

The Digitalization of Methods for Responsible Evaluation of Scientific Institutions

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INTRODUCTION

In the context of Ukraine's integration into the international research space and the intensification of mutually beneficial scientific, technical, and innovation cooperation, ensuring state support for Ukrainian entities engaged in scientific, scientific-technical, and innovative activities has become of paramount importance [1]. The list of such scientific institutions (SI) is compiled in the State Register of Scientific Institutions receiving state support (hereinafter referred to as the Register). To ensure rational state support for SI, it is necessary to periodically review and improve the normative and legal framework for assessing the performance of institutional scientific activities [2]. According to the vision of the European organization CoARA (Coalition for Advancing Research Assessment), the evaluation of researchers and research organizations should recognize results that maximize the quality and impact of research. This requires an evaluation primarily based on qualitative judgment, where expert assessment plays a central role, complemented by the responsible use of quantitative indicators. The challenges in this domain are largely associated with the multi-criteria task and the issue of selection. Therefore, making informed decisions by government authorities requires comprehensive analytical support. This can only be achieved through the digitization of evaluation processes, which involves providing experts

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with scientifically grounded and formalized computer tools and the necessary information support.

MATERIALS AND METHODS

The question of assessing the performance of scientific institutions has remained relevant worldwide for a long time. Many researchers, including those in Ukraine, draw attention to the unsatisfactory implementation of prioritizing directions and criteria for evaluating subjects of scientific activity for the purpose of their support. Conclusions have also been drawn about the necessity of using expert evaluation methods supplemented with quantitative indicators. To overcome these discrepancies, researchers and experts propose a range of approaches to decision support in a multi-criteria environment, including relying on heuristic, interactive, and expert methods. Developments of new methods for evaluating the performance of subjects of scientific activity, models, and information technologies that can be used for the practical organization of scientific performance evaluation are also suggested.

In modern times, ensuring access to open digital systems to support the evaluation processes of scientific institutions is advisable to implement based on a specialized information and telecommunications system and a national internet portal, which are currently being developed in the country. Such a system aims to create conditions for gathering information from various sources and to simplify and automate procedures for registering SI, including the completion of applications, questionnaires, reports, and other documents. However, to address multi-criteria evaluation tasks of scientific institutions, it is advisable to utilize approaches based on models, algorithmic tools, and methodological frameworks implemented as a Decision Support System (DSS). The authors propose an integrative methodology for constructing such a DSS, which is based on the use of several well-known methods, including approval voting (AVM), Analytic Hierarchy Process (AHP), Analytic Networks Process (ANP), combined with ontological data models, and the application of graphs for visualizing the alternative selection processes [3].

The combination of the aforementioned information and telecommunication system, the internet portal, and the corresponding DSS can facilitate the creation of a modern digital environment for effective government management of scientific activity evaluation processes (Fig. 1). The cognitive process of decision-making when solving unstructured multi-criteria evaluation problems using DSS supported by integrative methodology is shown in Fig. (2).

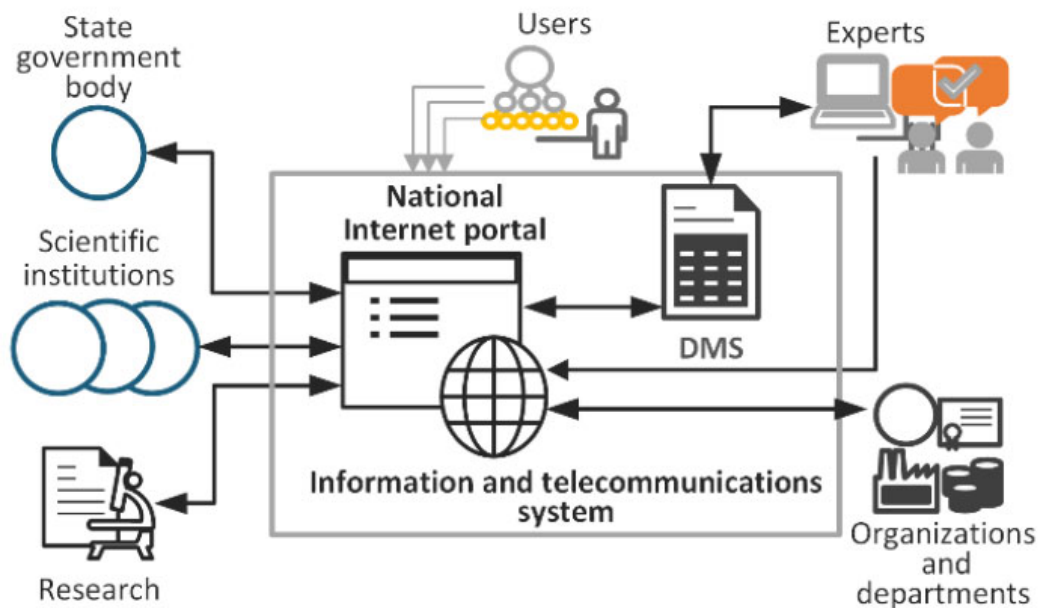


Fig. (1). Digital environment for evaluating scientific activity.

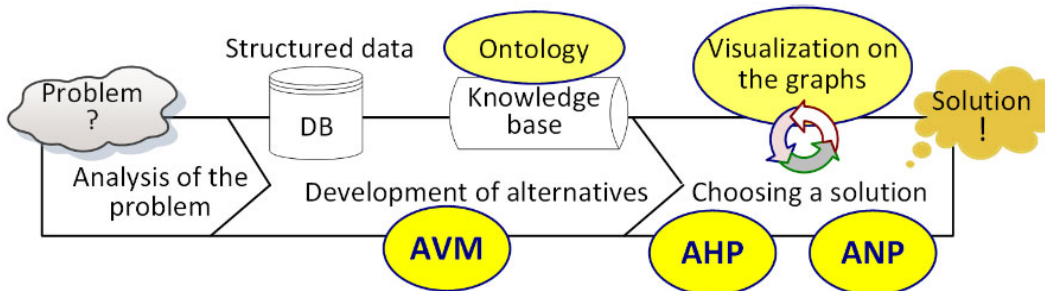


Fig. (2). A cognitive decision-making process for evaluation supported by an integrative methodology.

The above decision support methods can be applied both separately (for simple tasks) and in combination for tasks with complex relationships between alternatives and criteria. This procedure, with the use of appropriate software tools, can be performed by a group of experts from specialists of scientific organizations of various profiles, which will contribute to increasing objectivity and efficiency in decision making.

RESULTS

The experimental sample of the DSS was tested on tasks in the field of defense and civil protection, which confirmed the effectiveness of decision-making support. A technology for choosing alternatives has been developed, which can be

options for the composition of criteria and their point contribution to the overall assessment of the scientific institution activity.

CONCLUSION

The analysis of the state of evaluation of scientific institutions, which receive government support, indicates a lack of comprehensive information and analytical decision support for experts. These problems can be overcome through the use of modern mathematical methods and digital information communication tools.

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