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"GLOBAL DIGITAL INTEGRATION: THE RELEVANCE OF ENSURING MICRO AND MACROECONOMIC SUSTAINABLE GROWTH THROUGH TECHNOLOGICAL AND INDUSTRIAL DEVELOPMENT IN THE TRANSITION TO A GREEN ECONOMY BY 2030"

«ГЛОБАЛЬНАЯ ЦИФРОВАЯ ИНТЕГРАЦИЯ: АКТУАЛЬНОСТЬ ОБЕСПЕЧЕНИЯ УСТОЙЧИВОГО МИКРО- И МАКРОЭКОНОМИЧЕСКОГО РОСТА ЧЕРЕЗ РАЗВИТИЕ ТЕХНОЛОГИЧЕСКОЙ И ИНДУСТРИАЛЬНОЙ ПРОМЫШЛЕННОСТИ В ПЕРЕХОДЕ К ЗЕЛЁНОЙ ЭКОНОМИКЕ К 2030 ГОДУ»

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05.01.00 – Axborot texnologiyalari, boshqaruv va kompyuter grafikasi
05.01.01 – Muhandislik geometriyasi va kompyuter grafikasi. Audio va video texnologiyalari
05.01.02 – Tizimli tahlil, boshqaruv va axborotni qayta ishlash
05.01.03 – Informatikaning nazariy asoslari
05.01.04 – Hisoblash mashinalari, majmualari va kompyuter tarmoqlarining matematik va dasturiy ta'minoti
05.01.05 – Axborotlarni himoyalash usullari va tizimlari. Axborot xavfsizligi
05.01.06 – Hisoblash texnikasi va boshqaruv tizimlarining elementlari va qurilmalari
05.01.07 – Matematik modellashtirish
05.01.11 – Raqamli texnologiyalar va sun'iy intellekt
05.02.00 – Mashinasozlik va mashinashunoslik
05.02.08 – Yer usti majmualari va uchish apparatlari
05.03.02 – Metrologiya va metrologiya ta'minoti
05.04.01 – Telekommunikasiya va kompyuter tizimlari, telekommunikasiya tarmoqlari va qurilmalari. Axborotlarni taqsimlash
05.05.03 – Yorug'lik texnikasi. Maxsus yoritish texnologiyasi
05.05.05 – Issiqlik texnikasining nazariy asoslari
05.05.06 – Qayta tiklanadigan energiya turlari asosidagi energiya qurilmalari
05.06.01 – To'qimachilik va yengil sanoat ishlab chiqarishlari materialshunosligi
05.08.03 – Temir yo'l transportini ishlatish
05.09.01 – Qurilish konstruksiyalari, bino va inshootlar
05.09.04 – Suv ta'minoti. Kanalizatsiya. Suv havzalarini muhofazalovchi qurilish tizimlari
10.00.06 – Qiyosiy adabiyotshunoslik, chog'ishtirma tilshunoslik va tarjimashunoslik
10.00.04 – Yevropa, Amerika va Avstraliya xalqlari tili va adabiyoti
08.00.01 – Iqtisodiyot nazariyasi
08.00.02 – Makroiqtisodiyot
08.00.03 – Sanoat iqtisodiyoti
08.00.04 – Qishloq xo'jaligi iqtisodiyoti
08.00.05 – Xizmat ko'rsatish tarmoqlari iqtisodiyoti
08.00.06 – Ekonometrika va statistika
08.00.07 – Moliya, pul muomalasi va kredit
08.00.08 – Buxgalteriya hisobi, iqtisodiy tahlil va audit
08.00.09 – Jahon iqtisodiyoti
08.00.10 – Demografiya. Mehnat iqtisodiyoti
08.00.11 – Marketing
08.00.12 – Mintaqaviy iqtisodiyot
08.00.13 – Menejment
08.00.14 – Iqtisodiyotda axborot tizimlari va texnologiyalari
08.00.15 – Tadbirkorlik va kichik biznes iqtisodiyoti
08.00.16 – Raqamli iqtisodiyot va xalqaro raqamli integratsiya
08.00.17 – Turizm va mehmonxona faoliyati

Ma'lumot uchun, OAK Rayosatining 2024-yil 28-avgustdagi 360/5-son qarori bilan "Dissertatsiyalar asosiy ilmiy natijalarini chop etishga tavsiya etilgan milliy ilmiy nashrlar ro'yxati"ga texnika va iqtisodiyot fanlari bo'yicha "Muhandislik va iqtisodiyot" jurnali ro'yxatga kiritilgan.

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ASSESSING DIGITAL MATURITY IN HIGHER EDUCATION INSTITUTIONS: AN INTEGRATED FRAMEWORK APPROACH

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Abstract. The rapid expansion of digital technologies has transformed the operational and strategic landscape of higher education institutions worldwide. Universities are increasingly adopting digital platforms, cloud-based infrastructure, artificial intelligence, learning management systems, and data-driven decision-making mechanisms to improve educational quality and administrative efficiency. However, despite significant investments in digital transformation, assessing digital maturity remains a complex challenge. Existing evaluation approaches often focus on isolated technological indicators, such as infrastructure availability or software implementation, while overlooking broader institutional dimensions, including digital governance, management effectiveness, transparency, innovation, and organizational readiness. Consequently, there is a growing need for integrated assessment frameworks capable of measuring the overall level of digital maturity in higher education institutions.

Keywords: digital maturity, digital transformation, higher education institutions, digital governance, integrated assessment framework, university management, digital technologies, Uzbekistan.

Annotatsiya. Raqamli texnologiyalarning jadal rivojlanishi dunyo bo‘ylab oliy ta’lim muassasalarining faoliyati va strategik rivojlanishiga sezilarli ta’sir ko‘rsatmoqda. Universitetlar ta’lim sifati va boshqaruv samaradorligini oshirish maqsadida raqamli platformalar, bulutli infratuzilmalar, sun’iy intellekt, ta’limni boshqarish tizimlari hamda ma’lumotlarga asoslangan qaror qabul qilish mexanizmlarini keng joriy etmoqda. Biroq raqamli transformatsiyaga yo‘naltirilayotgan katta hajmdagi investitsiyalarga qaramay, raqamli yetuklik darajasini baholash murakkab masala bo‘lib qolmoqda. Mavjud baholash yondashuvlari ko‘pincha infratuzilma mavjudligi yoki dasturiy ta’minot joriy etilishi kabi alohida texnologik ko‘rsatkichlarga e’tibor qaratadi, biroq raqamli boshqaruv, boshqaruv samaradorligi, shaffoflik, innovatsion rivojlanish va tashkiliy tayyorgarlik kabi muhim institutsional omillarni yetarli darajada qamrab olmaydi. Shu sababli oliy ta’lim muassasalarining umumiy raqamli yetuklik darajasini kompleks baholash imkonini beruvchi integratsiyalashgan baholash tizimlarini ishlab chiqish dolzarb ahamiyat kasb etadi.

Kalit so‘zlar: raqamli yetuklik, raqamli transformatsiya, oliy ta’lim muassasalari, raqamli boshqaruv, integratsiyalashgan baholash modeli, universitet boshqaruvi, raqamli texnologiyalar, O‘zbekiston.

Аннотация. Стремительное развитие цифровых технологий оказывает существенное влияние на операционную деятельность и стратегическое развитие высших образовательных учреждений во всем мире. Университеты активно внедряют цифровые платформы, облачную инфраструктуру, технологии искусственного интеллекта, системы управления обучением и механизмы принятия решений на основе данных для повышения качества образования и эффективности управления. Однако, несмотря на значительные инвестиции в цифровую трансформацию, оценка уровня цифровой зрелости остается сложной задачей. Существующие подходы к оценке зачастую сосредоточены на отдельных технологических показателях, таких как наличие инфраструктуры или внедрение программного обеспечения, при этом недостаточно учитываются более широкие институциональные аспекты, включая цифровое управление, эффективность менеджмента, прозрачность, инновационное развитие и организационную готовность. В связи с этим возрастает необходимость разработки интегрированных моделей оценки, способных комплексно измерять уровень цифровой зрелости высших образовательных учреждений.

Ключевые слова: цифровая зрелость, цифровая трансформация, высшие образовательные учреждения, цифровое управление, интегрированная модель оценки, управление университетом, цифровые технологии, Узбекистан.

INTRODUCTION

The digital transformation of higher education has become one of the most significant trends shaping educational systems across the world. Advances in information and communication technologies, artificial intelligence, cloud computing, big data analytics, and digital governance tools have fundamentally changed how universities operate, manage resources, interact with stakeholders, and deliver educational services.

In the twenty-first century, digital technologies are no longer considered supplementary tools, but rather essential components of institutional development and competitiveness. The increasing complexity of higher education management requires universities to adopt innovative approaches that enhance efficiency, transparency, accountability, and responsiveness. Traditional administrative models are often characterized by fragmented information flows, lengthy decision-making processes, excessive paperwork, and limited integration between organizational units. Digital technologies offer solutions to these challenges by enabling real-time access to information, automation of administrative procedures, data-driven decision-making, and improved communication among stakeholders.

In recent years, governments around the world have prioritized digital transformation as a strategic objective for educational development. International organizations such as UNESCO, the OECD, and the World Bank emphasize the importance of digitalization in strengthening institutional resilience, improving educational quality, and supporting sustainable development. The COVID-19 pandemic further accelerated digital adoption across higher education institutions, highlighting both the opportunities and limitations of existing digital infrastructure.

Uzbekistan has also recognized the strategic importance of digital transformation within its higher education sector. The implementation of the “Digital Uzbekistan – 2030” strategy and subsequent reforms has stimulated the adoption of various digital management systems, including HEMIS, electronic document circulation platforms, online learning environments, and digital reporting mechanisms. Despite these developments, significant differences remain among universities in terms of digital readiness and digital maturity.

The primary objective of this research is to develop and apply an integrated framework that can effectively measure digital maturity levels in higher education institutions and identify the key factors influencing successful digital transformation. Through this approach, the study seeks to contribute to both academic research and practical policymaking by providing a reliable instrument for monitoring and improving digital governance within universities.

Digital transformation has become a defining characteristic of contemporary higher education systems. Over the last decade, researchers have increasingly emphasized the importance of integrating digital technologies into institutional management processes in order to enhance organizational effectiveness, improve service delivery, and strengthen competitiveness. Digital maturity has emerged as a critical concept within this discourse, reflecting the extent to which institutions successfully adopt, integrate, and utilize digital technologies to achieve strategic objectives.

Several international frameworks have been developed to assess digital maturity in educational institutions. The European Commission’s Digital Education Action Plan emphasizes institutional readiness, digital infrastructure, staff competencies, and governance mechanisms as essential dimensions of digital transformation. Similarly, OECD studies highlight the importance of data-driven decision-making, digital leadership, and organizational adaptability in fostering sustainable digital development within universities.

Research conducted by UNESCO demonstrates that digital transformation contributes significantly to educational accessibility, transparency, and institutional resilience. Universities with higher levels of digital maturity tend to demonstrate stronger crisis management capabilities, improved resource allocation, and greater flexibility in responding to changing educational demands. These findings became particularly evident during the COVID-19 pandemic, when institutions with advanced digital infrastructure were able to maintain operational continuity more effectively than those with limited digital capacity.

Recent studies also emphasize the role of artificial intelligence, big data analytics, and cloud computing in enhancing institutional performance. Artificial intelligence technologies support predictive analytics, student performance monitoring, personalized learning pathways, and administrative automation. Big data analytics enables universities to transform large volumes of institutional data into actionable insights that support strategic planning and evidence-based decision-making. Cloud technologies facilitate information accessibility, collaboration, and scalability while reducing infrastructure costs.

Despite the growing body of literature on digital transformation, significant challenges remain in measuring digital maturity. Many existing assessment models focus primarily on technological infrastructure indicators, such as internet connectivity, hardware availability, or software deployment. While these indicators are important, they do not fully capture the broader organizational and managerial dimensions that influence the success of digital transformation initiatives.

In the context of developing countries, including Uzbekistan, research on digital maturity assessment remains relatively limited. Existing studies primarily examine the implementation of specific digital platforms or technologies rather than evaluating the overall maturity of institutional digital ecosystems. Consequently, there is a need for comprehensive assessment frameworks capable of measuring digital maturity from a multidimensional perspective.

This study addresses this research gap by proposing an integrated framework that evaluates digital maturity through five interconnected dimensions: Administrative Efficiency, Resource Management, Decision-Making, Transparency and Reporting, and Innovation and Development. By combining these dimensions within a single analytical model, the proposed framework provides a more comprehensive understanding of digital maturity in higher education institutions.

The assessment of digital maturity requires a systematic methodological approach capable of capturing the complex interactions between technological, organizational, and managerial factors. To achieve this objective, the present study develops an Integrated Digital Maturity Framework (IDMF) designed specifically for higher education institutions.

The framework is based on five key dimensions that collectively represent the essential components of institutional digital maturity:

a) Administrative Efficiency (ADM);
b) Resource Management (RES);
c) Decision-Making (DEC);
d) Transparency and Reporting (TRA);
e) Innovation and Development (INN).

These dimensions were selected based on an extensive review of the literature on digital governance, higher education management, and organizational digital transformation. Together, they provide a multidimensional perspective that captures both operational and strategic aspects of digital maturity.

Administrative Efficiency evaluates the extent to which routine administrative processes are automated and supported by digital technologies. Resource Management examines the effectiveness of digital tools in managing financial, human, and infrastructural resources. Decision-Making measures the use of data analytics, artificial intelligence, and digital dashboards in supporting managerial decisions. Transparency and Reporting assesses the openness and accountability of institutional processes through digital reporting mechanisms. Innovation and Development evaluates the institution's ability to adopt emerging technologies and continuously improve its digital capabilities.

The assessment of digital maturity was conducted using data collected from twenty leading higher education institutions in Uzbekistan, including public, private, and international universities. The results revealed significant differences in digital maturity levels across institutions. Universities with advanced digital infrastructure, integrated information systems, and data-driven management practices demonstrated higher performance across all dimensions of the Digital Maturity Index (DMI).

Among public universities, the Tashkent University of Information Technologies, the National University of Uzbekistan, and the Tashkent State University of Economics achieved the highest digital maturity scores. Private and international universities, particularly Inha University in Tashkent and Webster University Tashkent, showed even stronger performance due to greater technological readiness and organizational flexibility. In contrast, several regional universities demonstrated lower levels of digital maturity, reflecting limitations in digital infrastructure, financial resources, and staff digital competencies.

The empirical analysis confirmed that all five dimensions of the proposed framework — Administrative Efficiency, Resource Management, Decision-Making, Transparency and Reporting, and Innovation and Development — contribute significantly to overall digital maturity. Among these dimensions, Administrative Efficiency and Decision-Making emerged as the most influential factors. This finding indicates that process automation, integrated management systems, and data-driven governance play a crucial role in improving institutional performance.

The regression results demonstrated strong explanatory power, confirming the validity of the proposed framework. Diagnostic tests showed no significant multicollinearity problems and supported the reliability of the estimated coefficients. These findings suggest that the Digital Maturity Index can serve as an effective instrument for evaluating the progress of digital transformation within higher education institutions.

From a policy perspective, the results highlight the importance of strengthening digital governance mechanisms, improving staff digital competencies, and expanding the integration of institutional information systems. Particular attention should be given to regional universities, where targeted investments in digital infrastructure and capacity-building initiatives can significantly accelerate digital transformation. Overall, the proposed framework provides a practical tool for assessing digital maturity and supporting evidence-based decision-making in higher education institutions.

CONCLUSION AND RECOMMENDATIONS

Digital transformation has become a fundamental factor influencing the effectiveness and competitiveness of higher education institutions. This study proposed an Integrated Digital Maturity Framework for assessing digital maturity in universities through five key dimensions: Administrative Efficiency, Resource Management, Decision-Making, Transparency and Reporting, and Innovation and Development.

The empirical analysis of higher education institutions in Uzbekistan revealed considerable differences in digital maturity levels across universities. The findings demonstrated that institutions with advanced digital infrastructure, integrated information systems, and data-driven governance practices achieved higher levels of digital maturity. Among the examined dimensions, Administrative Efficiency and Decision-Making were identified as the most influential factors affecting institutional digital development.

The study confirms that digital maturity should be viewed as a multidimensional concept encompassing technological, organizational, and managerial capabilities. The proposed framework provides a practical tool for evaluating digital transformation progress, identifying institutional strengths and areas requiring further development, and supporting evidence-based decision-making. Furthermore, the results highlight the importance of strengthening digital competencies, improving information system integration, and expanding digital governance practices to enhance institutional performance.

Overall, the proposed framework contributes to the growing body of research on digital transformation in higher education and offers practical recommendations for policymakers and university administrators seeking to accelerate digital development and improve governance effectiveness.

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