

Intelligent logistic information systems in adaptive management of education

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Abstract. *The paper analyzes the role of intelligent logistic information systems (ILIS) in managing higher education under uncertainty and crises. ILIS integrate artificial intelligence, machine learning, big data, IoT and cloud technologies to optimize resources, automate processes and support decision-making. Their implementation increases efficiency, reduces costs, improves adaptability and strengthens the competitive position of universities.*

Keywords: *logistic information system, intelligent information system, educational management, uncertainty and crisis.*

Introduction.

The modern service sector (including education) operates in conditions of high uncertainty [1-3], dynamic market changes and frequent crisis situations [4, 5], which requires organizations to have flexible and adaptive approaches to resource and process management. Traditional methods of logistics and operations management in such conditions often turn out to be insufficiently effective and unable to respond quickly to changes in demand, resource availability or external threats [6-8]. In particular, in modern conditions of globalization, rapid market development and high competition, effective management of logistics processes becomes a determining factor for success [9], [10]. Traditional supply chain management systems are no longer able to provide the proper level of efficiency, flexibility and accuracy in forecasting needs and planning resources [11]. In this context, intelligent logistics information systems (ILIS) come to the fore - complex software and hardware solutions that combine artificial intelligence methods [12], machine learning methods and algorithms, big data analysis and analytics [13] and Internet of Things technologies.

The Main Part.

The higher education system today operates in conditions of increasing complexity and uncertainty, which is due to global economic, technological and social changes. Higher education institutions are forced to simultaneously provide a high level of quality of educational services, rationally use limited resources and quickly adapt to external challenges, including crises, pandemics and fluctuations in demand for educational programs.

Traditional methods of managing educational organizations often turn out to be insufficiently flexible and operational. In such conditions, intelligent logistics information systems (ILIS) become particularly relevant - complex solutions that integrate artificial intelligence, machine learning algorithms, big data analysis and digital technologies, allowing to automate and optimize management processes in higher education.

1. The role of ILIS in higher education. ILIS provide integration of information about resources, curricula, flows of students and teachers into a single platform, which guarantees transparency and control of management processes. They help to optimally distribute educational and material resources, predict the needs of educational programs and increase the efficiency of the institution's management.

2. Functional capabilities of ILIS in higher education:

2.1. Forecasting and planning: analysis of demand trends for educational programs, modeling the load of classrooms and laboratories, drawing up optimal schedules and flows.

2.2. Resource optimization: rational distribution of teaching staff, equipment and infrastructure, minimizing downtime and overloads.

2.3. Analytics and decision support: identifying "bottlenecks" in educational processes, monitoring student success, assessing the effectiveness of educational programs.

2.4. Process automation: digitalization of document flow, management of student and teacher flows, monitoring key indicators of university activity in real time.

3. Advantages of implementing ILIS in higher education: Increasing the speed and accuracy of management decisions; Reducing costs and optimizing the use of resources; Increasing flexibility and adaptability of educational processes; Supporting strategic planning and rapid response to crisis situations; Creating competitive advantages by improving the quality of educational services.

4. Modern ILIS technologies in higher education. Modern ILIS integrate with cloud services, IoT devices and digital twins, which allows: to track the workload of students and teachers in real time; to predict changes in the needs of educational programs; to optimize the processes of distance and face-to-face learning; to provide continuous monitoring of the effectiveness of university management.

Conclusions:

1. Intelligent logistics information systems are a key tool for optimizing management processes in the face of uncertainty and crisis.

2. The use of artificial intelligence methods, machine learning and analysis of large data will ensure more accurate forecasting of student needs, optimization of resources and advance management decisions.

3. ILIS embrace the fluidity and adaptability of initial processes, allowing investors to quickly respond to changes in the current environment and minimize the negative impact of crisis situations.

4. The implementation of such systems increases the efficiency of the university's work, reduces operating costs, improves the efficiency of the lighting process and creates competitive advantages.

5. Prospects for the development of ILIS in the global sphere are related to the integration of dark technologies, IoT and digital twins, which will ensure more accurate planning, control and management of initial processes in real life. Hours of blame for the minds of high insignificance and crisis.

Discussion.

It is clear that the modern educational environment is characterized by high dynamism, uncertainty, and frequent crises, requiring educational organizations to adopt flexible and adaptive approaches to process and resource management. Traditional methods of managing educational institutions often fail to ensure the necessary efficiency, accuracy, and strategic resilience in the face of rapidly changing external factors. In these dynamic and unstable conditions [14, 15], hybrid intelligent logistics information systems—comprehensive solutions that combine artificial intelligence, machine learning methods, big data analytics, and digital technologies, as well as traditional information and logistics tools [16], [17]—come to the forefront. The hybrid structure of such integrated systems allows for the integration of the advantages of various approaches to synergistically improve the efficiency of process and resource management [18]. Hybrid intelligent systems ensure the integration of data on resources, curricula, student and faculty flows, as well as financial and material flows into a single information space. This allows us to increase process transparency, optimize resource use, and support strategic planning even in conditions of uncertainty and crises.

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