INTELLIGENT TECHNOLOGIES OF STRATEGIC AND OPERATIVE MANAGEMENT SUPPORT FOR ENTERPRISES

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Abstract. *The article is devoted to the development of a mechanism for the proactive support of strategic and operational decision-making in an enterprise. The starting point for this mechanism should be a model (pattern) of the enterprise, which embodies the principles of balanced strategic measurement systems. Development of the enterprise pattern as an 'object–project–process–environment' configuration allows to stitch together the strategic and operational indicators, to provide a vertical continuity, the allocation of responsibilities for the purpose of full control. An effective use of the enterprise data as a strategic resource involves knowledge discovery for decision support through developing interrelated analytical models. Taking into account the limitations of classical methods for strategic and operational management support, Data Mining (DM) is proposed as an adequate modeling tool. A basic set of autonomous DM methods for developing appropriate models is proposed. Besides, it is demonstrated that an effective mechanism for decision support should be based on the application of hybrid intelligent models and methods, and should be brought up to the level of a hybrid decision support system DSS. Achievements of modern information technology (Big Data, analytics in memory, cloud technology, etc.) play in favor of the proposed approach.*

Key words: *strategic management, operative management, intelligent technologies, mechanism for decision support, DSS*

Introduction

In a globalized economy, the need for a rapid change in the policy activities of economic agents in response to changes in turbulent market conditions, the importance of processing huge amounts of data coming from different sources and accumulated in the information warehouses, the issues of developing adequate decision support tools for enterprises are of the most urgent interest. The ability of an effective use of the stored information, extraction of its latent content, knowledge and practical application to management processes are the major factors in increasing enterprise competitiveness in the modern world economy. Data become a new strategic resource of economic systems.

That's why there is an urgent need for the introduction of such economic and mathematical tools into management processes that will fully take into account the realities

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of the contemporary world and would be based on knowledge discovery and the latest information technologies.

On the other hand, the increasing complexity of the system environment led to the emergence of a close dynamic connection between the operative and the strategic management and their mutual influence.

The operative management, based on monitoring data, is designed to implement the goals and strategies of the enterprise (Trahtengerc, 2009). However, due to the turbulent changes in the external environment, the results may become inadequate to these changes and will require changing the strategies or even aims of the enterprise with their subsequent implementation. Changing the strategies leads to changes in operative management. Therefore, in modern control systems in which the latest information technologies are widely used, the implementation of operative and strategic management is tried to be combined.

The appropriate decision-making support systems should perform the following functions:

- providing the interconnection of information flows among different levels of a company management;
- analysis of results of the monitoring;
- substantiation of the character and magnitude of strategic and operative impacts, their implementation;
- determination of the efficiency of operative impacts on the realization of the chosen strategy;
- assessment of success in the realization of the strategy while achieving the goal;
- providing support for changes of the strategy in case of impossibility to achieve the goal by using this strategy and in cases of the occurrence of threats or opportunities;
- providing support to changing the goal, if the achievement of the previous goal becomes unreal and unprofitable;
- substantiation of the nature of strategic decisions that implement the execution of goals within specified limits;
- formation of the parameters of strategic decisions based on the assessments of the effectiveness of operative impacts;
- determination of the character and magnitude of operative impacts based on assessments of the effectiveness of strategies;
- providing modifications of goals, strategies and operative impacts depending on the efficiency of their application.

The implementation of such functions provides for the realization of one of the most important components of the modernization techniques of decision making management – the ability to take effective measures in conditions of unexpected changes in the information environment by rapidly applying the modern computer technology. In this case the decision rate and adequacy should correspondent to the rate and depth of the changes.

Based on the analysis of the existing decision-making support systems for different enterprises (Akopov, Beklarjan, 2009; Lepa, 2006; Turban et al., 2010), it may be concluded that nowadays there exist a number of deficiencies in the methodology, teaching, modeling and application levels.

Here are the main of them:

1. Fragmentation of sources for collecting, processing, and analyzing the enterprise data does not provide interconnectivity of information flows among different levels of the management system, i.e. does not provide for the integrity of the management system.
2. Evaluation of the effectiveness of operation activity weakly associated with the assessment of the effectiveness of strategies and goal-setting.
3 The diagnostics of the situations is complicated by a significant amount of data that characterize an enterprise as a dynamic system.
4. There is no unique methodological approach, complex of interconnected economic and mathematical models and methods of providing a relationship between the strategic and the operative management of the enterprise.

Firstly, the difficulty in supporting the decision-making processes in the enterprise is the absence of the unified structure of strategic and operative indicators. Secondly, the problems of monitoring data on changes in the effectiveness of the activity of the enterprises are fragmented in the early stages. Thirdly, the human capabilities of developing the amounts of data which are rapidly growing are extremely limited.

All these factors imply the following tasks:

- providing a vertical succession between the strategic and the operative indicators;
- restoration of a complete picture of the situation and the conditions based on fragmentary data and their qualitative interpretation from the perspective of their impact on the enterprise in the process of its development;
- transfer of certain intellectual functions to information systems for extraction of knowledge from large arrays of accumulated data.

The goal of this study was to elaborate the mechanism of strategic and operative decision-making support for an enterprise, based on the tools of knowledge extraction from data.

In order to achieve a particular goal, general scientific methods are applied, such as classification and theoretical synthesis, system analysis, system modeling.

Proactive management and decision-making

In the works of the greatest theorists of management, such as P. Drucker (2001) and S. Covey (2004), the focus is set on the necessity of transition from a flexible adaptation of an organization to the environmental conditions, to the active, proactive impact on the environment, and to the model of proactive behavior. Adaptability, adaptation, flexibility, taken by themselves, are just a reaction to the changing environmental conditions; this is a ‘downstream’ movement. This behavior deprives an organization of the initiative, and the planning carried out in this vein deprives the enterprise of real prospects, strategic orientations.

The use of the concept of proactive management provides the operative detection and evaluation of the possible problems or potentials, with the possibility of the subsequent implementation of appropriate management measures (Chornous, 2012). Considering the fact that the essence of proactive behavior is to achieve its goals through an active influence on the environment, this approach to the management is impossible to realize without the integration of strategic and operative levels, because the extraction of purposes happens at the strategic level and their implementation is carried out by an effective operative management.

Proactive management covers all levels of the hierarchy of enterprise management: strategic (determination of the system in the environment and goal-setting), tactical (preparation of management solutions for the implementation of strategies and resources ensuring the implementation of relevant measures), operative (individual activities in the realization of individual tasks). At the strategic level, the objectives are determined, options for the future development of the business are developed, and appropriate management strategies are discussed. At the tactical level, strategies are complemented by the necessary organizational and resort support and transformed into a set of interrelated activities. At the operative level, the execution of individual measures is implemented.

Thus, proactive management as a management designed to initiate changes, especially those focused on the implementation of such types of management decisions as the general strategy or goal-setting (defining the current goals of the enterprise), the local strategy (defining the effective strategy that meets the goal and supported by the opportunities of its implementation) and operative decisions (identification of actions that correspond to the chosen strategy).

In accordance with the modern theories of economic systems, the functioning of an enterprise can be presented through the interaction of the four types of subsystems (object, project, process, environment) (Kornai, 1998; Kleiner, 2007); Lankin, 2012). Let us denote the enterprise as S. Then,

$$S = (S_o, S_p, S_{pr}, S_c, E(S_i), F_S, A_S), \tag{1}$$

where S_o, S_p, S_{pr}, S_c is the subsystem of the object, project, process, environment, respectively, $E(S_i)$ is the structural elements of these subsystems, F_S and A_S are, respectively, the laws and operation algorithms (mechanisms) of subsystems and of an enterprise as a whole system.

The stability of the ‘object – project – process – environment’ configuration and the effective exchange of resources among the relevant subsystems are associated with the adoption of goal-setting, strategic and operative decisions. Operative decisions influence changes in the environmental subsystems; local strategic decisions involve changes in the process subsystem. Following the adoption of the goal-setting decision, the project for a specified object is changing, and subsystems create a new configuration capable of an effective development.

Examining an enterprise in this presentation, it is reasonable to explore the global problem situations that require goal-setting decisions at the level of its project subsystem, to analyze the strategic problem situations that require local strategic decisions at the level of process subsystems, and, finally, to study the operative problem situations that require operative decisions at the level of the environment.

The information support of strategic and operative management of an enterprise is realized by analyzing the data monitoring results.

Modeling of the enterprise patterns

The main requirements that are imposed on the monitoring system of an enterprise activity in the context of solving the problems of proactive management are the ability to provide different levels of management hierarchy with the necessary amount of information according to their requirements in the dynamics. The feature of this system is based on a complex coverage of all areas of the enterprise activity, with taking into account the influence of factors of the internal and external environment in order to develop the optimal options of goal-setting, strategic and operative management decisions. That is why the monitoring system should work in the real time and be directed to a permanent (uninterrupted) tracking of economic data to identify threats and opportunities of the enterprise. Effectiveness of system operation will be provided only if the set of monitored indicators will be sufficient to complete the reflection of the existing situation.

For the purpose of implementing these requirements, it is expedient to develop and explore the enterprise model through a system of combined patterns of the project, process, and environment. They consist of a set of control point values.

The accumulated positive experience of the application of different methods for the analysis of the effectiveness and state of an enterprise allows to use the techniques of balanced systems of the strategic measurement to determine the control points and measurement characteristics for forming the enterprise pattern.

Over the past twenty years, a variety of approaches, models, and methods for analyzing the effectiveness and state of an enterprise have been demonstrated. These are Tableau de Bord, Performance Measurement in Service Business, ProMES (Productivity Measurement and Enhancement System), Performance Pyramid, BSC (Balanced Scorecard), and some others described by R. Kaplan (1996), D. Norton (2008), and D. Wells

(2000). One of the latest innovations, described by H. Rampersad (2003), is the TPS (Total Performance Scorecard). Some of these systems, such as BSC, pretend to be universal as they take advantage of previous ones and are able to solve the maximum set of tasks (including strategic planning, modeling, plan–fact analysis, motivation, etc.).

Procedures for the enterprise monitoring include the development and analysis of its pattern with the subsequent conclusion about the necessity of changing its objectives, strategies, and operative activities. Therefore, control points should be formed in a way to provide unique and consistent information on the project, process, and environment patterns in the best way.

The general strategy of enterprise development covers various aspects of its work and includes the goals, objectives, and specification of actions for their implementation. Management processes in the range of the general strategy ST are distributed among m local strategies $ST^i, \; i = \overline{1,m}$. The local strategies are in some way related to tracking directions $DR^j, \; j = \overline{1,n}$.

The problem of diversity and a huge amount of processes at en enterprise can be solved by combining them into common and at the same time different groups (tracking directions) which may be the same or combined in the developed strategies for solving the management problems. The results of enterprise activity tracking are grouped into relatively reliable local strategies and make it possible to assess its efficiency. The global problem situations lead to changes in the goals and local strategies of the enterprise.

A set of control points $CP_k^j, j = \overline{1,n}, k = \overline{1,r^j}$ is formed for each tracking direction j. The point of control is a process, project or function in the system, which needs a regular procedure of measuring and disclosure of deviations. Their number in each direction has to be reasonable, based on the importance of an object, process or function they represent.

There are typical control points for each specific tracking direction; however, for different tracking directions a different number of control points can be used. Also, certain control points may be attributed to several tracking directions of the enterprise.

Each control point is a set of characteristics which together reflect the cross-section of the object, process or function state: $CP_k^j = \left(x_1^{kj}, x_2^{kj}, \dots, x_{p_{kj}}^{kj}\right)$. Considering the characteristics x_l^{kj}, it should be noted that the same characteristics may be used for different control points.

Considering the above-mentioned aspects, the models (patterns) of the environment, process and project can be presented as follows.

The pattern of the environment $S(t)$ is modelled by the current data which include both financial and non-financial characteristics:

$$S(t) = \{\vec{\alpha}(t), \vec{\beta}(t), \vec{\gamma}(t)\}, \tag{2}$$

where $\vec{\alpha}(t) = (\alpha_j DR^j(t), j = \overline{1,n})$, $\vec{\beta}(t) = (\beta_k CP_k^j(t), k = \overline{1,r^J},\ j = \overline{1,n})$, $\vec{\gamma}(t) = (\gamma_l x_l^{kj}(t), l = \overline{1,p_{kJ}}, k = \overline{1,r^J},\ j = \overline{1,n}\,)$; $\alpha_j, \beta_k, \gamma_l$ are the importance coefficients of the tracking direction *j*, and the control point *k*, the control point characteristic *l* respectively; $t = t_g^{lkj}$ is the moment *g* of tracking the *l*-th characteristic of the control point *k* in the range of the tracking direction j, $g \in G$.

The pattern of the process $AS(t)$ is built according to the data of the average period duration, the characteristics are financial and are aggregated:

$$AS(t) = \{\vec{\alpha}(t), \vec{\beta}(t), \overrightarrow{\gamma'}(t)\}, \tag{3}$$

where $\vec{\alpha}(t) = (\alpha_j DR^j(t), j = \overline{1,n})$, $\vec{\beta}(t) = (\beta_k CP_k^j(t), k = \overline{1,r^J},\ j = \overline{1,n})$, $\overrightarrow{\gamma'}(t) = (\gamma'_l x_l^{kj}(t), l \in \{1,2,\dots,p_{kj}\}, k = \overline{1,r^J},\ j = \overline{1,n}\,)$; $\alpha_j, \beta_k, \gamma'_l$ are the importance coefficients of the tracking direction *j*, the control point *k*, and the control point characteristic *l*, respectively; $t = t_g^{kj}$ is the moment *g* of the control point *k* tracking in the range of the tracking direction j, $g \in G$.

The pattern of the project $PR(t)$ is modeled by using the aggregated financial indicators corresponding to a set of local strategies $ST^i, i = \overline{1,m}$, related to the tracking direction DR^j, $j = \overline{1,n}$; and expert estimations of the strategy implementation *U*:

$$PR(t) = \langle ST(t), U(t)\rangle, \tag{4}$$

where $ST(t) = \{\vec{\alpha}(t), \overrightarrow{\beta''}(t), \overrightarrow{\gamma''}(t)\}$, $\vec{\alpha}(t) = (\alpha_j DR^j(t), j = \overline{1,n})$; α_j is the importance coefficient of the tracking direction *j*, in the case of $ST^i = DR^j$, $i = \overline{1,m}$, $j = \overline{1,n}$, $m = n$, $\vec{\alpha}(t) = \left(\alpha''_j f\left(Dr^j(t)\right), j = \overline{1,n}\right)$; α''_j is the importance coefficient of the tracking direction j, $\overrightarrow{\beta''}(t) = (\beta''_k CP_k^j(t), k \in \{1,2,\dots,r^j\}$, $j = \overline{1,n}$; β''_k is the importance coefficient of the control point k, $\overrightarrow{\gamma''}(t) = (\gamma''_l x_l^{kj}(t), l \in \{1,2,\dots,p_{kj}\}, k = \overline{1,r^J},\ j = \overline{1,n}\,)$; γ'_l is the importance coefficient of the control point characteristic l, $t = t_g^j$ is the moment *g* of tracking the direction j, $g \in G$.

Intelligent approach to the identification of the enterprise state

The monitoring mechanism includes the formation of the enterprise pattern and its analysis as a first step.

The further analysis of the formed pattern is associated with implementing the procedures of identification of the enterprise state with the subsequent conclusion on the necessity to change the objectives, strategies, and operative actions (Fig. 1).

Substantiation of managerial influence comes to the selection of an appropriate model of decision-making support. This choice is based on the data processing which allows creating rules for the model formulation.

At the basis for support of identification of the enterprise state, we put such intelligent method as the case-based reasoning (CBR).

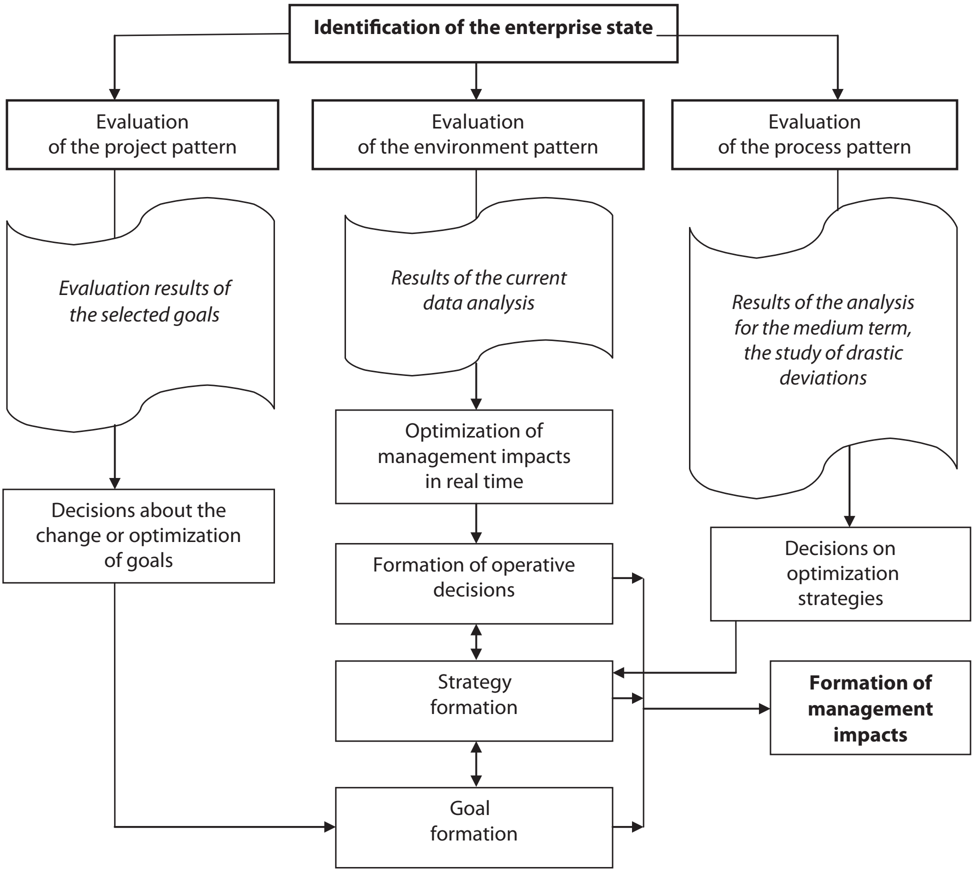

FIG.1. **Relation between the identification processes of the enterprise state and the appropriate types of decision making**

Source: compiled by the author.

The presence of an appropriate case (precedent) allows to get a ready-made solution or to conduct an additional action for its adaptation in order to reflect differences in the context of the current situation. If the relevant precedent is not found or the adaptation process requires the involvement of additional information, the decision will need an appeal to the knowledge base that contains basic information about the subject and methods of knowledge representation. Knowledge, as a regularized logic system, is presented in the rules' module. A set of rules contains rules for managing the activity processes (business rules), rules of decision-making in problem situations that arise during the management processes, and rules of the classification of mathematical models of decision-making.

The case E consists of a tuple $\langle PR, AS, S, R, Z \rangle$, where PR, AS, S are patterns of the project, process, and environment, respectively, R is the associated solution, and Z is the comment on the application of case.

The main task of the enterprise state identification is equiparation of the actual or forecast situation to a known pattern of situation contained in the case base.

Considering the fact that the management should be proactive, the case base includes not only the experience of the enterprise (including real situations with decisions which proved the model calculations) and projected situations with the proposed solutions, but also cases based on pattern retrieval. One of the intelligent DSS tasks is accumulating a lot of pre-designed cases. Data Mining (DM) provides methods for their discovery (Maimon, 2005).

Upon identifying the state of the enterprise, we can classify it as known, similar, or new.

If the state is classified as known or similar, the solution can be adapted or modified by the decision maker.

Otherwise, the search for the model and the most appropriate method for the support of solving specific management tasks are performed on the basis of rules.

In the process of the identification of the enterprise state, the functional relationship is established between strategic and operative management influences. The further analysis allows to set the time of transition from the correction of the business operation through operative decisions to the modifying strategies.

The sources of information about the imminent strategic challenges are not only the characteristics of enterprises forming the patterns of the process or project, but also the pattern of the future environment. Forecast implementation for the environment state allows to prepare strategic decisions simultaneously with operative actions establishing a close relationship among them. So, managers can identify the steps appropriate to different scenarios, without waiting for information about the upcoming changes in order to prevent the impending threats or to avail of the opportunities.

The discovery of patterns and relationships among events occurring at the enterprise is a complex problem; its solution is possible through examining the situation in the multidimensional space of the parameters that characterize it from different sides. This makes it necessary to develop a complex of economic and mathematical models based on DM.

Relationship between models of the enterprise monitoring support

In this research, a complex of models for supporting the enterprise monitoring are proposed. It is based on the combined usage of approaches to system state monitoring and the application of knowledge discovery, especially of DM tools (Fig. 2).

This complex includes the classic economic and mathematical models:

- models of the project, process and environment, based on a combined use of balanced systems of the strategic measurement;

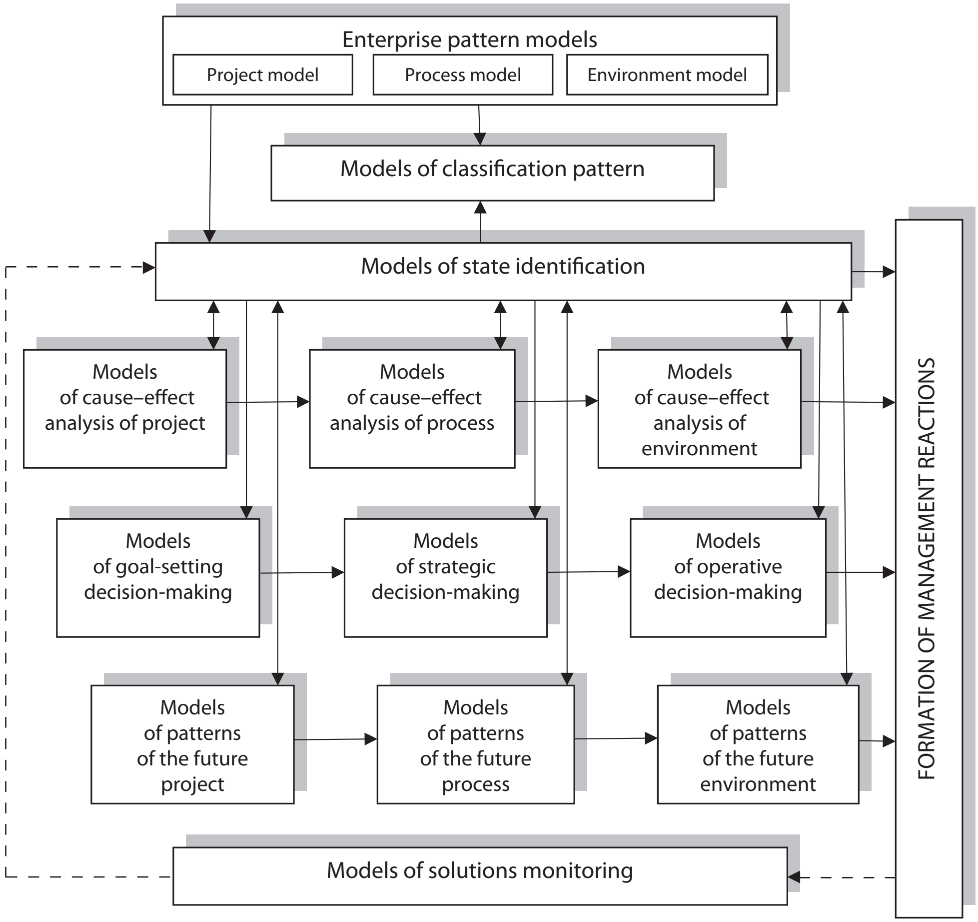

FIG. 2. **Relationship of a complex of economic and mathematical models for the enterprise state monitoring support**

Source: compiled by the author.

- a model of the pattern retrieval, based on the induction of rules, a neural network, visual analysis, etc.;
- models of the pattern classification using decision trees, rules, neural networks, genetic algorithms, cluster allocation models by the k-means method, etc;
- models for the identification of cause–effect relationships by statistical methods, the Bayesian networks, induction of rules, neural networks, cross-tab;
- optimization models using neural networks, genetic algorithms, decision trees, rule induction methods, evolutionary programming;
- predictive models based on the 'nearest neighbour' method, rule induction method, the Bayesian networks, statistical methods, neural networks, decision trees;
- models of solutions monitoring using neural networks, decision trees, rule induction, the 'nearest neighbour' method, etc.

Among the proposed models, there are both vertical and horizontal relationships.

The vertical ones correspond to the solution of proactive management problems through the implementation of the processes of situation review, causal analysis, decision-making, and plan analysis (Plunkett, Hale, 1982).

Horizontal connections reproduce the implementation of the 'goal-setting – local strategic – operative decisions' chain.

The processes of goal-setting and local strategic decisions' approval are not followed by the immediate operative impact. It usually ends with the establishment of the common directions, the promotion of which will provide a competitive advantage. The role of strategy first of all lies in helping to focus on a particular sequence of actions (scenarios), conditions and opportunities, and, secondly, in rejecting all the scripts which are not compatible with the chosen objective. The need of the current strategy may fall away as soon as the actual course of the enterprise will lead to the desired results.

Relations among models of different management levels are based on the technologies of transition from one type of the solutions to the others that have been developed in accordance with the methods of operative and strategic management and contain rules of such transitions (Kaplan, Norton, 2008).

Of the highest value for the formation of operative management impacts is the block of models of operative decision-making, including both models of business rules and analytic models (descriptive and optimization). Models of business rules are associated with policy support and supplemented by the results of the realization of analytical models.

The inputs of the operative decision-making models can be the output of models of the future environment patterns, models of the causal analysis of environmental models, and strategic decision-making models. The coordinating role is played by the block of the identification of the enterprise state.

The models of solution monitoring are also very important. They realize the tracking of the correspondence between the results of the model and the actual facts, and allow to offer models adequate to the current situation through a comparison of results obtained using different models.

Intelligent DSS and hybrid approach

The main methodical and model constructions for the monitoring mechanism should be brought to the level of applied information systems, intelligent DSS.

In the process of changing the strategies and character of operative influences, the enterprise management should monitor and organize the interaction of managers at different levels. To perform this task, intelligent DSS should represent all the necessary information on the results and impacts of changes in the external and internal environment, require from them the necessary subjective evaluation of the presented data on the basis of the obtained information and the applied methods that help to propose possible solutions and actions.

Higher levels of management define the action character of the lower one: to: generate goals and objectives, to form the assessment criteria, to determine the permissible limits of criteria values. In the implementation of operative impacts and local policy decisions, the lower levels of management show to the higher level how correctly the goals are formulated, whether they really satisfy the requirements of the external world and the conditions for their implementation within the enterprise.

Information comes simultaneously on all levels of management. The task of the DSS is to notify promptly all management levels about the need of operative impacts and making local and goal-setting strategic decisions in relation to changes in the external world and within the enterprise, based on the analysis of the monitoring data.

The adoption of operative decisions may require both the immediate managerial impact and the impact that has a delay in time. Local and goal-setting strategic actions always involve the need for a specific period for their implementation and completed with a number of operative reactions.

Operative decisions are made regularly; relevant operative impacts can be both regular and irregular. Local strategic influence is performed in cases when normalization of the process by the operation action only fails. Therefore, local strategic decisions are not made regularly and not determined by the number of realized operative impacts. Local strategic actions in different areas of the enterprise may not be connected through time. A similar relationship in the timescale is observed for local and goal-setting strategic decisions. The last feature is that they can be related to several areas of the enterprise and may not be related to earlier local strategic decisions. It explains the one-way relations among models of the same level.

The basis for the development of intelligent DSS is to become a hybrid approach to the use of DM. Integration of different methods within the hybrid model allows to overcome the limitations of each method, which in turn provides new possibilities to support the decision-making process within a single architecture, which should combine traditional elements of decision support with different models of knowledge discovery associated with DM.

The hybrid use of methods and models also means:

1. At various stages of decision-making support should be used 'pure' approaches, as well as their hybrids in the form of modified algorithms and combined instruments.
2. To support multiple successive stages of analysis the ensembles of models are to built and implemented, the ensemble of models are efficiently used in specific stages of decision-making support.

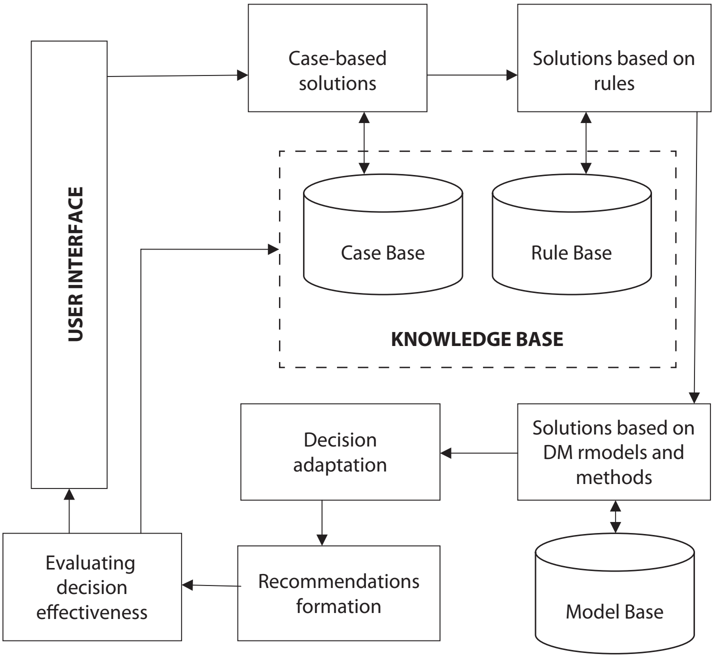

FIG. 3. **Scheme of interaction among the components of hybrid intelligent DSS**
Source: compiled by the author.

3. During the formation of tools for modeling at various stages in terms of management levels, it is necessary to combine DM methods in such a way as to provide for the preference of visual methods and expert analysis in transition from models supporting operative decisions to models supporting strategic and goal-setting decisions.

In the construction of the hybrid DSS, the most difficult problem is to develop a general algorithm of decision-making support, which should include a combination of algorithms from the rules, cases, and algorithms of decision-making based on DM models and methods. To illustrate the usage of a hybrid approach to DSS, the general model of the structure of the system can be presented, including the knowledge base with rules and cases, as well as the solution adaptation module and solution search based on rules, cases, DM models and methods (Fig. 3).

The application of methods based on cases in intelligent DSS improves the decision-making efficiency. Such DSS have the advantages of rule-oriented intelligent systems, too: an explanation of the proposed solution, the speed and timeliness of decision-making support, the possibility to work with an expert, an efficient solution of the problem of uncertainty, the formalization of expert estimations, the possibility of the evolution of business policies, the lack of contradictions, the influence of subjective factors, etc.

Conclusions

This study leads to a set of conclusions.

The complexity of enterprise operation in the contemporary highly dynamic world contributes to a search for the new concepts of management. Proactive management is a reply to globalization challenges. The proactive approach involves the discovery of the latent information content hidden in the chaos of diverse corporate and external data.

The development of the models for an enterprise through a combination of the project, process, and environment patterns based on the principles of balanced strategic measurement system allows to:

- combine into a single structure the strategic and operative indicators;
- provide a vertical continuity, the distribution of responsibilities;
- support the association with a certain level of the management system;
- provide the usefulness of management at the enterprise depending on the nature of the problem.

The mechanism of enterprise monitoring involves the formation of an enterprise pattern, its identification and analysis (within the diagnosis), and the generation of scenarios of the future development of the system. All these steps make it possible to establish effective management decisions (strategic or operative) and to realize the management operative impact.

The decision-making process support takes place in the conditions of an avalanche growth of information and its increasing diversity. That's why an adequate tool for its analysis is DM.

Support of proactive management processes should be based on a hybrid application of intelligent models and methods and be implemented in a hybrid intelligent DSS.

The starting point of the synthesis of the support mechanism of the relationship between strategic and operative decisions for the application is the development of an enterprise pattern that acquires practical importance in the process of specifying the parameters according to the specifics of its operation. The problem of determining the directions of tracking the performance of the enterprise should be resolved by its management, with the participation of consultants who need to conduct a thorough systematic analysis of the structure and activity. This should be done because of the unique organizational structure, management and decision-making technology for every enterprise. The same individual approach is necessary for the definition of specific models that can maintain proactive management processes at all management levels of the enterprise.

Broad-based in the proposed approach is the requirement that the mechanism of the strategic and operative decision support should be based on the principles of a balanced strategic measurement, complied with the basic processes of proactive management (situation review, causal analysis, decision-making, and plan analysis) and implemented in a hybrid intelligent DSS. A parallel analysis of patterns of the project, process and environment should be ensured by means of DM tools, the vertical continuity of solutions, retrieval of proactive systematic enterprise patterns.

Proactive elaboration of the 'object–design–process–environment' configuration variants can increase the manageability of an enterprise through an increased diversity of the possible management impacts.

The effective implementation of the suggested approach promotes the progress in information technology. It means not only an enhanced capability of information seeking and storage, not only the appropriate analytical software including in-memory analytics or knowledge retrieval algorithms, and not only a powerful communication. Most important is the availability of the appropriate systems and technological advances. By virtue of cloud technologies, any enterprise can afford implementing modern management approaches based on DM.

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