

Application of the Decision Support System "DATA" for Regional Management

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Abstract. The Russian Federation was faced with a conscious need to make a breakthrough in technological development and in the field of information development of society and, in particular, artificial intelligence. It is discussed how effective digital public management will be, as well as the legal aspects and possible international and social consequences of the introduction of digital technologies in the daily practice of public management [1-5]. Among the priority areas of state support for the development of digital economy in our country, we can highlight the use of new (digital) technologies by the public authorities of the Russian Federation aimed at improving the quality of public management. The article discusses the possibility of using the "decision support system "DATA" for the purposes of regional management. We specify the study area as the formation of the main framework to apply the tools of a typical automated workplace of civil servants to assess the environment impact on the regional socio-economic system in the framework of the National project "Digital economy".

1. Introduction

The Russian Federation was faced with a conscious need to make a breakthrough in technological development and in the field of information development of society and, in particular, artificial intelligence. It is discussed how effective digital public management will be, as well as the legal aspects and possible international and social consequences of the introduction of digital technologies in the daily practice of public management [6-8]. Among the priority areas of state support for the development of digital economy in our country, we can highlight the use of new (digital) technologies by the public authorities of the Russian Federation aimed at improving the quality of public management. We specify the study area as the formation of the main framework to apply the tools of a typical automated workplace of civil servants to assess the environment impact on the regional socio-economic system in the framework of the National project "Digital economy".

As a result of the implementation of the Federal project "Digital public management", state authorities and local governments will have effective mechanisms at their disposal for the automation of their activities, and the interdepartmental information circulation. An important direction is the introduction of the automated workplace of civil servants in the practice of civil service by the end of 2021.

This article is a continuation of a series of works [9,10]. It is devoted to the peculiarities of development and use of the decision support system "DATA" (DSS "DATA") within the framework of the Federal project "Digital public management" to ensure a sufficient level of regional public management in the conditions of information transformation to come.

2. Relevance of the article

Today's realities, which determine the development of information society in Russia, allow us to say that some experience has already been accumulated in the field of decision support at the regional level. Thus, modern regional DSSes are focused on the accumulation, subsequent analytical processing of territorial information. DSSes often offer tools for systematic modeling of socio-economic development of the region [11-13]. However, a review of modern software systems operating in the field of DSS at the regional level showed that they do not take into account the experience and knowledge of experienced public managers and experts. The development of this problem was the formalization of the processes of managerial decision-making in fuzzy conditions (in works of such scientists as Aizerman M. A., Aleskerov F.T., Altunin A. E., Podinovskiy V. V., Potapov M. A., Semukhin M. V., Terelyanskiy P. V., Shvydun S. V., Yampolskiy, V. C.) [14-16]. Among the foreign authors it is possible to mention Hamdy A. Taha, Brams S.J., Clemen R., Goodwin P., Hansson S. O., Raiffa H., Roth A., Smith J. Q., Sotomayor M.O., Taylor A., Wright G. [17-24]. The specific character of the formation of management decisions, including the ones based on expert evaluations, was considered in the works of Litvak B. G., Orlov A. I., Aizerman M. A., Aleskerov F. T. [25-27].

3. Problem statement

When making management decisions in the context of the ambiguous influence of the external environment on the regional socio-economic system, it is necessary to provide ordinary employees of regional governments with the opportunity to expand the list of possible management alternatives. We formulate the relevance of this study as ensuring the transfer of management experience with the help of DSS "DATA", which will reduce the risk of making incorrect or suboptimal decisions when solving complex and poorly formulated tasks in an unpredictable influence of the environment. In addition, on the other hand, automation of decision support is the direction of optimization of management activities in the context of the Federal project "Digital public management" within the framework of the National program "Digital economy".

4. Theoretical Part

4.1. DSS "DATA" as a control device in the management system of a regional socio-economic system

Works [9,10] showed that a regional socio-economic system is the object of management in a complex structured management system. Its description can apply the concepts and principles of management theory. Fig.1 shows a part of the management system of a regional socio-economic system, in which the targets of the national projects of the Russian Federation act as the master control of $g(t)$.

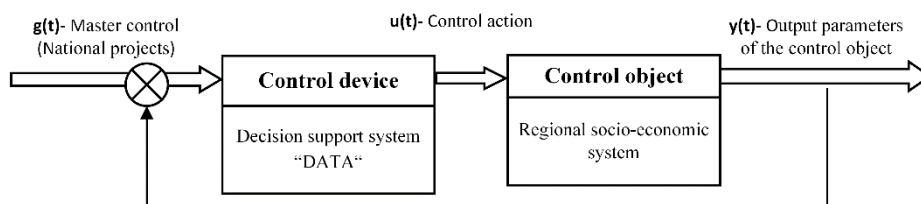


Figure 1. The control device and the control object as a part of the management system of a regional socio-economic system.

The master control $g(t)$ enters the control device - the decision support system "DATA" (DSS "DATA"), and then it is corrected through a negative feedback system. The DSS "DATA" forms a control action $u(t)$, which provides an impact on the regional socio-economic system in accordance with the targets of the National projects. The evaluation of the output parameters $y(t)$ makes it possible to estimate the achievement degree of the parameters set by the master control.

4.2. Architecture of the software complex DSS "DATA"

The developed architecture of the information system contains many modules for intermediate calculations and user interfaces, each of which is represented by a separate software that allows you to clearly separate the functions, provide flexibility to expand the system functionality and ensure the security of data access. Let's consider the main ones (Fig.2).

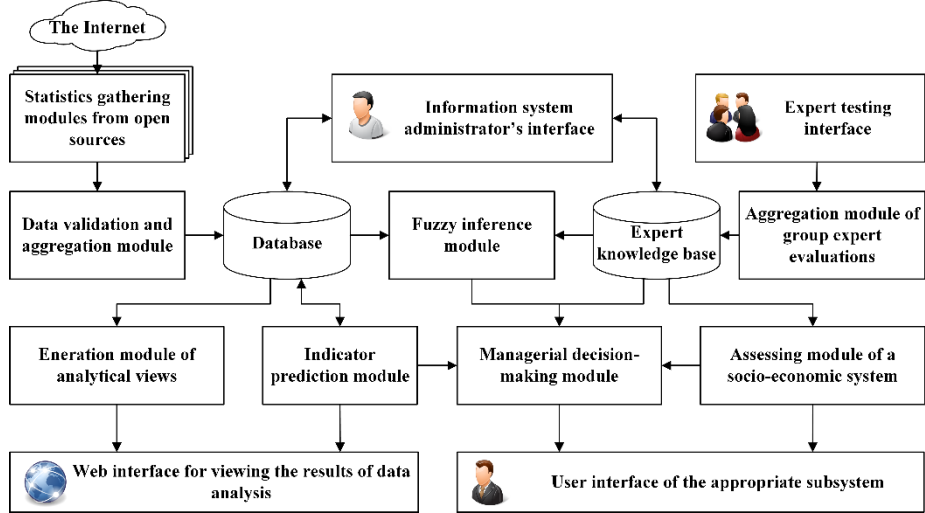


Figure 2. Architecture of the software package DSS "DATA".

4.3. Main elements of the software package DSS "DATA"

The main task of each statistics gathering module from open sources is to access through the Internet to the site containing the data, load, sorting out the necessary data, their interpretation and saving the results in the database.

Data validation and aggregation module ensures data aggregation from different sources. This involves the comparison of various names of indicators, their grouping in a hierarchical structure, converting to a common unit of measurement, removing duplicates, verification and cleaning of noisy data. The module works in the semi-automatic mode, most of the actions are performed by the module itself.

The indicator prediction module performs the regression analysis of the values of regional indicators in order to detect trends in their development and extrapolation.

The generation module of analytical views collects and aggregates the generated statistics, as well as the results of indicator prediction in accordance with the specified forms of analytical reports, which can later be presented in the form of charts and tables. The module forms aggregate data representations in the database, forming their hierarchical structure. This provides support for the OLAP technology, which allows you to get real-time analytics regardless of the amount of the accumulated data, as the new data supplement the existing aggregates and do not lead to their full recalculation. The module works autonomously and continuously in the background mode, making calculations as new data become available.

The aggregation module of group expert evaluations is designed to combine the expert evaluations into the overall impact of factors on the socio-economic system. This module is necessary for the formation of a balanced generalized and more objective evaluation of the degree of influence of factors on the known problems, as well as the definition of a list of effective measures to minimize the negative factors of influence.

The assessing module of the socio-economic system determines the general state of the studied socio-economic system and identifies its own problems. Possible problems are defined in the knowledge base. The value of each problem is determined on the basis of the available trends of all indicators, the

dependences of the factors of influence on the socio-economic environment on these problems and the force of influence of these factors on possible problems. This identifies the most important current problems in the region, as well as the factors that have a strong impact on the problem and/or significant deviations from the target level of indicators.

The fuzzy inference module is a separate subsystem that is used by other modules for operations of phasification, making inference on the given fuzzy production model, and dephasification. The module is used with different input and output values both at the stage of the aggregation of fuzzy expert evaluations, and at the stage of formation of managerial decisions. In this regard, the implementation of the module is universal within the framework of the developed system.

The managerial decision-making module is one of the main modules that form the result of the system operation to represent it in the user interface of the advising system.

5. Conclusion

It was determined that the regional heads of different levels can use the DSS "DATA" at different stages of the managerial decision-making process. Automation of decision support is the direction of optimization of management activities and differs favourably from the decisions made on the basis of traditional methods based on the manager's intuition or the notion of "common sense". The developed automated system can be recommended for use in the activities of the regional government, as well as in the educational process of technical universities.

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