

Bank system of making decision on the basis of multilevel multi-purpose systems of making decision

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Complex systems of making decisions have received especially wide circulation in solving management problems and banking control. Modern bank tasks contain both qualitative and quantitative initial parameter set. The formalization of input data set explains hierarchy of making decision systems. Let's consider some systems of making decisions in order to estimate the opportunity of application them for solving complex bank problems. The complex situations are solved with the help of hierarchical approach. Define a set of problems which can be solved by a consecutive way so that the solution of any problem from this sequence determines and fixes some parameters in the next problem so that it becomes completely determined and can be solved. The solution of primary problem is received when all subproblems are solved. The example of such grouping is shown in figure 1. Each block here represents an element which makes a decision. The output of an element (for example D_2) is the decision or the sequence of the decisions of the task which depends on the parameter fixed by the input x_2 . This input in turn is the output of the high level element. Thus the complex problem of making decision is broken into a set of simpler subproblems represented consistently so that the decision of all the subproblems allows the solution of initial problem. Such hierarchy called the hierarchy of levels of making decisions and whole making decision system which is represented in figure 1 by letter 'D' is called the multilevel system of making decisions [1]. In practice as an example of the multilevel making decision system can be the system of making bank decisions which is shown in figure 2. The input information Y considered task is the balance, the business-plan, the plan of marketing, production and management. Z is the additional information about client of the bank which is kept in bank archives. Thus the complex problem of making decisions concerning basic bank operations, such as, crediting is broken into a class of consistently represented simpler subproblems so that the decision of all these subproblems allows to solve initial problem.

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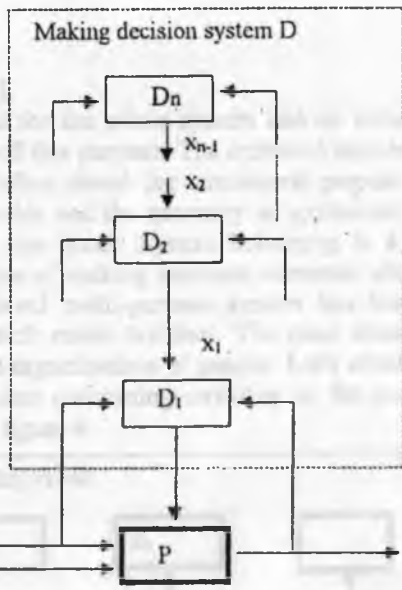


Fig.1 Multilevel hierarchy of making decision system

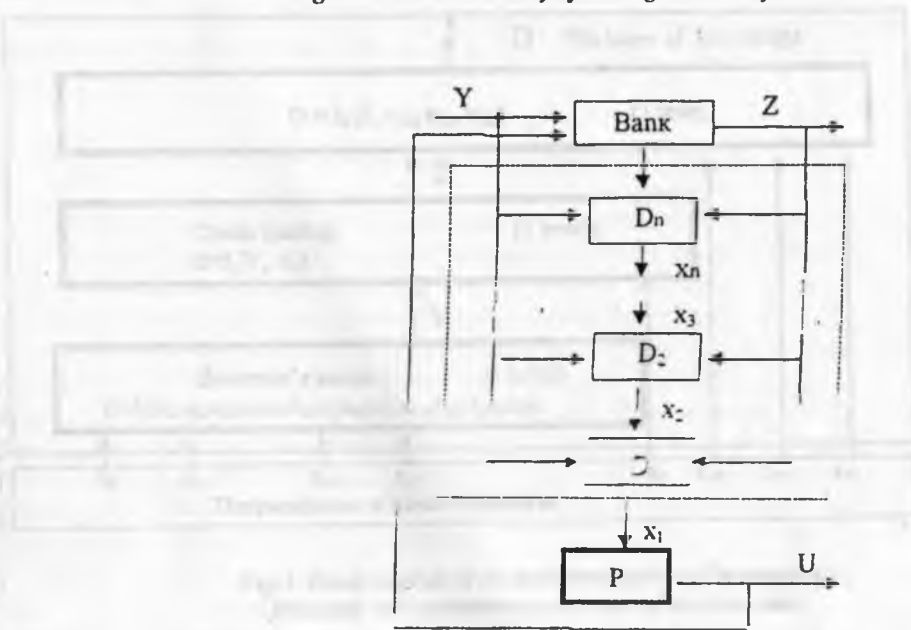


Fig.2 Multilevel hierarchical system of making bank decision

Among existing versions of hierarchies it is necessary to stress the organizational hierarchy which causes that [1]:

- System consists of a set of precisely determined cooperating subsystems;
- Some subsystems are elements making decision;
- Making decision elements are represented hierarchically, that is some of them are under influence or controlled by other decisive elements.

Let's consider the circuit of such type of hierarchy (Fig. 3). The level in such a system is called the echelon [1]. This system is also called a multilevel or multi-purpose because different elements making system and capable of making decision have the purposes which can be opposite. This purpose contradiction is not only the by-product of evolution and association of different subsystems in one system it is necessary for effective management of the system as a whole.

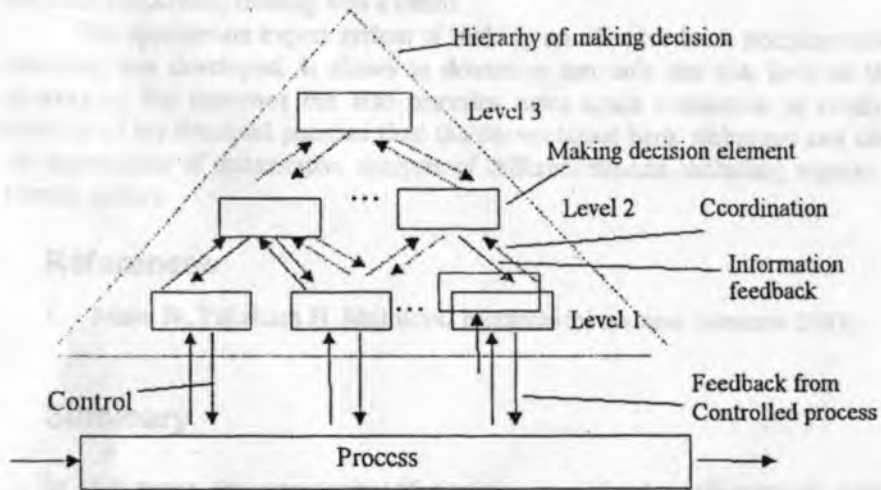


Fig. 3 Multilevel organization hierarchy

It is necessary to emphasize such an important characteristic of multilevel multi-purpose systems which distinguishes them from conceptually simpler systems of making decisions with many variables. The elements of the top level in them cause teleological activity of the bottom level elements but not completely control it. The elements of the bottom levels which make a decision need some freedom of a choice of their own decisions. Such freedom of actions is characteristic of any social or economic multilevel system. For effective utilization of a multilevel structure it is necessary that the rational distribution of efforts concerning making decisions among different level elements should be carried out. Only this condition will justify the existence of hierarchy.

All these facts result in conceptually important classification of making decision systems:

- a) Single-level one-purpose systems;
- 6) Single-level multi-purpose systems;
- b) Multilevel multi-purpose systems [1].

In the first case the purpose is defined for the whole system and all variables are selected so as to provide the achievement of this purpose. The technical decision of the problem of making decisions which satisfies above the considered purpose can be complex because the task is multi-measurable and the necessity of application of both methods of optimization and forecasting can occur. System belonging to a class of single-level multi-purpose systems consists of making decision elements which have their own purposes. The class of multilevel multi-purpose system has hierarchical relations among the system elements which make decision. The most characteristic example of systems of such type is formal organizations of people. Let's consider such system as it is used in bank. The decision concerning crediting is, for example, a multilevel multi-purpose system shown in figure 4.

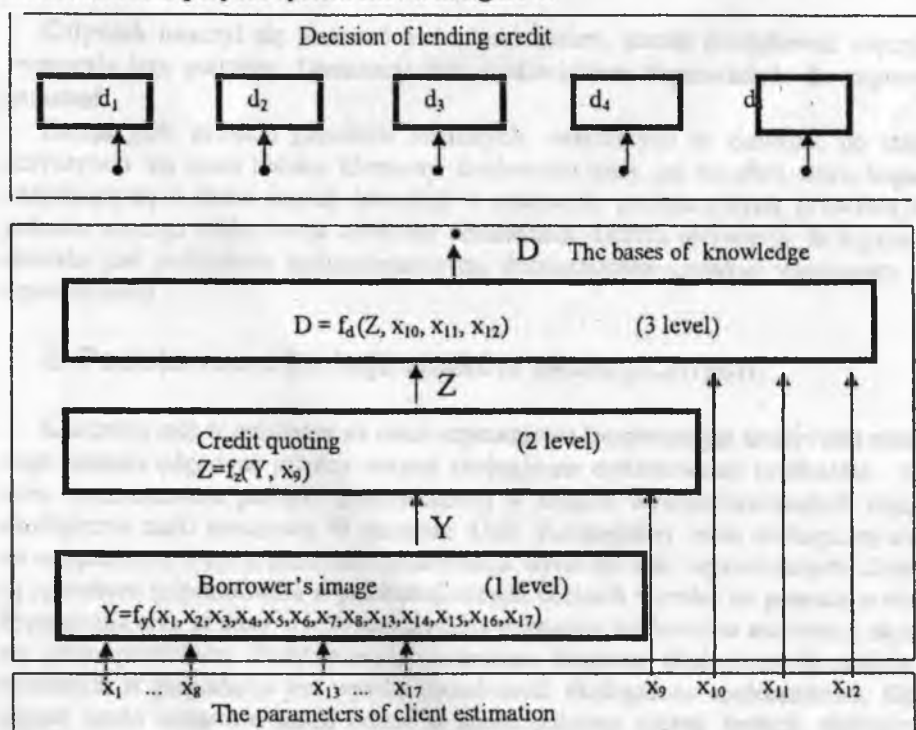


Fig.4 Block diagram of the multilevel system of borrower's financial risk estimation on the basis of the fuzzy sets

On the basis of the documentation received from the client and some additional information on him in the first echelon of making decision: the borrower's quantitative

parameters and his reputation are estimated. In the second echelon the definition of borrower's risk factor and his image is carried out. According to the banking management theory of western countries image represents the generalized estimation of criteria of the first echelon.

In the third echelon of the system the necessary coefficients are checked and also the credit quotation of the enterprise which represents the balanced set of borrower's risk coefficient and his image is determined.

Taking into account the final decision banks build their own credit relations with the client, estimate the client's risk degree and also have an opportunity to supervise over the risks. In order to formalize the considered model the theory of fuzzy sets is used. By using the developed matrixes of knowledge on the basis of developed functions of belonging the author had defined the system of logic equations. It made possible to determine a bank risk degree when crediting the borrower and also the final decision concerning lending him a credit.

The appropriate expert system of making an effective bank decision concerning crediting was developed. It allows to determine not only the risk level of the bank concerning the borrower but also provides more exact estimation of credit status, stability of his financial position than the conventional bank technique and also gives an opportunity of quantitative analysis of different aspects including aspects «of the human factor».

References

1. Mako N., Takahara H. Multilevel hierarchical systems. Moscow 1981.

Summary

In this paper the opportunity of applying multilevel multi-purpose system in modeling bank multilevel multi-purpose making decision system is analysed.

In order to formalize the considered model the theory of fuzzy sets is used. The appropriate expert system of making the effective bank decision concerning crediting is developed. It allows to determine not only the risk level of the bank but also provides a more exact estimation of credit status, stability of his financial position than the conventional bank technique and also gives an opportunity of quantitative analysis of different aspects including aspects «of the human factor».

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