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# HYBRID INTELLIGENT INFORMATION TECHNOLOGIES FOR ADAPTIVE EDUCATIONAL CRISIS MANAGEMENT

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***Abstract.*** *Modern education is experiencing a period of instability and transformation caused by global crises - pandemics, military conflicts, economic and climate shocks. In such conditions, traditional forms of management of educational institutions are not effective enough. Adaptive approaches that allow flexible responses to external challenges are coming to the fore. Central to this transformation are intelligent information technologies - systems based on artificial intelligence, data analysis, digital modeling and automated decision-making.*

***Key words:*** *crisis educational management, adaptive educational management, innovative educational management, intelligent information technologies, hybridization of IT technologies & methods*

## Introduction.

1). In the context of rapidly changing external environment, digitalization, globalization and increasing instability, traditional approaches to managing organizations are losing their effectiveness [1], [2]. They are being replaced by innovative management - a system of flexible, creative, technologically sound methods and strategies that ensure sustainable development, competitiveness and adaptation of organizations in conditions of uncertainty [3].

Modern innovative management is not just the use of technology, but a complete transformation of management logic [4]: from control to cooperation, from bureaucracy to flexibility, from reactivity to proactivity, from hierarchies to networks, from stability to adaptation and change [5].

Innovative thinking allows organizations to be adaptive, sustainable, productive and people-oriented. It is these approaches that become the basis for competitiveness in the VUCA world [6] (volatility, uncertainty, complexity, ambiguity).

2). In the conditions of constant instability of the modern world - pandemics, military conflicts, economic shocks, climate disasters and technological failures -

organizations and institutions are faced with the need to quickly adapt [7], ensure the continuity of their activities and maintain competitiveness [8].

Traditional approaches to management are not always able to effectively cope with multifactorial threats [9]. In this situation, anti-crisis innovative management [10] plays a key role, representing a synthesis of flexible management strategies and modern technological solutions aimed at preventing, overcoming and minimizing the consequences of crises [11].

Innovative specialized information technologies and systems [12], flexible organizational approaches and the active participation of experienced personnel make it possible not only to overcome crises, but also to use them as a point of growth and transformation [13]. *Thus, anti-crisis management should not be a reaction, but a built-in, proactive and strategic process that ensures the survival and success of organizations (for example, in the field of education) in conditions of instability.*

**Main Part.**

The education sector in the 21st century is facing an increasing number of crises: pandemics, military conflicts, digital threats, psychological and social upheavals. These challenges require a new management philosophy and methodology - flexible, predictive, technologically rich and knowledge-based [14].

In this regard, intelligent information technologies (IIT) - systems that combine big data processing (data-driven approach) and knowledge obtained from expert, logical and cognitive models (knowledge-based approach) [15] - begin to play a special role. Such a hybrid digital basis makes it possible to form sustainable, adaptive, manageable models of anti-crisis response [16].

*1. The concept of intelligent information technologies in education.*

Intelligent information technologies (IIT) are technologies that are capable of: independently analyzing information; learning from data; using formalized knowledge; make management decisions in conditions of uncertainty.

In education, IITs are implemented in the form of: intelligent monitoring systems; adaptive learning platforms; expert decision support systems; analytical panels and dashboards; chatbots, assistants, digital twins of the institution.

*2. Educational crises and types of their impact.*

| Type of crisis | Consequences for education |
|---|---|
| Pandemic | Transition to online, student outflow, digital inequality |
| Military | Political Migration, destruction of infrastructure, loss of personnel |
| Social | Economic Reduced funding, stress, disorientation of students |
| Technological | Cyberattacks, platform failures, unpreparedness for the digital transition |
| Psychological | Teacher burnout, student anxiety |

*3. The concept of adaptive management of educational crises.*

Adaptive management is a dynamic management in which: decisions are made based on real data and forecasts; the system structure can change to suit the situation; management focuses on supporting vital functions even in extreme conditions.

In the educational sphere, this includes: rapid change of learning formats (offline, online, hybrid); prioritization of safety and accessibility; individualization of approaches to teaching; automatic redistribution of resources.

*4. Knowledge-based vs data-driven technologies in crisis management.*

4.1. Knowledge-Based: Expert systems — work according to formalized rules laid down by experts; Ontologies and knowledge bases — model the connections between concepts (e.g. the structure of the educational process, dependencies between disciplines and competencies); Applicable for logical analysis when there is insufficient data [17].

4.2. Data-Driven: Use big data on student and faculty behavior, risks, and resources; Use machine learning and neural networks; Are effective in the presence of large-scale, live information [18].

4.3. The hybrid model (integration of knowledge + data) provides maximum flexibility and reliability, especially during crises, when some data is missing and some can only be obtained empirically.

*5. Challenges and risks:* Lack of data at the time of a crisis; Low digital readiness of the staff; Ethical issues in analyzing student behavior; Interoperability of systems (incompatibility of different IITs); Dependence on infrastructure and connectivity.

*6. Recommendations*: Implement hybrid IIT systems capable of working with both data and expert knowledge; Ensure centralized risk monitoring in educational systems;

Develop national or regional platforms for anti-crisis management of education; Train digital education leaders — new generation managers; Form an ethical architecture for data and knowledge management.

**Summary and conclusions.**

1). In times of crisis, when traditional management methods lose their effectiveness, intelligent information technologies become a key resource for ensuring the sustainability, flexibility and adaptability of educational institutions. Intelligent information technologies make it possible not only to respond to changes, but also to predict them, prevent risks, personalize approaches to learning and optimize the use of resources. Thus, the introduction of intelligent information technologies in adaptive management is not just a technological trend, but a strategic step towards ensuring the continuity, safety and quality of education in any conditions.

2). Intelligent information technologies that combine knowledge and data are becoming a strategic tool for sustainable management of educational crises. They ensure: accuracy and flexibility of decisions, rapid adaptation of the educational process, protection of the interests of students and teachers in an unstable environment. Hybridization of knowledge-based and data-driven approaches opens the way to the formation of a “smart”, predictive and ethical education system that is resistant to future crises and challenges.

**Discussion.**

Hybridization of intelligent information technologies is a breakthrough approach to ensuring adaptive and sustainable management of educational institutions in times of crisis. Hybridization of intelligent information technologies is the process of combining various digital solutions (Big Data, data-driven & knowledge-based DSS, cloud and edge computing for modeling [19], classical ML [20], ANN [21] & deep ANN [22]) into a holistic AI system [23] that provides advanced functionality for effective adaptive management [24], especially in times of crisis [25]. Such hybridization allows: quickly adapting management to changing conditions; improving the quality of decision-making; automating key processes and minimizing risks in times of crisis [26-28].

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