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DECISION MODELS: INTEGRATING DIFFERENT PERSPECTIVES

Sabina-Cristiana NECULA*

Abstract

Decisions' modelling often relies on numbers and symbols and we might say that very often decision-makers interpret numbers in order to obtain symbols that are qualitative factors. Interpreting qualitative factors is an aspect that has little to do with rational approach of decision-making and in this way there are no static decision-models. We sustain in this article that defining decision steps and information needed in making decisions belongs to the decision-maker and in this respect the control on data sets must be specified by the decision-maker at the decisional place.

In this scope, the aim of this research is to identify the way of making business decisions. The results discuss the optimal way of using different technologies.

Key words: decision models, quantitative factors, qualitative factors, knowledge, information technology
JEL classification: D81

1. Introduction

While management models involves the management and optimization models whose data are analyzed indicators, for organizational accounting information metamodel management means respecting the true and fair value principle and efficient cost-benefit in providing relevant information.

In our opinion, action knowledge belongs to human being, to decision-maker, to organization and knowledge application depends on people. Moreover, knowledge elicitation is achieved by an assertion of qualitative factors, almost impossible to formalized using neural networks. Symbols issue involved here, semantics, and inferences. Applying knowledge is a free will, decision-making responsibility, time, situation, will, interest, etc. Whatever we want knowledge application automation society and its members will always show that they will not evolve as a whole, but individually. People want tools to discover knowledge, to stimulate knowledge application. They don't want knowledge automation. If in terms of knowledge discovery there are neural networks, knowledge extraction supposes the existence of representation formalisms that cannot be control structures, as they deal with the implementation of control and not with knowledge acquisition.

Thus we can state the following hypothesis relevant to this article: modelling decisions involves formalizing IF-THEN-ELSE controls on concepts that belong to decision-making models and which refer to information symbolically labelled. Specifying and customizing

* Sabina-Cristiana NECULA (sabina.mihalache@yahoo.com), PhD, Researcher , Research Department, "Alexandru Ioan Cuza" University of Iasi, Faculty of Economics and Business Administration.

decision-making models by applying knowledge belong to decision-makers and may be formalized prior as data+control structures or locally at the decision place.

Information required in making decisions come from heterogeneous sources: from the organization and beyond. More information reduces uncertainty, but also a good management reduces the uncertainty. A good management achieved by specifying the permitted work procedures, plans and objectives of that are tools through which the management structure is realized.

Business continuity is an objective for management and an accounting principle, which means that, while for management business continuity is a subject to monitoring, for accounting the business continuity is a mandatory state-facto for consideration in compliance of true and fair value image reliable.

2. Business decisions modelling

Management aims to ensure continuity for an organization. In accounting, achieving this objective is to follow the evolution of performance and financial position. Any decision made at the organization level is defined by two synthetic leverages: return on investment and return on equity. Return on investment refers to the operating profit reported to the total assets; return on equity refers to the financial net income reported at equity. Any decision is reflected in changes to the numerator and denominator, and in accounting in modifying synthetic indicators.

From the informatics point of view, calculating the indicators lies in the implementation of mathematical functions defined on the input variables most often extracted from a database. The definition of related functions is a general knowledge (return on investment will always be defined as the ratio between the size of operating profits and asset size, and increasing the size indicator is a performance improvement company). Of course, from the mathematical point of view, anyone can realize that an increase in profits that is equal to the increase in assets (the same multiplication factor) determines the constant size of the indicator and thus we can say that for the analysis of return on investment it is not sufficient only to calculate the indicator size, but an analysis of the recorded values is necessary. Analysis concerns general knowledge that derives from mathematical axiom for existence laws of some variations in sizes of a numerator and a denominator of a fraction. Synthetically, we can express the relevant knowledge in the form of decision trees that formalize profitability analysis indicators (see Figure 1 and Figure 2).

Values of input variables are themselves influenced by economic decisions (operating, financing, investment decisions).

In analyzing return on investment we start from the formula 1.

$$\mathrm{Re} = \frac{Pe}{A} \qquad (1)$$

Where

Pe = operating profit;

A= total assets;

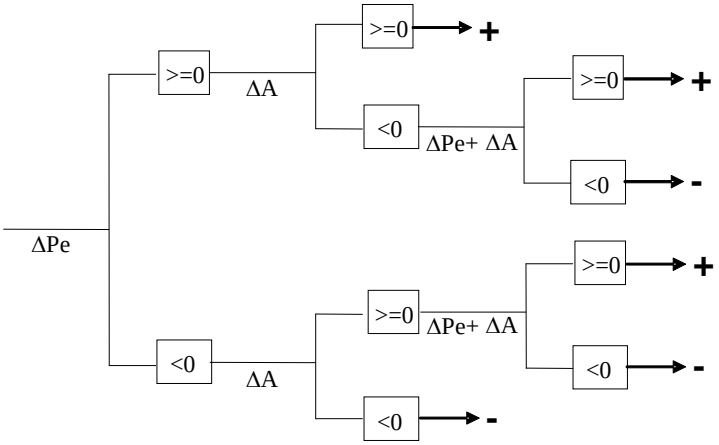
$\Delta Pe = Pe_1/A_0 – Pe_0/A_0$ = operating profit modification's influence;

$A = Pe_1/A_1 – Pe_1/A_0$ = total asset modification's influence.

Thus, models of management interfere with models of economic and financial analysis with models of management accounting, with financial and economic models. The meta-model interfere with management organizational models and do not suppose following some indicators but to establish some constraints in the recognition, classification and economic assessment items for values attachment.

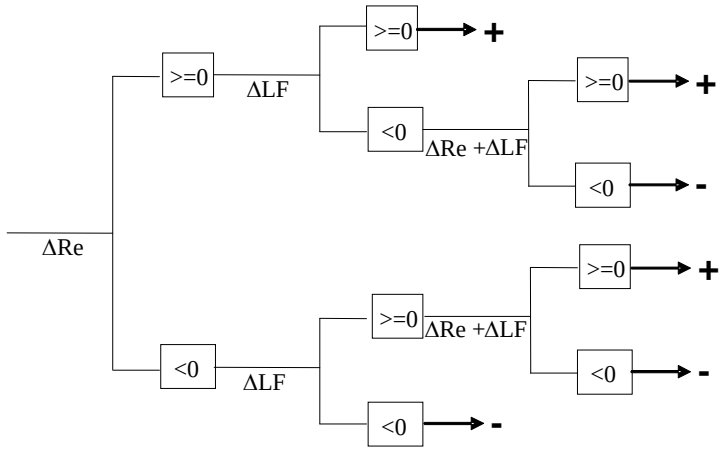
Management monitors the constraints of the business and accounting recognizes, classifies and evaluates items in order to provide information requested by the real business plans. Accounting uses its own methods and organizes data and providing information.

Currently, recording items contained in a document can be considered recognition, broadly, only when the input is what can be admitted "without doubt" by selecting from a list of elements that exist in a database. There are many situations where the recognition, classification and economic assessment of elements is not an easy task and must follow certain accounting policies defined by the company and declared in the set of financial statements submitted to external information users.



Δ Pe = operating profit modification
ΔA = total assets' modification
+ = increasing performance
- = decreasing performance

Figure no 1. The decision tree for analyzing the return on investment



ΔRe = return on investment modification
ΔLF = financial leverage modification
+ = increasing performance
- = decreasing performance

Figure no 2. The decision tree for analyzing return on equity

In addition to decision trees should we must take into consideration the cause-effect relationships determinant and necessary. Always in decision-making there must be a problem, a trigger, a state of alarm.

Patterns and rules of business organize processes and contain control specifications for making decisions. Decisions concerning the means and resources must be taken in the context of decision-making process at the organization level. Working within the management activities are presented in Figure 3.

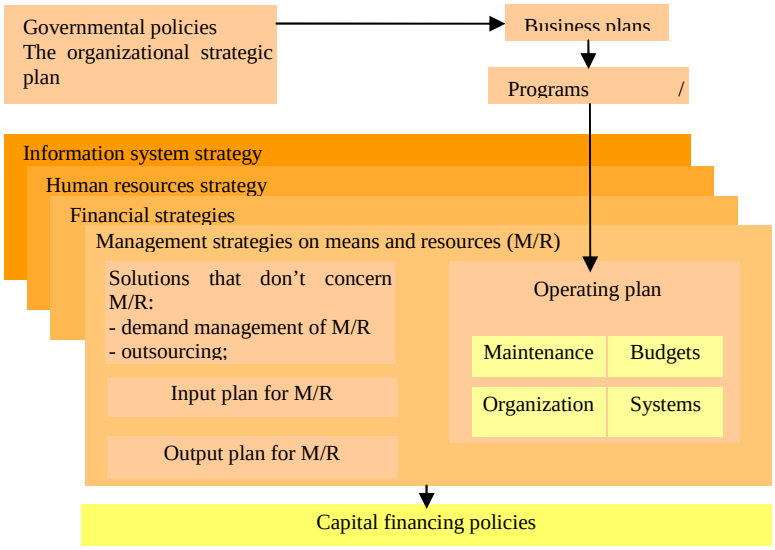


Figure no 3. Policies, strategies and plans for management

At higher organization level of information system should be used enterprise ontology. Integration of business rules in the system model can be achieved by specifying constraints on concepts of ontology. The model implemented thus could be called business model.

3. Information technologies needed in modelling decisions

Using information and communication technologies resulted in obtaining benefits, even if sometimes they were difficult to quantify or suspect. Terms as data processing technologies, data mining technologies, Internet technologies, collaborative technologies, intelligent technologies attempt to cover the wide range of users' needs of IT applications and information systems in various forms of integration.

In this paper we try to make some distinctions between quantitative analysis and qualitative analysis in decision making. It is known that operational research models are not perfect, that statistical models can be good if they are working on very large data sets so that the normal distribution act on all possible states. Risk assessment models from rational approach are appropriate only in theory but in practice assessment models based on possibilities or fuzzy sets are more suitable. Decision-making models of maxi-min or maxi-max cannot prove the usefulness from the laboratory and, in practice, the incorporation of decision rules in expert systems or other software that specifies controls are more suitable. Each method, technique or algorithm has limitations and is not general, since its use depends on practical problem-solving context.

In modelling decisions it remains important to mention that the decision-maker is the human being, he makes decisions using inferences chains operating on concepts and their attributes such as little, much, probable etc.

It is true that mathematical economic models in decision making are difficult to combat because often the statistical evaluation for the developed models is favourable. The problem remains, however, the usefulness and practical use of them. In the context of stock exchange where the values are many and constantly changing the mathematical analysis and neural networks are useful because they constitute a tool for evaluating the market. Audit fraud detection using neural networks proves to be successful for that set of factors is constant, the set is continually changing, and the dependence of the factors is not perfectly defined.

In the microeconomic context, at the organizational level things are not on such scale as in the previous cases although data about the production process are sometimes the only benchmark for assessing an organization's business continuity.

Genetic algorithms are used in stock optimization. Estimating indicators' evolution is possible to achieve, indicating that the neural networks developed for this purpose should have defined as input factors that determines the indicator and not time series with indicator's values. One possible user will understand the following statement "we estimate that next year the production will increase by 10%" that projected growth is possible because organization is aware of possible investment in ongoing investments, additional staff costs and does not imply that the estimation was in effect made on statistical time series or using a neural network designed in the same manner.

Statistically speaking the factors' dependency that determines an index value is realized by using regression analysis. The technique is difficult to apply and has not very convincing results, but demonstrates the dependence of factors and the type of relationship between factors and the analysis. If the solution is accepted the obtained statistical equation can be used in future estimates, but the basic assumption that must be admitted is that the factors' influence is constant.

The estimation problem needed in informing decision-making process is not addressed in practice by using statistical methods or by using induction method. It may have value, unless the conditions involve the same action, risk and uncertainty.

Genetic algorithms, neural networks and fuzzy rules are working with numeric values, and thus data obtained by using implemented models must be labelled in order to be used by decision makers in future inferences. Often different hybridization allows knowledge extraction by using rules, but they are quite difficult to use because the business environment requires relevant information, current, and useful.

Possibilities of integrating numerical and qualitative factors, numeric and symbolic variables in developed applications should be undertaken depending on the structure and context-dependency issues. If numerical factors can be identified and a default problem solving model is known, then economic and mathematical models can be applied, and software implementation will realize simulations. When the factors are qualitative and their assessment depends on the context and on the decision-maker the problem-solving model must allow inferences' specification on the qualitative factors' ontology.

4. Conclusions

At a simple analysis it can be seen that the needed input data to define trees come from management accounting system and the input data from the superior level result from calculations, functions, data processing.

That's why prior formalization is part of the design phase in system implementation. Technique chosen for the formalization concerns the design phase and most often is not user-oriented due to the fact that at this level is unlikely for users to be involved in developing the system. Hiding knowledge through formalization often translates into increased complexity of the solved problem and ends by implementing a useless model.

The only aspect that remains constant in decision models implementation is the decision tree metamodel representation. All control specifications must be "removed" from design phase and let into user account.

People are limited in cognitive terms, think about the small problems in the IF-THEN-ELSE pattern, but knowledge definitely belongs to them. Chaining the input and output of small decision trees is the representation of human inferences which can be formalized by inference engines. People perform inferences operating on concepts and not on numeric values.

Ideally speaking, if we had to think about an interface where a user can select the input variables to define an inference, then we should provide a way for him to write it in the language chosen for representation. The main problem involved consists in specifying the place of writing. A user does not know the internal organization of data and it remains necessary to ensure ways of writing in the language of representation. The only option that is open to consider in this case is to use ontology.

In data + control structures approach, each alternative is a possible decision and "hide" knowledge provided by those who have achieved the theoretical model.

The disadvantages come from "mixing" data with control structures specifications that lead to difficulties in changing models and to abandonment the developed model. For accounting, this translates into the impossibility of using information in new models and developing personalized aggregation on different contexts.

The output information is contained by reports that usually have aggregation of amounts, resources involved, cost centres, company performance, product plans and budgets. While for financial accounting there are standard reports, the management accounting does not work with standard reports. Designing corresponding reports constitutes the main activity in the analysis phase of the information system.

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