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THE EVOLUTION OF UNIVERSITY RESOURCE MANAGEMENT IN DIGITAL KAZAKHSTAN

In the context of digital transformation, higher education in Kazakhstan is faced with the need to rethink approaches to university resource management. In the article, the transformation of university resource management under digitalization conditions is examined. The evolution of approaches to resource management in Kazakhstani universities is considered, from centralized planning and budgetary financing to the introduction of digital solutions and elements of institutional autonomy. Based on statistical data for 2022–2024, the current state of university resource provision is analyzed, including indicators of assets, income, and human resources. International practices of university resource management in the context of digital transformation are analyzed, and their applicability to the national higher education system is determined. Key areas of digital transformation in universities are identified, including the implementation of LMS platforms, data management systems, analytical tools, and electronic document management services. Systemic barriers to effective digital resource management are identified, such as uneven levels of digital maturity among universities, shortages of IT specialists, weak integration of digital platforms, and regulatory constraints. It is shown that overcoming these barriers requires a comprehensive strategic approach to digital resource management, based on institutional maturity, the development of digital competencies, and the expansion of university autonomy.

Keywords: resource management, university, digital transformation, human capital, strategic Management, university autonomy, efficiency, digital technologies, higher education.

Кілт сөздер: ресурстарды басқару, университет, цифрлық трансформация, адами капитал, стратегиялық басқару, университет дербестігі, тиімділік, цифрлық технологиялар, жоғары білім

Ключевые слова: управление ресурсами, университет, цифровая трансформация, человеческий капитал, стратегическое управление, автономия вуза, эффективность, цифровые технологии, высшее образование

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Introduction. In modern conditions, universities are increasingly acting not only as educational institutions but also as centers of knowledge generation, digital innovation, and strategic development of society. Their sustainability and competitiveness largely depend on the effective management of all types of resources—human, financial, infrastructural, and digital. In the context of digital transformation and global competition, the need for a transition to integrated resource management models based on strategic planning, transparency, and digitalization is increasing. With the expansion of institutional autonomy in Kazakhstani universities and the introduction of management performance elements, higher education institutions face new challenges: the need to increase the efficiency of resource allocation, integrate digital solutions into administrative processes, and evaluate the return on investment in human capital and infrastructure. At the same time, there is a fragmentation of existing approaches, a lack of uniform metrics, and poor coordination between different types of resources. This leads to the need to develop an adapted university resource management model that can ensure sustainability, flexibility, and strategic focus in the context of the digital transition.

Foreign universities demonstrate a variety of approaches to resource management, from centralized administrative models to flexible and digitally oriented strategies that integrate all types of resources within

a single decision-making system. In countries with high academic performance (Singapore, Finland, and the USA), tools for digital analytics, KPIs, program-oriented budgeting, and human-centered development strategies are increasingly being used. The study of these models and their correlation with Kazakhstani realities makes it possible to identify applicable practices and barriers to their implementation. The relevance of this study is due to the need for a systematic rethinking of resource management in universities in Kazakhstan, taking into account international experience and the challenges of digital transformation. Despite the availability of strategic documents and individual digitalization initiatives, most domestic universities face limitations in financial and personnel autonomy, inefficient resource allocation, and the lack of an integrated management system.

The purpose of the article is to analyze foreign and Kazakhstani models of university resource management in the context of digitalization, identify applicable elements of effective practices, and develop recommendations for the formation of an adaptive model focused on sustainable development and digital maturity. To achieve this purpose, the following research objectives are formulated: (1) to examine the evolution of approaches to university resource management under conditions of digital transformation; (2) to analyze international models of integrated and digital resource management in higher education institutions; (3) to assess the current state of resource management practices in Kazakhstani universities; (4) to identify key barriers and institutional constraints affecting the digital transformation of resource management; and (5) to determine priority directions and tools for the development of an adaptive university resource management model aligned with digital maturity and sustainability goals. The research methodology is based on a meaningful and institutional comparison, including an analysis of strategic documents, official reports, and digital tools of foreign universities, as well as an overview of open sources describing current management practices in Kazakhstani universities. The empirical base consists of data from national and international rankings, university platforms, reports on the implementation of digital strategies, and academic publications indexed in Scopus and Web of Science. This approach made it possible to compare management models in different institutional contexts and identify key challenges and development directions in the context of digital transformation.

Literature review. Modern research demonstrates that the digital transformation of higher education goes beyond the introduction of technology and affects fundamental aspects of university management, including the Management of human resources, infrastructure, and processes. Thus, the study by Yavuz M., Kayalı, B., Karaman, S. highlights the complexity of digital transformation in Turkey, encompassing six key dimensions: science, education, culture, processes, technology, and public mission [1]. An analysis of more than 200 universities has shown that the most successful universities are actively integrating digital platforms, using intelligent systems, and developing digital culture. Hang Dr. N.T. emphasizes that the introduction of digital education contributes not only to improving the quality of human resources but also to the formation of a digital university management culture. In the context of Industry 4.0, universities should develop the digital competence of their staff, invest in technology, and build effective educational platforms [2]. Akhmetshin E.M., Vasiliev, V.L. consider digitalization as a transformation of the entire university resource management system. The authors highlight the need to move from administrative control to a decentralized, digitally oriented model using digital twins, cloud technologies, and process automation [3]. Earlier, in the work of Gafurov, I.R., and others, they emphasized that digital transformation entails a change in the entire management paradigm: from resource administration to a system of digital access, control, and analysis [4].

In the context of personnel management in the context of digital transformation, Tiwow, G.M., et al., focus on strategies to increase organizational flexibility, digital leadership, and resilience in crises. They emphasize that it is human capital that is becoming a key factor in the adaptability and innovative development of the university [5]. In the Kazakh context, the issues of digitalization are considered in several studies. Bisenova M.U., Sakhanova G.B. note the gaps between formal strategies and the real digital maturity of universities. In particular, the problems of weak infrastructure, shortage of qualified personnel, and lack of universal standards of digital transformation are indicated [6]. Nakhbaeva, G., Nurtazina, R., and Kaidarova, A., based on in-depth interviews with experts, identified the key barriers to digitalization: limited resources, weak regulatory support, and inertia of management structures. The authors emphasize the importance of institutional readiness and digital competence of university management [7]. Bugubayeva R.O. et al. consider the transformation of higher education in Kazakhstan through the prism of digitalization, emphasizing the need for systemic changes in Management, including the digital transformation of educational, scientific, and administrative processes.

Their work highlights the need to introduce digital tools into strategic Management, personnel policy, and the education quality system. Thus, an analysis of the literature shows that the digital transformation of universities requires not only the introduction of technology but also a revision of approaches to resource management: from personnel and infrastructure management to financial planning and strategic control. Flexible and decentralized models based on digital analytics, institutional autonomy, and a focus on sustainable development are considered the most effective.

Main part. A modern university is a complex organizational and technological system, the sustainable functioning of which is impossible without effective resource management. In a market economy, resource provision is becoming the most important factor in ensuring the competitiveness and sustainable development of the university. It directly affects the quality of educational, research, and production activities, as well as the achievement of strategic goals [9]. The goal of modern university management is to increase the efficiency of all processes and provide them with the necessary resources at all stages of the life cycle. The controlled parameters are the educational technologies used and the types of resources. It is technology that determines the requirements for planning, implementing, and controlling educational processes, as well as influencing the structure and amount of resources involved. The level of professional training of graduates and the formation of necessary competencies and skills largely depend on the quality and availability of these resources. In the university's educational activities, the main types of resources are: faculty, teaching and support staff, material and technical base (classrooms, laboratories, equipment, machinery, supplies), financial resources, intellectual resources, educational and methodological support, and information resources.

In the context of digital transformation, new components are being added to traditional categories: digital educational platforms, cloud storage, data management systems, automated learning modules, and digital analytics services. At the same time, there is a shift in focus from controlling the physical allocation of resources to managing access, data, and educational outcomes. The effectiveness of the educational process increasingly depends on the integration of digital solutions, adaptive models, and modern IT infrastructures.

Table – 1

Dynamics of the material and technical base of institutions of Kazakhstan in the field of higher education, thousand tenge

Indicator	2022	2023	2024	Growth rate in %	
				2023/2022	2024/2023
Assets	1021760340	1054724785	1302435912	103,2	123,5
including:					
Short-term assets	319500 931	326314 557	410957582	102,1	125,9
Long-term assets	702259 409	728410 228	891478330	103,7	122,4
Liabilities	1021760 340	1054724785	1302435912	103,2	123,5
Including:					
Short-term obligations	147204564	142487136	181833662	96,8	127,6
Long-term obligations	346745769	330782670	338508385	95,4	102,3
Capital	527810007	581454979	782093865	110,2	134,5

**compiled by the authors based on sources [10]*

An additional condition for the effective functioning of the university is the availability of a modern corporate information management system that ensures the coordinated operation of all elements of resource provision, from personnel policy to logistics and quality control. Such a system facilitates the transition from fragmented administration to systematic, transparent, and analytically sound Management. Thus, the modern understanding of the university's resource provision covers both traditional elements - human, financial, and material - as well as digital, information, and intellectual resources, which together form the basis for the university's sustainable development in the digital economy.

The analysis of statistical data for 2022-2024, shown in Table 1, shows a steady increase in the resource potential of higher education institutions in Kazakhstan. The total assets of universities increased from 1.02 trillion tenge in 2022 to 1.30 trillion tenge in 2024, which indicates an increasing attention to investments in the development of educational infrastructure. At the same time, a significant share of the

increase is provided by the growth of long-term assets -capital investments in the material, technical, and digital base of universities.

Table – 2

Dynamics of income indicators and the number of teaching staff of higher education institutions in Kazakhstan

Indicator	2022	2023	2024	Growth rate in %	
				2023/2022	2024/2023
Income, thousand tenge	598 983 099	758 404 692	860 530 826	126,6	113,5
Number of teaching staff, people	36 404	37 391	37 599	102,7	100,6

**compiled by the authors based on sources [10]*

At the same time, there is an increase in university revenues: from 598.9 billion tenge in 2022 to 860.5 billion tenge in 2024 (Table 2). The increase was more than 43%, which may be due to both an increase in government orders and the expansion of paid educational services, grant programs, and income from scientific activities. It creates the basis for management modernization and digital transformation at the institutional level. The human resources potential of universities remains relatively stable. The number of faculty members increased from 36,404 to 37,599. However, quantitative growth is accompanied by the need to improve quality, primarily in the direction of developing digital competencies and abilities to work with new educational platforms, learning management systems, and data. Modern university resource provision goes beyond the traditional understanding. Human, material, financial, and intellectual resources are now inextricably linked to digital components such as cloud technologies, electronic databases, distance learning platforms, and analytics systems. In the context of digital transformation, it is the integration of ICT and flexible management models that is becoming a determining factor in the sustainability of universities.

According to the content analysis of national and international sources, many Kazakhstani universities are actively implementing electronic journals, digital admissions, self-service portals, and developing their digital transformation centers. Nevertheless, the level of digitalization remains uneven: some regional universities continue to experience a shortage of ICT infrastructure, software, and qualified IT specialists. Thus, the resource provision of Kazakhstani universities as a whole demonstrates a positive trend. However, the transition to the digital university model requires not only financial investments, but also a systematic approach to Management, with an emphasis on the development of digital culture, increasing the digital maturity of staff, and the integration of information and management systems into the structure of university management. The practice of digitalization of higher education in different countries demonstrates a variety of strategies, models, and tools for managing university resources. Despite the differences in national education systems, several common vectors can be identified: an emphasis on digital infrastructure, the development of flexible management platforms, enhancing staff digital maturity, and integrating data into management processes (Table 3).

Table – 3

Comparative analysis of digital strategies of universities in different countries

Country	Key elements of digital transformation	Features of resource management
Finland	Digital campuses, Moodle, open-access, analytics	High autonomy, flexible budget allocation
Germany	LMS and CRM integration, Smart Campus	Centralized Management with strong IT service
Turkey	has six areas: education, science, culture, processes, etc.	Unified strategy for all public sectors
USA	Individualization, LMS+, Analytics, AI	KPIs, institutional digital leadership
Kazakhstan	LMS, e-learning, partial digitalization	Strong dependence on the state regulator, gaps

**compiled by the authors based on sources [10]*

International experience confirms that successful digital transformation in universities requires: a systematic approach to resource management, the development of digital competencies of staff, the creation of flexible IT infrastructure, and the introduction of analytics and digital monitoring tools. Kazakhstani universities need to take these trends into account when adapting their digital management models based on the national context, regulatory framework, and current level of digital maturity. University resource management in Kazakhstan has undergone significant changes in recent decades. Whereas in the 1990s and 2000s the management model was predominantly centralized and prescriptive, since the early 2010s, there has been a gradual transition to more flexible, decentralized, and digitally oriented approaches. The evolution of approaches to university resource management in Kazakhstan includes three stages.

Stage 1: the traditional model (until 2010). During this period, the resources of universities were distributed mainly vertically, through the Ministry of Education and Science. Financing was carried out according to the estimated principle; there were no effective mechanisms for assessing the effectiveness of resource use. The universities had limited autonomy in personnel and financial policy, as well as in the disposal of property and investments. Human resources management focused on quantitative indicators - the number of teachers, their degrees, and seniority. Information resources consisted of local databases based on paper archives, and there was no unified digital environment. The material and technical base was updated irregularly and often, regardless of the needs of educational programs.

Stage 2: Transitional model (2010-2020). During this period, the institutional transformation of higher education began: elements of autonomy were introduced, the participation of universities in international rankings increased, and their financial and academic independence expanded. Public-private partnerships, the development of scientific clusters, and the digitalization of individual functions (electronic journals, admissions committees, and online learning) became popular. Formally, elements of strategic resource management appeared, including KPI systems, electronic document management, and the first elements of information and analytical platforms. However, the digital transformation was spot-based, not covering the entire institutional system.

Stage 3: digital vector (starting in 2020). Since 2020, especially in the context of the COVID-19 pandemic, the digitalization of universities has become an integral part of their strategies. Universities have begun to actively implement integrated educational process management platforms (LMS), CRM systems for working with applicants and students, and automated accounting and HR modules. Opportunities for distance learning, digital certification, and online access to library and research resources have expanded. Resource management has become more integrated, relying on digital tools. It is now possible to plan workload and finance through ERP systems. Digital portfolios of teachers have been introduced, and universities have switched to assessing the effectiveness of teaching staff using digital metrics (publication activity, digital engagement, etc.).

Nevertheless, despite the positive changes, the resource management system remains heterogeneous. The high level of digital maturity is primarily characteristic of metropolitan and national universities, while a significant number of regional universities are experiencing a shortage of qualified IT personnel, as well as funding and organizational flexibility. Despite the progress in the digital transformation of Kazakhstani universities, the transition to effective digital resource management faces several systemic barriers. These challenges affect both the infrastructural, organizational, and personnel levels.:

1. The uneven digital maturity of universities. One of the most acute problems remains the gap between the leading universities (metropolitan, national, and research) and regional universities. The former has access to financial and human resources, allowing them to implement integrated digital platforms and develop internal IT departments. At the same time, many regional universities are limited in funding, which affects their ability to maintain modern IT infrastructure, upgrade equipment, and introduce innovative educational technologies.

2. Digital transformation requires not only the availability of technology, but also specialists who can work with it. There is still a shortage of staff at universities in Kazakhstan with expertise in digital analytics, educational platform management, cybersecurity, and digital process design. It limits the possibilities of implementing and adapting new solutions, and also leads to surface digitalization – "for reporting", without a real increase in efficiency.

3. Limited integration of IT systems. Many universities have disparate digital solutions: one system is responsible for schedules, another for personnel records, and the third for student academic performance. The lack of integration between these modules reduces the effectiveness of management decisions,

complicates analytics and monitoring, and places a strain on staff who have to process data across multiple platforms manually.

4. Financial and regulatory constraints. For full-fledged digitalization, universities need substantial funding, including for staff training, software licensing, equipment purchases, and maintenance of IT systems. However, not all universities have access to targeted sources or financing tools for digital transformation. In addition, regulatory barriers, including outdated budgeting approaches and slow adaptation of standards, limit the flexibility and initiative of universities in the field of digital resource management.

5. Low usage of analytics and data. Despite the development of digital services, many universities still lack a data-driven management culture. Decision-making mechanisms rarely rely on digital analytics, indicator visualization, or predictive models. It reduces the efficiency of resource use and limits the ability to assess the contribution of individual departments and employees.

Conclusion. The study examined the impact of digital transformation on university resource management in Kazakhstan, demonstrating its growing significance for the sustainability and competitiveness of higher education institutions. It was shown that over the past two decades Kazakhstani universities have evolved from centralized resource management models to more flexible and results-oriented approaches, in which information technologies play a key role. The analysis revealed that modern Kazakhstani universities manage not only traditional resources—human, financial, logistical, and intellectual—but also digital resources, including learning management platforms, cloud solutions, and analytical services. At the same time, a number of barriers limiting the transition to effective digital resource management were identified, such as uneven levels of digital maturity among universities, shortages of qualified personnel, insufficient integration of IT systems, and regulatory constraints. The analysis of international experience confirmed that sustainable university resource management in the context of digitalization requires the systematic integration of digital technologies into management processes, the development of staff digital competencies, and the use of data analytics in managerial decision-making. It was determined that for Kazakhstani universities, digital transformation should be accompanied by the formation of a strategic management culture, focused on the interaction and coordination of different types of resources. The results of the study indicate that the further evolution of university resource management models in Kazakhstan should be based on a balance between technological innovation and institutional maturity. It is shown that under conditions of increasing global competition and rising societal expectations, effective resource management becomes a key prerequisite for the sustainable development of higher education.

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ЦИФРЛЫҚ ҚАЗАҚСТАНДАҒЫ УНИВЕРСИТЕТ РЕСУРСТАРЫН БАСҚАРУ ЭВОЛЮЦИЯСЫ

Андатпа

Цифрлық трансформация жағдайында Қазақстандағы жоғары білім университеттің ресурстарын басқару тәсілдерін қайта қарау қажеттілігіне тап болады. Мақалада цифрландыру жағдайында университет ресурстарын басқарудың трансформациясы қарастырылған. Орталықтандырылған жоспарлау мен бюджеттік қаржыландырудан бастап цифрлық шешімдер мен институционалдық автономия элементтерін енгізуге дейінгі Қазақстандық университеттердегі ресурстарды басқару тәсілдерінің эволюциясы қарастырылады. 2022-2024 жылдарға арналған статистикалық мәліметтер негізінде университеттің ресурстармен қамтамасыз етілуінің ағымдағы жағдайы, оның ішінде активтер, кірістер, адами ресурстар көрсеткіштері талданады. Цифрлық трансформация жағдайында университет ресурстарын басқарудың халықаралық тәжірибесі талданады, олардың ұлттық жоғары білім беру жүйесіне қолданылуы анықталады. Университеттерде цифрлық трансформацияның негізгі бағыттары анықталды, оның ішінде LMS платформаларын, деректерді басқару жүйелерін, аналитикалық құралдарды, электрондық құжат айналымы қызметтерін енгізу. Цифрлық ресурстарды тиімді басқарудағы жүйелік кедергілер анықталды, мысалы, университеттер арасындағы цифрлық жетілудің біркелкі емес деңгейі, АТ мамандарының жетіспеушілігі, цифрлық платформалардың әлсіз интеграциясы және нормативтік шектеулер. Бұл кедергілерді еңсеру институционалдық жетілуге, цифрлық құзыреттіліктерді дамытуға және университеттердің дербестігін кеңейтуге негізделген цифрлық ресурстарды басқаруға кешенді стратегиялық көзқарасты талап ететіні көрсетілген.

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ЭВОЛЮЦИЯ УПРАВЛЕНИЯ УНИВЕРСИТЕТСКИМИ РЕСУРСАМИ В ЦИФРОВОМ КАЗАХСТАНЕ

Аннотация

В контексте цифровой трансформации высшее образование в Казахстане сталкивается с необходимостью переосмысления подходов к управлению ресурсами университетов. В статье рассматривается трансформация управления ресурсами университетов в условиях цифровизации. Рассмотрена эволюция подходов к управлению ресурсами в казахстанских университетах - от централизованного планирования и бюджетного финансирования до внедрения цифровых решений, и элементов институциональной автономии. На основе статистических данных за 2022-2024 годы проанализировано текущее состояние ресурсного обеспечения университета, включая показатели активов, доходов и человеческих ресурсов. Проанализированы международные практики управления университетскими ресурсами в контексте цифровой трансформации и определена их применимость к национальной системе высшего образования. Определены ключевые направления цифровой трансформации в университетах, включая внедрение платформ LMS, систем управления данными, аналитических инструментов и сервисов электронного документооборота. Выявлены системные барьеры на пути эффективного управления цифровыми ресурсами, такие как неравномерный уровень цифровой зрелости университетов, нехватка ИТ-специалистов, слабая интеграция цифровых платформ и нормативные ограничения. Показано, что преодоление этих барьеров требует комплексного стратегического подхода к управлению цифровыми ресурсами, основанного на институциональной зрелости, развитии цифровых компетенций и расширении автономии университетов.

