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HYBRID ARTIFICIAL INTELLIGENCE IN INNOVATIVE MANAGEMENT OF EDUCATION DURING CRISIS

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Abstract. The paper explores hybrid artificial intelligence (HAI) as a strategic tool for innovative educational management in crisis conditions. Combining symbolic AI with machine learning and neural networks, HAI offers analytical precision and adaptability, enabling rapid response, resource optimization, and personalized learning. The approach incorporates synergetic and econophysical methods to study the dynamics of the modern information economy under instability. Results show that HAI helps transform crises into opportunities, supporting sustainable and human-centered development in education.

Keywords: innovative educational management, crisis management, hybrid artificial intelligence, synergetic methods

Introduction.

In today's increasingly competitive economy, where technological progress is advancing by leaps and bounds, the ability of companies to constantly change and innovate is becoming a guarantee of survival and long-term success [1]. Innovation management is not just a separate function or department, it is a holistic management philosophy that permeates all business processes [2]. It includes not only the creation of new products, but also the optimization of processes, the introduction of new business models, and the formation of a unique corporate culture focused on finding and implementing advanced solutions [3]. It is not so much a reaction to changes as their anticipation and creation [4]. In an era of global instability and technological shifts, where the future cannot be easily predicted, modern innovation management is undergoing radical changes [5]. It is no longer just a project management process, but a complex system capable of functioning in conditions of uncertainty [6], which has both a dynamic and stochastic nature [7]. Dynamic uncertainty is associated with rapid and unpredictable changes in the external environment (technology, competitors, politics), while stochastic uncertainty is caused by random, probabilistic factors (success of a new product, technical failures). Success in such an environment

depends not on predicting the future, but on the ability to quickly adapt to it, turning risks into new opportunities [8]. In a crisis, when the external environment becomes unpredictable and aggressive, modern innovation management ceases to be just a tool for growth and development [9]. It is transformed into a key function of survival and adaptation, becoming a vital part of the company's strategy [10]. During this period, traditional management methods based on long-term planning and stability lose their effectiveness [11]. Flexibility, speed and the ability to find non-trivial solutions in conditions of resource scarcity come to the fore [12]. Innovative management in a crisis is not about how to create a new breakthrough product, but about how to revise current processes, find new sources of income and strengthen market positions by using limited opportunities and turning threats into new opportunities for growth [13].

In modern realities, when crises (economic, geopolitical, pandemic) have become not an exception, but almost the norm, traditional information technologies of management are losing their effectiveness [14]. In conditions of uncertainty, when the speed of change exceeds the human ability to make decisions, innovative intelligent information systems are becoming a key technology for business survival and adaptation. These systems, based on the methods and algorithms of classical machine learning [15] and connectionist machine learning (using artificial neural networks) [16], [17], classical Data Mining [18] and Big Data analysis & analytics within the framework of Data Science [19], symbolic (based, as a rule, on rules [20]) and neural network AI - allow not only to collect and process information in real time, but also to predict possible scenarios, optimize processes and find hidden patterns. In this way, they transform a crisis from an unmanageable chaos into an environment where informed and balanced decisions can be made.

The Main Part.

In an era when crises — from pandemics to economic shocks — threaten the stability of the educational system, innovative education management requires qualitatively new tools. Traditional management approaches based on manual analysis and slow decision-making cannot cope with a dynamic and unpredictable

environment [21]. In these conditions, hybrid artificial intelligence (HAI) is becoming not just a technological innovation [22], but a strategically important tool that can ensure the continuity and effectiveness of the educational process. HAI, combining the strengths of symbolic, knowledge-based [23], [24] AI (rules, logic, semantic networks, frames) and connectionist AI (machine learning, neural networks), allows educational institutions to quickly adapt, optimize resources and personalize learning, turning a crisis from a threat into an opportunity for transformation.

The essence of HAI technology: symbolic AI provides transparent and formalized solutions that are easy to explain; Subsymbolic AI is flexible and able to detect hidden patterns in large amounts of data. Their combination allows for both analytical rigor and adaptive learning.

Research on the relevance and effectiveness of HAI in education management during a crisis:

1). Adaptation to unpredictability: Hybrid AI is able to not only analyze large amounts of data (e.g. academic performance, attendance), but also understand the context using symbolic rules. This allows it to quickly adapt to changing conditions, for example, to offer new educational trajectories during a crisis or to personalize the learning process.

2). Resource optimization: In a crisis, when resources are limited, HAI helps make decisions about their efficient allocation. It can predict which courses will be most in demand, optimize the class schedule or automate routine tasks, freeing up teachers' time.

3). Personalization of learning: HAI can analyze the individual characteristics of each student - their strengths and weaknesses, the pace of learning and the style of learning. Based on this, it creates personalized curricula, which is especially important in conditions where students may have difficulty self-organizing.

4). Stress reduction: automation of routine tasks (checking work, compiling reports) with the help of HAI reduces the workload of teachers. This allows them to focus on more important aspects - individual communication with students, their

mentoring and providing emotional support.

The role of HAI in innovative management of the educational sphere during a crisis: operational analytics and forecasting: modeling scenarios for the development of events, risk assessment; resource optimization: rapid redistribution of finances, personnel and technologies; support for strategic decisions: finding non-standard, but justified management decisions; adaptation of processes: restructuring of management chains and services to changing conditions.

The advantages of HAI in education management in unstable conditions: accelerated identification of problems and threats; the possibility of a personalized approach to clients, employees or process participants; increasing the speed and accuracy of management decisions.

Thus, HAI acts as a catalyst for adaptive strategies during a crisis, allowing the organization not only to survive, but also to develop, finding innovative ways to solve problems.

Summary and conclusions.

The use of hybrid AI in education management in crisis conditions is not just a technological innovation, but a strategic necessity. It allows educational institutions not only to survive, but also to actively develop, ensuring high quality of education, despite all external challenges.

In other words, hybrid artificial intelligence is a key tool for innovative education management in crisis conditions. It not only helps to solve operational problems, but also lays the foundation for long-term sustainable development. The main advantages of HAI: flexibility (the ability to quickly adapt to changes); efficiency (optimization of the use of limited resources); personalization (focus on the individual needs of each participant in the educational process).

Ultimately, the use of HAI allows educational institutions not only to survive, but also to emerge from the crisis with new competitive advantages, as they become more adaptive, efficient and human-oriented.

Discussion.

The author puts forward the following argumentative thesis: application of

innovative management in the field of modern education using synergetic and econophysical methods that allow for a systematic study of the dynamics and structure of the information economy. This approach is especially valuable in the context of increasing instability and crises of various natures, as it helps to better understand the interrelations, predict changes and develop adaptive development strategies [25], [26]. So, this is promising part of the author's future scientific R&D will be reflected in future publications.

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