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DIGITAL UNIVERSITY IN THE SYSTEM OF FORMING LONG-TERM COMPETITIVE ADVANTAGES

Abstract. *The article examines the economic essence of a digital university as a model for forming long-term competitive advantages in the higher education system. It is substantiated that digitalization ensures increased management efficiency, cost optimization, scaling of educational services, and development of intangible assets. It is shown that the integration of digital platforms, data analytics, and artificial intelligence creates a new economic logic for university activities based on the use of data and knowledge as key resources. Particular attention is paid to digital avatars of teachers as tools for personalizing learning and increasing productivity. It has been determined that a digital university functions as a value creation ecosystem in which technological innovations are combined with human capital, ensuring financial stability and global competitiveness.*

Keywords: *digital university, competitive advantages, digitalization, intangible assets, artificial intelligence, teacher's avatar.*

ЦИФРОВИЙ УНІВЕРСИТЕТ У СИСТЕМІ ФОРМУВАННЯ ДОВГОСТРОКОВИХ КОНКУРЕНТНИХ ПЕРЕВАГ

Анотація. У статті розкрито економічну сутність цифрового університету як стратегічної моделі формування довгострокових конкурентних переваг у системі вищої освіти. Обґрунтовано, що цифровізація є ключовим фактором модернізації освітньої, наукової та управлінської діяльності університетів, сприяє підвищенню їх економічної ефективності, фінансової стійкості та інвестиційної привабливості. Показано, що перехід від традиційної ресурсно-орієнтованої до інтелектуально-цифрової моделі створення вартості забезпечує зростання капіталізації нематеріальних активів – даних, алгоритмів, цифрових платформ, освітнього контенту та аналітичних систем. Доведено, що цифрова трансформація змінює економічну логіку діяльності університету: цифрові інструменти знижують транзакційні витрати, підвищують продуктивність праці, розширюють можливості масштабування освітніх послуг без збільшення витрат і формують нові джерела доходів завдяки комерціалізації результатів інтелектуальної діяльності. Особливу увагу приділено ролі цифрових аватарів викладачів як елементів освітньо-економічної екосистеми університету, здатних підсилювати персоналізацію навчання, підвищувати якість освітніх послуг і створювати економічний ефект за рахунок автоматизації рутинних процесів. Визначено, що впровадження штучного інтелекту, аналітики навчальних даних і платформних рішень формує нову архітектоніку управління, у межах якої університет виступає як інтегрована цифрова екосистема зі стійкими мережевими ефектами. Наголошено, що розвиток цифрових компетентностей персоналу, управління нематеріальними активами та інституційна готовність до інновацій є критичними умовами підвищення економічної результативності. Підкреслено, що цифровий університет стає не лише освітнім, а й економічним агентом, який акумулює знання, генерує інновації та формує власну бізнес-екосистему у сфері економіки знань. Отримані результати можуть бути використані для удосконалення стратегій сталого

розвитку університетів, підвищення ефективності управління цифровими активами й побудови нових моделей інституційної конкурентоспроможності у глобальному цифровому просторі.

Ключові слова: *цифровий університет, конкурентні переваги, цифровізація, нематеріальні активи, діджиталізація, штучний інтелект, аватар викладача.*

Problem statement. The modern knowledge economy is characterized by intensifying global competition between universities, which are increasingly considered not only as educational but also as economic agents that form intellectual capital and create added value in the digital environment. In the context of the digital transformation of the education sector, traditional models of management, financing, and performance evaluation of higher education institutions are losing their effectiveness. Universities are faced with the need to ensure financial stability, maintain competitive positions in the global education services market, and attract investment in intangible assets. At the same time, the rapid spread of artificial intelligence, data analytics, and digital platforms is creating a new economic logic for the functioning of universities, where data, algorithms, and knowledge are becoming the basic factors of production.

However, most domestic universities still operate within the framework of an inertial, resource-dependent development model, which limits their innovative capacity and ability to self-finance. The absence of unified methods for evaluating digital assets, the lack of institutional mechanisms for monetizing educational and scientific products, and the insufficient level of digital competence of staff hinder the formation of long-term competitive advantages. In these conditions, there is a need for scientific substantiation of the economic essence of a digital university as a complex ecosystem of value creation capable of ensuring sustainable economic growth, effective use of intellectual capital, and integration into the global educational and economic space.

Analysis of recent research and publications. The digital transformation of universities, the formation of their competitive advantages, and the integration of innovative technologies into the higher education system have been studied by Mankuta Ya. M., Zakharova I. V. [1], Areshonkov V. Yu. [2], Yahodzinskyi S. [3], Skliarenko O. V. [4], Komninos A., Santoro C., Gavalas D. [5], Kortemeyer G., Dittmann-Domenichini N., Merki C. [6], Krap A., Bataiev S., [7], Kubiv S. I. [8], Lysenko S. [9], Tymoshenko O. I., Yahodzinskyi S. M. [10], and others. Their works cover issues of digitalization of university management, development of intangible assets, introduction of AI technologies, and creation of platform ecosystems as the basis for long-term competitiveness of digital universities.

The current stage of higher education development is characterized by a transition to a digital knowledge economy, in which universities act not only as educational institutions but also as active economic agents that form the innovative potential of the state. The globalization of education markets, the emergence of new learning formats, and the growing role of data and intellectual assets necessitate a rethinking of the economic nature of universities. This requires a comprehensive scientific analysis of the economic mechanisms of value formation in a digital university, the identification of factors of its investment attractiveness, and the development of strategies that will ensure sustainable growth and long-term competitiveness in the global digital economy.

The aim of the article is to provide an economic justification for the role of the digital university in forming long-term competitive advantages by transforming its resource model into an intellectual-digital one based on intangible assets, data, platforms, and algorithms.

Presentation of the main material. The modern higher education system is witnessing an unprecedented level of global competition, with universities competing for limited resources – funding, talented teachers and students, research grants – on a global scale. This necessitates a rethinking of traditional approaches to the competitiveness of higher education institutions. A considerable body of research still interprets the competitive positions of universities in an overly simplified way – through the prism of purely resource provision or place in international rankings. It should be noted that such a narrow approach does not reflect the full complexity of the challenges faced by universities today: the globalization of educational services, demographic changes, increasing labor market demands for quality personnel, and rapid technological change.

The global higher education system reveals a number of contradictions: uneven levels of digital maturity among universities, limited introduction of intelligent educational technologies, lagging curricula behind the dynamics of the digital economy, and a persistent gap in the level of digital competencies between different social groups [10, p. 6]. All this complicates the realization of human capital potential and the innovative capacity of society. Thus, the competitiveness of a modern university is becoming multidimensional, encompassing not only economic indicators but also the capacity for sustainable development, meeting stakeholder expectations,

and fulfilling a social mission. The current global challenges in higher education are prompting universities to seek new strategic directions, in particular, to turn to the opportunities of digital transformation as a source of long-term competitive advantages.

Thus, the digitalization of higher education today is emerging as a decisive factor in strengthening the educational and scientific potential of universities and shaping their long-term competitive positions [12, p. 103]. The introduction of digital technologies is changing the logic of creating competitive advantages in this area, acting as a catalyst for profound institutional changes. While the key success factors for traditional universities were material and technical resources, human resources potential, and management flexibility, for the new generation of universities, the ability to integrate data, digital platforms, and intellectual assets into a comprehensive value creation system is becoming decisive. This strategic focus on digital innovation directly links the university's development to its long-term economic resilience, investment attractiveness, and ability to compete at the national and global levels. Moreover, digitalization is not just a technical upgrade, but a new logic of value creation that reorganizes educational and scientific processes. Data and algorithms are becoming the core of management, transforming the activities of HEIs from the fragmented use of IT solutions to the systemic coordination of the university ecosystem. In this environment, new mechanisms of economies of scale and scope emerge, transaction costs are reduced, and multilateral markets for educational services are formed, where the university acts as a platform integrator of supply and demand for knowledge, content, services, and data. Digital infrastructure, accordingly, is becoming a strategic intangible asset that accumulates network effects and increases the flexibility of educational product offerings without a proportional increase in material resources.

The economic logic of digital transformation is consistent with the theory of dynamic capabilities: a university that quickly identifies new opportunities, revises its business model, and reorganizes its processes gains an advantage in a rapidly changing environment [3, p. 32]. For higher education, this means a transition from standardized courses to flexible, data-driven formats, where personalized learning, learning analytics, automated recommendation systems, and digital twins of educational processes become sources of competitive advantages. The value of such transformations is reflected not only in financial indicators but also in the growth of the university's intellectual capital, stakeholder confidence, and increased investment attractiveness of the institution. In other words, digital transformation lays the foundation for combining economic performance with the university's reputational and societal development.

A practical measure of the university's digital transformation is the introduction of new digital tools and platforms that enhance its competitive advantages. The spread of distance and hybrid learning formats has given rise to the phenomenon of "education without borders," where knowledge is available around the clock to a wide range of learners [9;12]. On the one hand, this has contributed to the massification of higher education and the expansion of social inclusion, and on the other, it has intensified competition in the educational services market, shifting it into the digital domain.

In the digital environment, the priorities are becoming less about profit maximization and more about growing network effects, academic mobility, and attracting new audiences. Digital platforms play a key role in this: they bring together participants in the educational process, ensure the scalability of services, and provide universities with tools for differentiating educational products. With the help of platforms, a university can simultaneously act as a provider of educational content, an intermediary between students and employers, and an innovation incubator. The university's new digital assets – educational platforms, large datasets, algorithms, cloud services, virtual laboratories – are becoming an integral part of its resources [4, p. 250]. They belong to the category of intangible assets, the value of which is determined by specific factors of the digital environment: interoperability, scalability, network effects, legal compliance of data and intellectual property rights, as well as proven educational and scientific impact.

Contemporary researchers, in particular O. I. Tymoshenko and S. M. Yahodzinskyi, note that traditional methods of evaluating university assets do not fully take into account these determinants of value, so managers need new approaches to managing digital intellectual assets [10, p. 6]. By managing such assets strategically, the university lays the foundation for unique competitive advantages that are difficult for competitors to replicate.

Among the latest digital tools, a special place is occupied by the teacher's avatar – a modular digital representation of the teacher's activities. The avatar combines algorithms for processing educational data, scenarios for interacting with students, and decision-making support tools. In the digital educational environment, it serves as a personalized assistant, explaining material adaptively, providing prompt feedback, and coordinating learning activities for large groups of students. By delegating routine operations (checking

typical tasks, monitoring progress, etc.) to algorithms, teachers have more time for creative and scientific work, individual interaction, and the development of new courses, while learning outcomes improve and per-student costs decrease.

The practical implementation of such a tool is demonstrated by leading universities around the world. In particular, the Swiss Federal Institute of Technology (ETH Zurich) has created an innovative technology of photorealistic digital avatars of teachers as part of an interdisciplinary research project. These avatars are capable of reproducing not only the appearance but also the facial expressions, movements, voice, and intonations of real people. The study, published on the official ETH Zurich portal, emphasizes that such avatars can be integrated into virtual learning environments, providing the effect of the teacher's presence in the digital space. The use of deep neural networks, 3D scanning, and video synthesis allows for a high level of personalization and emotional authenticity in interactions [13].

Despite the innovative component, the economic component of this process is extremely important. For clarity, let us illustrate the economic feasibility of introducing teachers' avatars into the university environment graphically (see Figure 1).

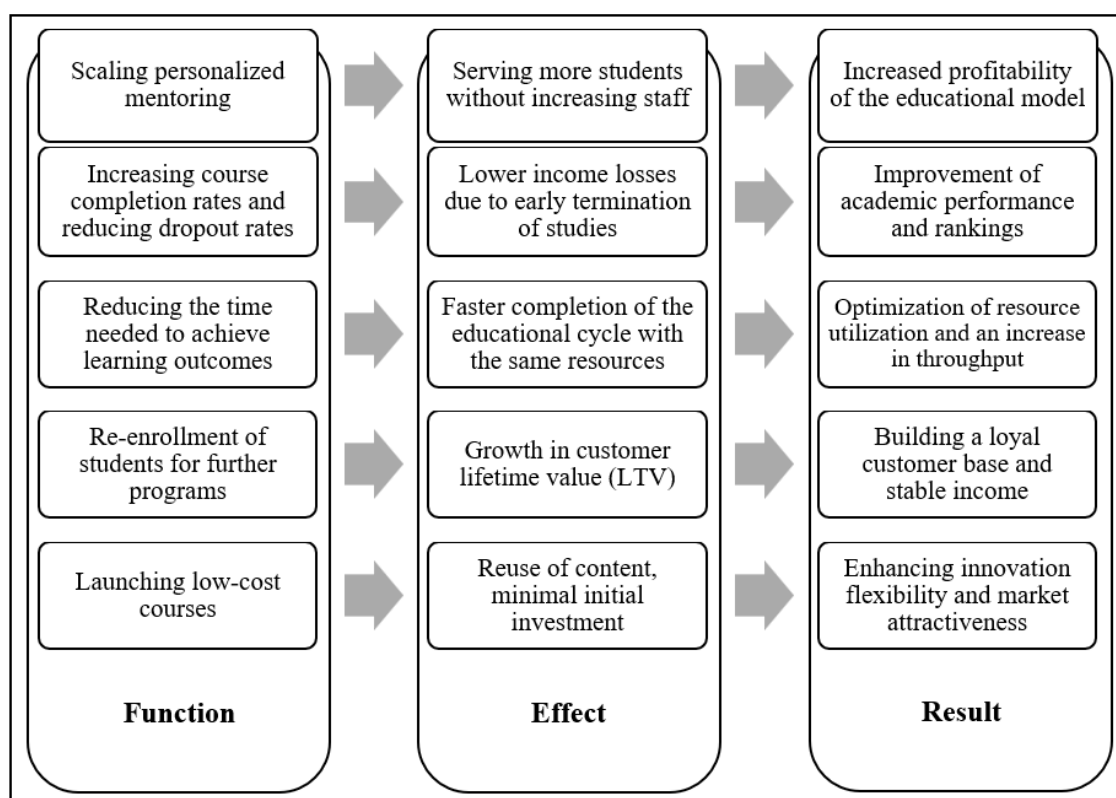


Figure 1. The economic feasibility of introducing teachers' avatars into the university environment
Source: compiled by the author independently

The economic feasibility of introducing avatars is confirmed by several value creation channels: first, the university can scale up personalized mentoring without proportionally increasing staff numbers; second, course completion rates are increasing and student dropout rates are decreasing; third, the time required to achieve planned learning outcomes is decreasing; fourth, the proportion of re-enrollment to continue the educational trajectory increases; fifth, it becomes possible to launch courses with low start-up costs due to the reuse of digital content. Thus, digital avatars of teachers and similar artificial intelligence tools not only enhance the individualization of learning but also create economies of scale and increase the operational efficiency of the university.

It is important to note that the success of digital transformation is measured not only by the introduction of technology, but also by the development of human resources potential and intangible assets of the university [5]. The ability of academic staff to master digital skills and use them in teaching practice is becoming strategically important.

Recent studies show that investing in the digital competence of staff should be considered not as an expense

but as a contribution to the future competitiveness of the university [6;11;12]. In particular, strengthening the digital skills of teachers increases the productivity of academic work (accelerates the development of new courses, improves the use of data and analytics, and increases the quality of feedback from students) and at the same time improves the student experience through the personalization of learning trajectories and the introduction of flexible, attractive formats. As a result, the university is expanding its portfolio of digital education solutions – online courses, educational content databases, learning analytics data, blended methodologies – which have long-term value and a multiplier effect for research and innovation activities.

Thus, investing in the development of digital human resources potential transforms human capital into a catalyst for innovation, and the accumulated portfolio of digital solutions into a reproducible intangible asset that ensures the sustainable growth of the university and expands its opportunities for integration into the global educational and economic space. In other words, the development of digital competencies and knowledge management at the university are closely linked to strengthening its competitive position in the long term.

A comprehensive, ecosystemic approach to the development of a digital university involves focusing not only on internal processes but also on the broader context of partnerships and societal needs. Today, a digital university is seen as a multi-level educational ecosystem that integrates traditional resources (human, financial, material) with digital assets into a single field of sustainability and competitiveness. It combines the functions of an educational, scientific, and innovation center with platform mechanisms for managing knowledge, data, and technologies. This institutional model involves close interaction with the external environment: the university builds relationships with other educational institutions, scientific institutions, technology platforms, employers, and government institutions. Integration into global knowledge networks and participation in international educational initiatives strengthen the university's competitive position, allowing it to attract additional resources and exchange best practices.

Equally important is the link between digital transformation and sustainable university development. Modern models for measuring the effectiveness of changes in higher education increasingly take social and environmental criteria into account alongside economic ones [8, p. 251]. Digitalization creates conditions for more inclusive and flexible learning that is consistent with sustainable development goals, in particular, ensuring quality education for all segments of the population. Expanding access to educational programs through online platforms and massive open courses lowers barriers to admission and learning, promoting social inclusion and equal opportunities. Distance learning has become a tool that allows representatives of different regions, people with disabilities, working people, etc. – that is, those who previously may have been excluded from traditional classroom education – to participate in university education [1, p. 173]. This inclusive approach not only meets ethical and social imperatives but also lays the foundation for the growth of human capital on a societal scale. As researchers note, the focus on inclusive development (overcoming poverty and inequality through access to education) elevates the university to the role of a new type of inclusive institution, which strengthens its social legitimacy and support [2, p. 4].

Thus, digital transformation is a key factor in forming the long-term competitiveness of modern universities in the context of sustainable development. It allows overcoming traditional limitations, creating a holistic digital ecosystem of education and science, and ensuring adaptability to global changes. The digital university combines classic academic values with new technological opportunities, develops intangible assets, and strengthens institutional resilience. The result is an educational and scientific institution that not only provides quality services and produces new knowledge, but also acts as a catalyst for socio-economic transformation, integrating the resources of society, business, and the state for the development of the knowledge economy. A focus on digitalization, personalized learning, ecosystem interaction, and the principles of sustainable development gives modern universities a unique competitive position – flexible, resilient, and future-oriented, in which technological innovations serve the goals of social progress.

Conclusions. Summarizing the results of the study, we can conclude that a digital university is a strategic economic model capable of ensuring the formation of long-term competitive advantages through the transformation of mechanisms for creating, accumulating, and monetizing knowledge. Its economic stability is based on the transition from a resource-dependent development model to a model focused on intangible assets – digital platforms, data, algorithms, and intellectual capital. The digitalization of educational and scientific processes is changing the structure of the university's costs and revenues, namely: reducing transaction costs, increasing economies of scale, and opening up new sources of profit through the commercialization of digital products and partnership ecosystems. The introduction of digital avatars of teachers and analytical systems creates a multiplier effect – labor productivity increases, course development time is reduced, student retention

is enhanced, which directly improves financial performance.

The economic feasibility of the university's digital transformation is evident in its ability to convert technological innovations into manageable digital capital, which creates stable revenue streams, increases investment attractiveness, and ensures long-term competitiveness in the global educational and economic environment.

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