score that will define the company's creditworthiness; based on the accounting system applied in various countries, the cause variables were subsequently redefined and reformulated (in some papers we find X1, the enterprise flexibility, X2 - self-financing rate assets etc).

The Altman model was one of the first that imposed in the world of international finance being mainly applied by banks in determining the creditworthiness of companies that were to be credited. When a commercial bank allocates substantial funds for investment in the medium and long term, the basic prudential rules oblige the bank to look further into the company's past (at least for the last four years), to assess as accurately as possible the management and marketing of the firm, the position of the firm on the market to be able to forecast the extent to which the company will reach or not bankruptcy during the "n" years in which it has to repay the bank the loan. Later, the Altman model underwent various adaptations, modifications and simplifications; today commercial banks apply simplified version of the theoretical principles underlying this model to determine the

creditworthiness of a customer including individual requesting a loan. Among other ways of applying the Altman model there are:

- Investment funds currently operating on the main stock markets apply this model to predict the future course of action listed;
- Other organizations or institutions that have different economic interests relating to acquisitions, mergers, reorganizations, seizure of competitors, etc. have financed large sums of money for choices more "finished" of the Altman model for predicting the risk of potential bankruptcy of a company;
- Similarly, other organizations such as rating agencies were and are interested in more sophisticated models through which to attempt to capture the situation of a company at a time and the possible bankruptcy in a reasonable course of time.

Finally, it must be said that Professor Altman was able to determine the weighting indicators of the mathematical function on a statistical analysis (discriminant function), over several years of efforts in which he followed in parallel:

- A group of about 200 companies, from various fields, which over many years have prospered, that had a permanent trend favorable on business cycle of the company (BCC), case in which some accounting indicators experienced significant improvements from one year to another;
- A group of about 200 companies of comparable size and location to the first one for which the developments during the "n" years of monitoring resulted in bankruptcy or in failures close to bankruptcy.

b) Use of Conan-Holder model, as application and interest field in the financial and stock world in different countries, did not move away significantly from the course had by the Altman model. Commercial banks, investment funds and others similar received with interest this theoretical construction as a tool for financial economic analysis of companies.

c) The rating model - rating of a company presents types of information about certain financial indicators of the company for various periods of time; for each indicator it is established a separate score that positions the part of the accounts of the company, and by summing results the overall score for the firm at the time of evaluation.

We must say that the rating model has been applied mainly by *commercial banks to establish the creditworthiness of companies* that were to be credited on certain intervals. In some states, such as for example France, central banks have intervened, commissioned and funded separate studies to estimate the risk of bankruptcy of enterprises, so that it was imposed in literature the so-called "method of scores" applied by commercial banks.

As mentioned, we believe empirically that each of the three models reviewed processes and operates various types of knowledge that can be shared as follows:

- About 94% explicit knowledge given by the information obtained from the accounting of the firm, regardless if they are in a more *raw* or finished stage when they contribute to the determination of indicators;
- About 2% tacit knowledge have been "put" in the accounting of the firm, in the sense of gradually induced in the regular operation process by accounting experts who have participated together in the tree structure of accounting information to the balance sheet;
- About 2% tacit knowledge that have been "brought" and "included" in the internal mechanism for calculating each model by experts who contributed to the design and finishing of the functioning module over time;
- About 2% tacit knowledge that are and remain associated with *bank official* or other expert who is called to apply, as appropriate, the Altman, Conan-Holder or Rating model (depending on skills and qualifications it is taken more or less stringent and relevant information from the accounting of the firm and are translated into the model to obtain the final score function).

Thus, we talk of explicit - tacit sharing of knowledge when it comes to structuring tree accounting information from personal account to the balance sheet; we discuss about explicit and tacit knowledge which are "put" in the operation of the three models and ***in the operation of an expert***

system. It is important to say that the effort to empirically quantify the amount / volume of tacit knowledge that are induced, as appropriate, in the accounting information in the Altman model or other similar model and the ES operation is a more methodological approach to give a unitary character of the research. ***In fact, not the amount of tacit knowledge that is mixed with a given volume of explicit knowledge is relevant (previous example: 6% to 94% for a given problem); contrary the qualitative side / dimension of tacit knowledge the human experts possess and induce in the analyzed processes remains an essential dimension to successfully solve an economic problem.*** It is clear that the assessment of "quality" that a volume of tacit knowledge has is an extremely difficult approach for any field of knowledge, including the economy.

As an example (fig. no. 1), we illustrate the manner in which the Altman model is based in its operation on explicit knowledge and tacit knowledge, all these following a tree structure of processing to obtain the final result; *mixing between the two categories of knowledge is one of chaotic type and we cannot determine, other than intuitively, the share with which each class competes in the final contour of the score function.*

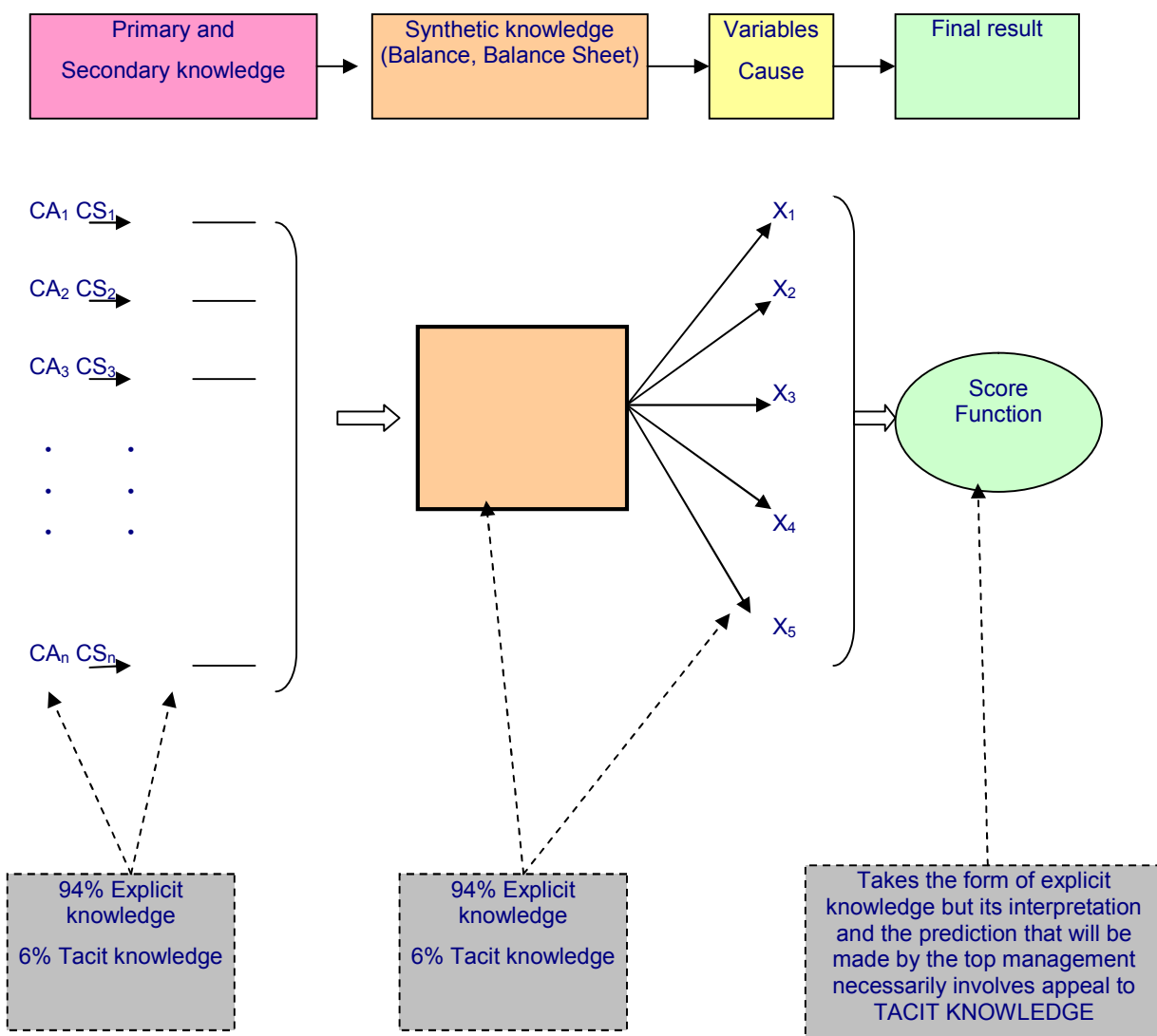


Figure 1. Altman Explicit and tacit knowledge in applying the Altman model

Conclusion type knowledge

Usually, the firm's superior decision maker evaluates the existing situation, the information available, other elements that define the market and competitors, trying to formulate a number of "n" scenarios about the possible future of the organization, i.e. traces "n" possible positions for the road of the firm on the BCC (Burciu, 1999). The appeal of the decision maker to various financial and economic analysis models and to various information tools for data processing available to him, is likely to support human experts in taking a strategic decision that will later reflect as closely in the road that will follow the company. However, the top management of the company (remark

applied for a bank at the time when is determined the creditworthiness of a company to which it is granted a loan for 10 years; similarly it applies to a credit institution, investment funds, etc.), develops the usual three possible scenarios:

a) a *realistic scenario (base)*, namely the one that best fits the objective realities of internal and external environment of the company; this scenario reflects realistically, as possible mathematically, **the knowledge type conclusion** that can be drawn from the accounting of the firm; Finally we discuss of knowledge type conclusion at the time when the data are taken from personal accounts to synthetic accounts (occurs general first conclusion), and then from synthetic accounts to balance (occurs second general conclusion), then from balance to balance sheet (occurs third general conclusion) and subsequently from the balance sheet in preparation of documents describing the overall situation of the company (occurs fourth essential synthetic conclusion);

b) a *pessimistic scenario* against which the decision maker must be psychologically prepared and have thought preventive measures such as, for example, a positive cash-flow for the months ahead; this scenario takes into account **the knowledge type conclusion** provided by the accounting of a firm but takes into account certain turbulences occurred at macroeconomic, regional, global level, etc.

c) an *optimistic scenario*, which appears as an extension of the base scenario, i.e. as a possible hypothesis given by the fact that some premises on which the baseline scenario is based will witness a significant improvement, whatever the cause of this improvement (market, competition, the revenue boom periods, etc.).

Conclusions

The purpose of the various economic and financial models, including the three models put forward, is that based on the analysis of the past of the evolution of the company to be able to make the most realistic scenarios regarding the health of the company in the years to come. Thus, the senior decision maker of the firm, either he uses the Altman model or another one similar, or he cumulates the three models (database processing in this case cannot occur without the support of an efficient information system) wants to see **a sum of knowledge type conclusions often preferred as a graph**, as it is extremely meaningful and easy to interpret.

Obviously, at the end of the application of any model through which it aims to capture the economic and financial situation of a company (in the general sense we discuss of "n" economic models based on explicit and tacit knowledge), the synthetic conclusion resulting will mandatory include in its structure two large classes of knowledge in Nonaka sense:

- A certain volume, structure and forms of *explicit knowledge* forms through which is 'quantified' in mathematical sense the health of the company of the company analyzed;
- A certain volume, structure and forms of *tacit knowledge*; they are sometimes part of the conclusion statement itself resulting from the application of the model (this happens rarely); in majority, ***tacit knowledge will be used extensively at the time when the top management interprets the statement through the final conclusion is made when applying the economic model.***

Finally, if we want to deepen the research on the conclusion type knowledge resulting at the end of the application of the "n" models of economic analysis, it is appropriate to discuss briefly about the written form such conclusions take (electronic or printed). We understand that a part not at all negligible in stating conclusions for such complex analyzes will also have a verbal form, through discussions and interpretations, divergent views among specialists who summarize such conclusions to be made available to top management. We appreciate, however, that predominantly conclusions type knowledge take a *written form* and their statement often have three distinct types:

- A statement in the form of mathematical formulas on the variables / indicators accurately quantifiable, case that in such conclusions rests 100% on the ***explicit knowledge***;
- A statement in the form of accounting formulas and other formulas alike (economic and financial), case in which we estimate empirically that such conclusions rest in proportion of 98% on ***explicit knowledge*** and 2% on ***tacit knowledge***;

- A statement in a description form, of type report, note, etc., case in which the resulting conclusion in its entirety (or part of the overall conclusion, as far as that part is specified descriptive), mixes in almost equally proportions of tacit and explicit knowledge; Empirically, we say that such conclusions are based on 50% of explicit knowledge and 50% of tacit knowledge.

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