The Modeling of the Decisional Process. A Case of Study for the Portfolio Management

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In the architecture of the management functionality and performance, its decisional component has a privileged position. No other element has a more stressed managerial specificity and a greater impact in all the plans of its activities and results. There are the main reasons which determined the authors to do a detailed analyze of the elements which intervene in decisional process. To have as a result a well founded and opportune decision any decisional model had to acquire, process, interpret a larger volume of information, in a shorter period. This demands have directed the whole structure of this paper.
***Keywords**: decision, decisional model, decisional variables, parameters, cause – effect relations.*

Introduction

A chance in the substantiation of a management of the operations with financial derivatives products is offered by the researches from the domain of decision modeling [Filip, Ghe. 2002, Ştefănescu, L. 2004], of the techniques of the financial mathematics and, more important, by the possibility of rendering through their informational modeling and defining a decision support system.

The decisional modeling of phenomena and processes with a stock exchange character is made, actually, through the construction of *some representations with a variable degree* of the real economical world or of a constituent part of this, as the secondary capital market is - the place where financial products are the nature transactions. The reason to apply to *representations* was, successively:

▷ the understanding of the phenomenon or the approached segment of reality,

▷ the knowledge in detail and then in depth (the analysis) as a purpose in itself

▷ the action of the analyzed phenomenon.

Ungureanu, L. 2006, by example, consider that "*the model is viable and represents accurately a certain economical phenomenon only if it includes the analysis of the structure and properties, as well as elements of its specification. The mathematical models help to give substance to the managerial decision in efficient conditions for the manager, offering him the possibility to think better and quicker, without distorting the reality*". Not randomly, the stages of the modeling process are likely to the stages of the decision process, because the latter describe a general model of the decision theory.

The modeling of the decision for sustain the management process

In this paragraph, we will try to describe stage after stage the decision modeling to sustain the management of portfolio. Each stage serves for as a premise or basic offset for the next, which stresses the necessity of each other and their unchaining as a whole.

In this way, the starting point will be constituted by the modeling of the decisional process, through which the elaboration of a decisional model will be done. The decisional model thus obtained allows the construction of a mathematical model and of a solid algorithm, both being sustained by the models variables, identified parameters, and the possibility of being expressed through mathematical relations. All these allow the accomplishing of repeated experiments on the elements and choice of values belonging to variables and entrance parameters which will lead to the targeted performances.

The decisional model thus obtained will constitute the nucleus which gives the system support of the decision assistance for the management of operations, the capacity to

analyze and solve different decisional problems [see Ştefănescu, L. and all 2004]. Practically, its utility consists in that, it can be used in the training and the development of managers and specialists. Once the decisional model is assimilated it becomes a practical tool of management which can be used by the manager in taking important decisions for his activity's efficiency.

Obviously, we want to develop a decisional model as good as it can be. In this context, a good decisional model is a model which reflects with accuracy our perceptions upon the decisional area and it can be used to sustain the decisional process. The essential conditions for the development of such a model are:

- the understanding of the key variables of the decision;
- the knowledge of the cause-effect relation which influences the variables;
- the appreciation of the way in which the mathematical formulae in establishing the respective model and in the defining of the ongoing algorithm.

A case of study for the portfolio management

In the modeling process, the components of the decisional process are associated with a series of variables and parameters. The variables are important in the describing process of a system through a model, because the decisional models are mainly dynamical and they describe the behavior of a system in time. These variables transmit information on the system's condition from a period to another. The variables used in the decision modeling are classified in input and output variables, the way in which these are driven on the model are schematically represented in Figure 1 below:

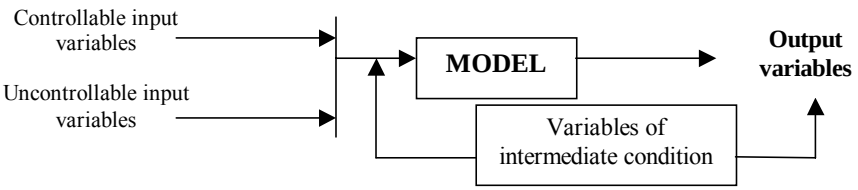

Figure 1 – Types of variables used in he modeling process

For instance, let's suppose that a portfolio manager must take a decision concerning the keeping of a portfolio of a certain futures contracts. The controllable input variables is the number of futures contracts which will b the nature of transaction. In this way the new level of the futures contracts' quantity is a factor that can be controlled and that have a certain influence on the efficiency of the manager's portfolio policy. The output variables reflect the way I which the decision efficiency will be measured out. The possible out variables include the sum invested to constitute the portfolio, the managerial effort to control the portfolio, the quantity and the value of the transactionated futures contracts, the probability of the insufficiency of sums to constitute a portfolio with a maximum level of profitableness *(see Figure 2).*

Figure 2 does not point out generally the way through which the variables act on the decisional model but it shows, for real, all these aspects keeping in focus the considered decisional situation.

The purpose of the model is to express the uncontrollable variables of the decisional situation, depending on those controllable, in such manner that the performance criteria should be satisfied, that is, the system should be solved.

The uncontrollable output variables raise an immediate problem for the decision taker. Because they are not controllable we cannot determine the exact value that they can take. Consequently, our appreciation in what their shape is concerned, can be better represented through a distribution of probability than through a single value. In this situation is true, these variables can be rather described as probabilistic than as determinist.

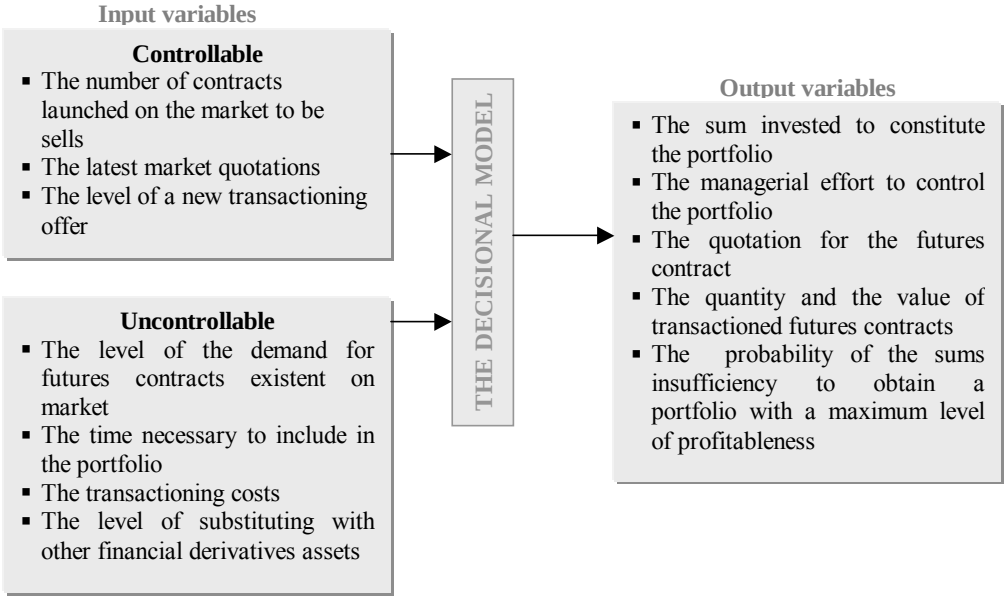

Figure 2 – The variables of the decision of constituting a portfolio of financial products

Practically, the way in which we approach the uncontrollable variables depends on those out variables which we select to measure the decision efficiency. For instance, in the decision of constituting a portfolio, the insufficiency of sums to obtain a portfolio with a maximum level of profitableness appears as a result of a superior sum level than the one that can be covered. If we choose not to use an output variable, the insufficiency of sums to obtain a portfolio with a maximum level of profitableness (or other similar variables), then it is not necessary to describe the level of sums in a probabilistic manner and we can make a determinist assumption. Similarly making assumptions on the sums' level necessary for the investments, substitution financial assets, etc., the decisional model can be simplified very much, having the form in the *Figure 3*.

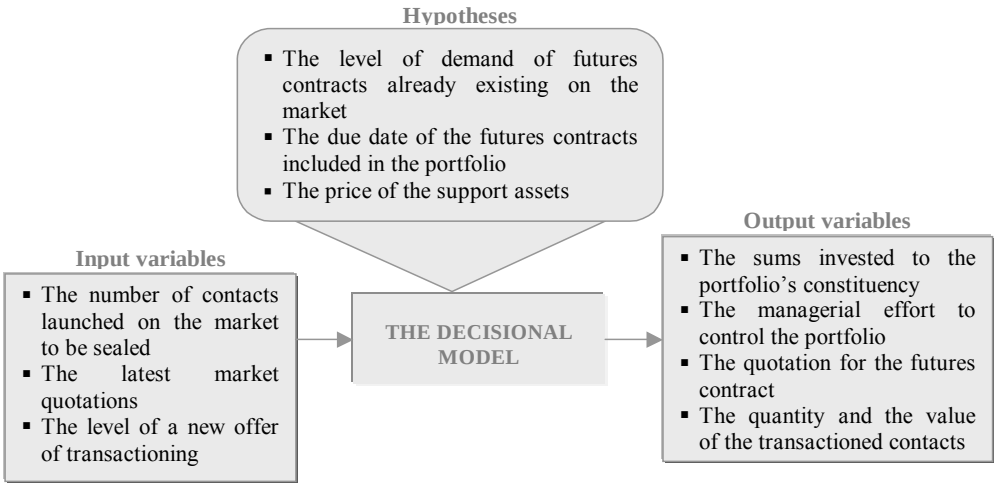

Figure 3 – The variable that interfere in the decision of the portfolio's constitution, as uncontrollable variables estimated in the model

The next level of complexity in the modeling process is to explain the structure cause – effect connecting in this way the entrance and the exit agents. The easiest way to indicate the existence of a relation between two agents from a decision is to show the influence direction through an arrow, on a cause – effect diagram. If, for instance, it is considered that the risk and the profitableness influence the selection of the financial derivatives in a portfolio, we can illustrate this thing as in *Figure 4.*

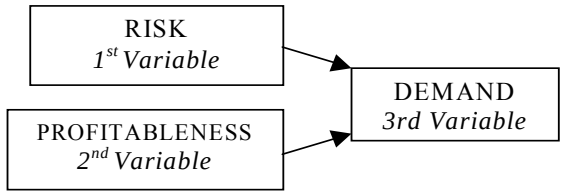

Figure 4 – A single cause – effect relation

These diagrams can be marked off backwards starting from the output variables, specifying influencing agents until the input variables are found. Figure 5 illustrates this process showing the cause – effect influences for the stock exchange quotations.

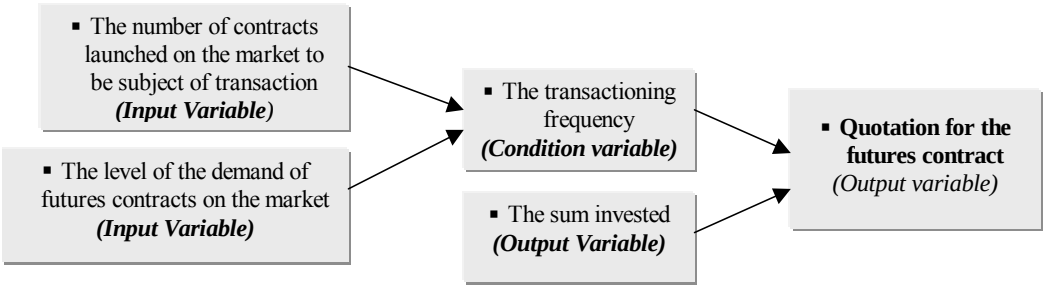

Figure 5 – Model of cause – effect influences upon the quotation for the future contract

The output variable "quotation for the future contract" will be determinates by the transactioning price of the support asset and by the frequency of transactions. The frequency of transactioning is, on its turn a function of " number of contracts launched on the market" and of " the level of demand", both input variables.

Following this procedure to mark off the influences backwards, a model can be built on this basis of interactions among the agents which interfere in a decision. Figure 6 presents a more complex model of the decision of constituting a portfolio.

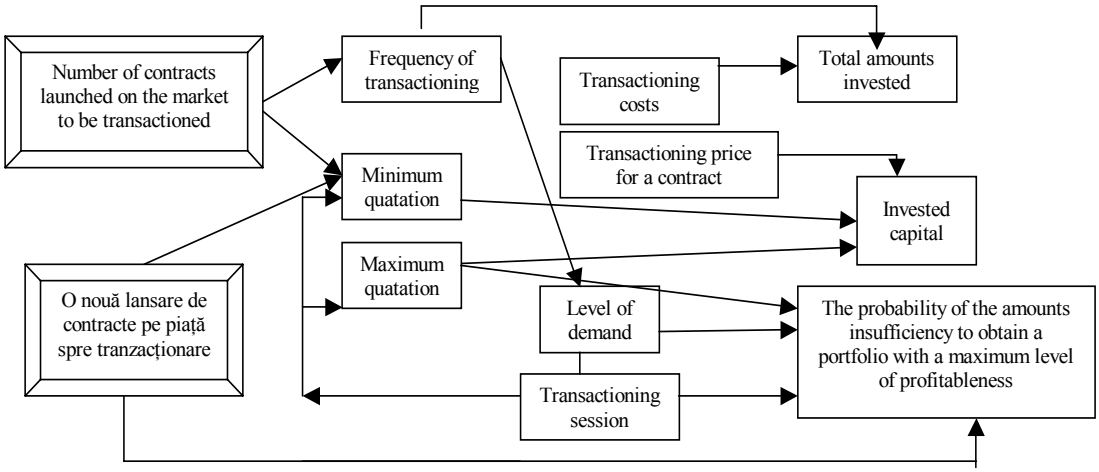

Figure 6 – A complex cause – effect model of decision of the portfolio constitution

Along with the entrance and exit variables, in this model there are intermediary variables 'frequency of transactioning', 'maximum quotation', 'minimum quotation'. These variables are influenced by the entrance variables and , in their turn, they influence the exit variables, but they are part of the model's interior and are called state variables.

The decisional variables, the parameters and the different cause-effect relations identified after the decisional modeling are transformed in hypotheses of the model, in one or more mathematical relations among the variables. With the help of those entrances are being generated, and taking into account the internal states of the system, through the right al-

gorithms, the exits are determined and the evolution in time of the internal states of the system is described. there are cases in which the interdependences are described through logical conditions or through procedures that can be solves computer assisted. The mathematical model filled with the help of such procedures becomes a support decision system [Filip, Ghe. 2004], [Zaharie, D. 2000].

Synthetically, the transformation process of the decisional model in a mathematical model and further, in a decision assistance support system, is shown in *Figure 7*.

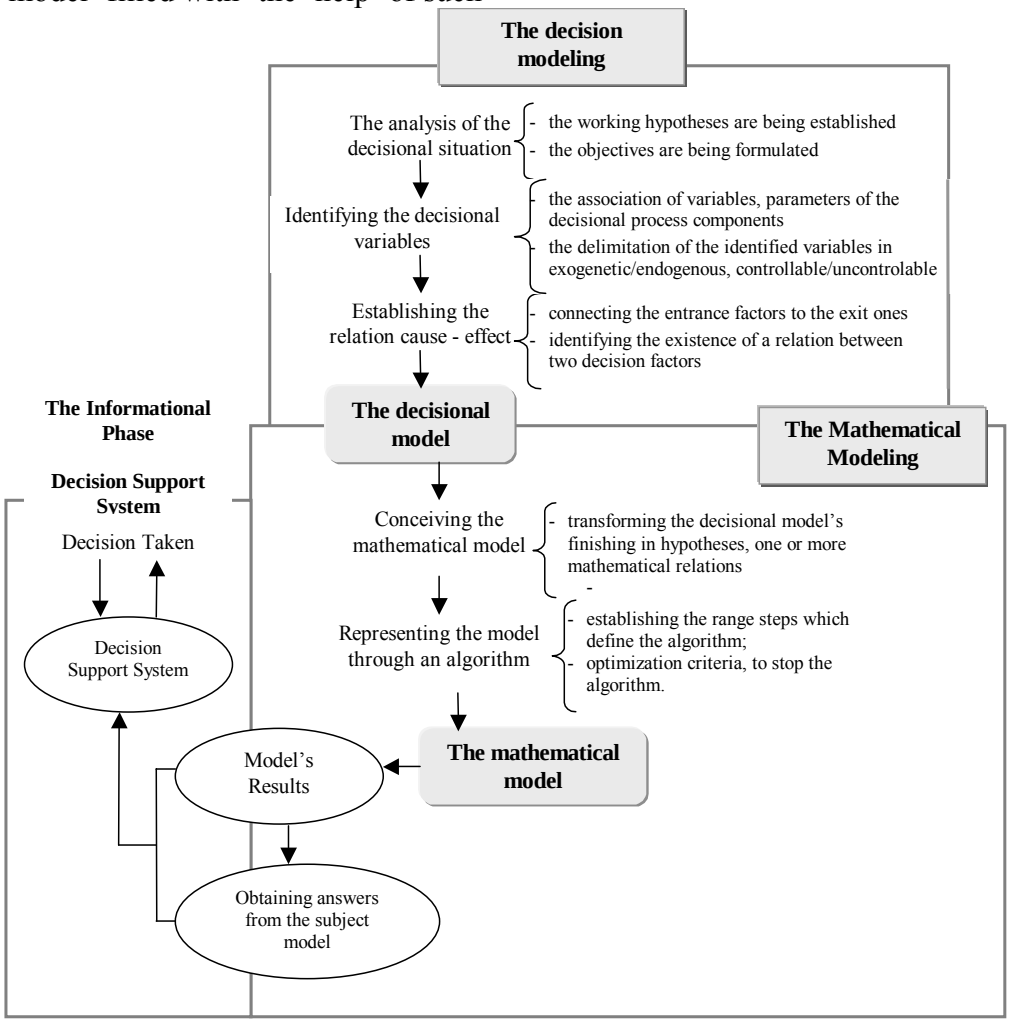

Figure 7 – The interference between the decisional, mathematical and informational modeling

Conclusions

In this paper we present a ample process of decisional modeling in a specific new way. It is necessary to specify that for the realizing of the decisional model we considered:

- *the specific of decisions in the stock exchange area*: *complex* and *difficult to apply* due to the presence of risk and uncertainty, *multicriterial*, *influenced* by a series of factors: *internal* and *external*, but also due the *decision-maker behavior*;
- *the decisional approaches from this area*: the approach through optimization models, through normative models [Coats, C. 1999], [Farrel, J.L.jr 1997];
- *the technique of decisional modeling*, accomplished in stages, as follows:
  - defining the objective function and the variables defining;
  - establishing hypotheses and restrictions to simplify the phenomenon;
  - identifying the cause-effect relations;
  - defining the decisional criteria;
  - defining the decisional variants;
  - mathematical form rendering of the decisional model [Ungureanu, L. 2000].

- *the role of decisional support of the model;*
- *the materiality of data and the interpretation done by the management of the solutions offered by modeling;*
- *decision assisting* through the use of a set of specific indicators to the ongoing of the stock exchange operations;
- *the definition of a management strategy* of operations with financial products, as part of the general strategy of management of the Stock Exchange.

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