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Exploring the Readiness for AI Innovation in Higher Education at the Serbian Universities

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Abstract

The purpose of this work-in-progress paper is to explore the current readiness for artificial intelligence (AI) implementation at the Serbian universities, both public and private, addressing a gap in localized research on AI adoption in Southeast Europe. The study examines organizational, technological, and human factors that may influence the integration of AI into higher education teaching, learning, and administration. The analysis will combine qualitative and quantitative data gathered using a structured survey method from faculty, administrators, and students, measuring their AI awareness, digital competence, ethical concerns, and perceived usefulness of AI-related innovation. Institutional documents and digital infrastructure will also be reviewed. Preliminary findings are expected to reveal inconsistent AI literacy across roles, limited infrastructural support, and further training interest largely dependent on the role assumed in the university context. The paper aims to identify strategic entry points for responsible AI innovation and offer recommendations for institutional policy and development. These insights will serve as the empirical foundation for a broader research and innovation project focused on AI adoption in higher education. This is an exploratory research paper that contributes to the emerging literature on AI-readiness in education by providing context-specific evidence from a Serbian university setting.

Keywords: Artificial intelligence, Higher education, Innovation, Serbian universities

1. Introduction:

Artificial Intelligence (AI) is no longer an experimental add-on in higher education. It is increasingly regarded as a core driver of data-rich, adaptive, and personalized learning ecosystems. Global exemplars of predictive analytics, intelligent tutoring, and generative feedback illustrate AI's transformative promise, yet their diffusion remains uneven and contingent on the sociotechnical fabric of individual institutions (OECD, 2023; Zawacki-Richter et al., 2019). Empirical studies consistently demonstrate that successful adoption depends less on algorithmic sophistication than on the interplay among governance structures, digital infrastructure, faculty competences, and culturally embedded attitudes toward innovation.

Serbia represents a particularly instructive case study because of its almost paradoxical dynamics. While its universities have a long-standing tradition and are recognized particularly in STEM disciplines, universities are aligning with EU digital strategy imperatives but still operate within legacy information systems, constrained fiscal environments, and a historical ambivalence toward disruptive reform (Kuleto et al., 2022), that constrain the realization of transformative innovation. These contextual particularities magnify the need for a nuanced, multidimensional assessment of AI readiness that transcends purely technological metrics and embraces organizational, cultural, and ethical determinants.

AI adoption in education has been conceptualized through various theoretical lenses. The Technology Acceptance Model (TAM) posits that perceived usefulness and ease of use predict technology acceptance (Davis, 1989). In collectivist cultures, however, this model often underestimates the salience of normative pressures and institutional mandates (Tarhini et al., 2017). The Diffusion of Innovations Theory (Rogers, 2003) further emphasizes that innovation adoption is contingent on perceived compatibility, observability, and trialability — constructs that are especially pertinent in higher education settings characterized by entrenched pedagogical norms and high-power distance (Hofstede, 2010). To systematically explore this phenomenon, the present research builds on a robust body of theoretical and empirical scholarship examining technology adoption in educational settings. Several conceptual frameworks provide complementary perspectives on why individuals and institutions accept or resist innovative technologies. The Technology Acceptance Model (Davis, 1989) remains among the most cited, emphasizing perceived usefulness and perceived ease of use as key predictors of adoption intention. The Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) expands this logic, adding constructs such as social influence and facilitating conditions, which are especially relevant in hierarchical institutional environments. Diffusion of Innovations Theory (Rogers, 2003) further contextualizes adoption within the broader social system, highlighting the importance of perceived compatibility, relative advantage, complexity, trialability, and observability. This perspective is critical for understanding how new technologies diffuse across universities with diverse governance structures and cultural norms. The Theory of Planned Behavior (Ajzen, 1991) enriches this picture by incorporating attitudes, subjective norms, and perceived behavioral control — constructs that help explain both intention and actual use behavior. Beyond individual acceptance, the literature underscores that successful AI integration depends on the interplay between technical systems and organizational and cultural environments. Socio-technical Systems Theory (Trist & Bamforth, 1951) emphasizes the co-evolution of technology and social structures, arguing that implementation succeeds only when social and technical subsystems are jointly optimized. This insight is particularly relevant in Serbian universities, where formal policies often still coexist with deeply embedded informal practices and collective attitudes.

Contemporary frameworks developed by leading consultancies and research institutions further enrich this theoretical foundation by introducing structured models of organizational readiness and digital maturity. For example, the MIT Digital Transformation Framework highlights the interplay of customer experience, operational processes, and business model innovation, underpinned by dynamic

organizational capabilities (Kane et al., 2015). The Boston Consulting Group's Digital Acceleration Index (BCG, 2025) offers a diagnostic approach to measuring digital maturity across strategy, offerings, technology, and culture — dimensions that closely parallel readiness challenges in higher education. Similarly, Gartner's Digital Maturity Model provides staged progression from initiation to transformation, emphasizing governance and data infrastructure as prerequisites for sustainable adoption. McKinsey's 7S Framework has also been adapted to digital transformation contexts, emphasizing the alignment of strategy, structure, systems, shared values, skills, style, and staff (McKinsey & Company, 2018). Finally, the Microsoft AI Maturity Model proposes a staged approach to AI-specific adoption, progressing from exploration and experimentation to formalization and optimization, with attention to culture, talent, data, and tools (Microsoft, 2019). Cultural dimensions further shape perceptions and behaviors toward AI. Hofstede's (2010) model, especially power distance and collectivism, helps explain why faculty and administrators may defer to hierarchical mandates rather than proactively championing innovation. In collectivist cultures, social consensus and authoritative endorsement weigh heavily in determining legitimacy and trust in new technologies. Innovation Resistance Theory (Ram & Sheth, 1989) similarly reminds us that perceived risks, inertia, and traditions can inhibit adoption, even when clear benefits are recognized. These perspectives converge on a critical insight — readiness for AI adoption in higher education is a multidimensional construct. It is shaped not only by technological infrastructure and policy alignment but also by organizational culture, governance maturity, leadership commitment, and faculty and student competencies. Accordingly, this study draws on both classical theories and contemporary maturity frameworks to design an evidence-based, context-sensitive approach to assessing AI readiness in Serbian universities. Table 1 summarizes how classical theories and contemporary maturity models jointly form the survey design in the upcoming research, ensuring multidimensional coverage of attitudes, competencies, governance factors, and cultural dispositions.

Table 1. Conceptual Models and Their Contribution to Survey Design

Framework	Key Constructs / Dimensions	Survey Themes Informed
Technology Acceptance Model (TAM)	Perceived usefulness, perceived ease of use	Perceptions of AI benefits, ease of integration into teaching and learning
Unified Theory of Acceptance and Use of Technology (UTAUT)	Performance expectancy, effort expectancy, social influence, facilitating conditions	Social norms, institutional support, faculty attitudes
Diffusion of Innovations Theory (DOI)	Compatibility, relative advantage, complexity, trialability, observability	Alignment with institutional culture, visibility of benefits, perceived implementation challenges
Theory of Planned Behavior (TPB)	Attitudes, subjective norms, perceived behavioral control	Intention to adopt, self-efficacy, peer influence
Sociotechnical Systems Theory	Joint optimization of technical and social subsystems	Governance structures, collaboration practices, leadership alignment
Cultural Dimensions Theory (Hofstede)	Power distance, collectivism, uncertainty avoidance	Cultural norms, deference to authority, tolerance for technological change
Innovation Resistance Theory	Perceived risks, inertia, tradition, switching costs	Barriers to adoption, resistance factors, perceived threats
MIT Digital Transformation Framework	Customer experience, operational processes, business model innovation, dynamic capabilities	Strategy alignment, process modernization, institutional readiness
BCG Digital Acceleration Index	Digital strategy, technology and data, culture, talent, governance	Infrastructure maturity, cultural openness, skills gaps

Framework	Key Constructs / Dimensions	Survey Themes Informed
McKinsey 7S Framework	Strategy, structure, systems, shared values, skills, style, staff	Organizational alignment, leadership commitment, policy coherence
Gartner Digital Maturity Model	Maturity stages (initiating to transforming), governance, integration	Institutional progression, readiness benchmarking, digital capability assessments
Microsoft AI Maturity Model	AI strategy, culture, data infrastructure, tools, talent	AI-specific readiness, training needs, data governance

It is worth noting that recent research has critiqued the oversimplification of the existing models when applied to AI. Zawacki-Richter et al. (2019) argue that AI's opacity, ethical complexity, and reliance on massive datasets render it qualitatively distinct from prior educational technologies. Therefore, the AI readiness frameworks must be re-conceptualized to account for governance, transparency, and cultural legitimacy (Abbas et al., 2023). Organizational readiness usually encompasses strategic alignment, resource allocation, and infrastructural maturity (McKinsey, 2018). Studies have consistently demonstrated that institutions lacking cohesive AI strategies experience fragmented adoption and low impact (Pisica et al., 2023). In line with that, a study by Kuleto et al. (2021) underscores that Serbian universities exhibit a pronounced deficit in AI infrastructure, with many institutions operating under legacy systems incompatible with contemporary AI applications.

While Serbia's establishment of the National AI Supercomputing Platform (OECD Observatory of Public Sector Innovation, 2023) represents a notable policy innovation, as well as the recent Strategy for the Development of Artificial Intelligence (Government of the Republic of Serbia, 2025), their benefits have not been uniformly distributed yet across different sectors, which may undermine the country's capacity to ensure interoperability, data stewardship, and ethical safeguards efficiently (European Commission, 2019). Empirical evidence also highlights resource disparities as critical constraints. For instance, BCG's deployment of AI tools such as Deckster demonstrates the potential of AI to optimize administrative workflows (Business Insider, 2025), but the financial and technical prerequisites exceed what many Serbian institutions can mobilize without targeted investment and capacity-building initiatives.

Human readiness, particularly AI literacy among faculty, emerges as a recurring determinant of adoption efficacy. UNESCO (2021) posits that AI literacy constitutes a foundational competency on par with digital literacy. However, cross-sectional studies reveal stark disparities: while the Digital Education Council (2024) documented widespread student engagement with AI tools (86% globally), faculty adoption remains tentative, often constrained by epistemological skepticism and limited pedagogical training (Campbell Academic Technology Services, 2025). Kuleto et al. (2021) observed that Serbian faculty reported low familiarity with AI applications beyond rudimentary functions, a pattern consistent with broader Southeast European trends (Pisica et al., 2023). This misalignment between student expectations and educator readiness is likely to exacerbate pedagogical dissonance, potentially undermining the legitimacy of AI-enhanced learning environments. In high-impact implementations, professional development and communities of practice are key enablers. For example, MIT's institutional AI labs have developed interdisciplinary training frameworks that blend technical fluency with pedagogical reflection (Holmes et al., 2021). These models illustrate the importance of systemic capacity-building over isolated training interventions.

Serbia's cultural configuration, characterized by collectivism, high power distance, and uncertainty avoidance, exerts a profound influence on AI acceptance (Hofstede, 2010; Kovacic, 2009). Tarhini et al. (2017) demonstrate that in collectivist societies, technology adoption is often mediated by peer consensus and hierarchical endorsement rather than individual attitudes alone. This dynamic has two

implications. First, adoption trajectories may hinge disproportionately on institutional leadership and formal policy endorsements. Second, collective skepticism, fueled by historical ambivalence toward Western-centric technological models, can attenuate readiness despite policy imperatives (Pisica et al., 2023). Chan and Tsi's (2024) global study shows that those cultural orientations shape perceptions of AI's legitimacy and risks, including fears of academic depersonalization and algorithmic bias. These observations challenge universalist assumptions embedded in many AI readiness models and underscore the necessity of culturally situated implementation strategies.

Beyond infrastructural and cultural determinants, AI's impact on cognitive development has emerged as an urgent research frontier. Recent neuroscientific evidence suggests that AI-enabled cognitive offloading may attenuate neural engagement during complex tasks (Kosmyna et al., 2025). In controlled experiments, students relying on generative AI tools exhibited diminished memory retention and reduced metacognitive awareness. Tlili et al. (2023) similarly caution that algorithmic personalization, while ostensibly enhancing learning efficiency, risks curating epistemically narrow experiences, thereby constraining critical thinking. These findings resonate with UNESCO's (2021) call for intentional integration frameworks that scaffold human–AI collaboration without eroding learners' agency or analytical competencies. In the Serbian context, where digital literacy remains uneven (Kuleto et al., 2021), these cognitive risks may disproportionately affect students with limited technological self-efficacy, potentially entrenching existing educational inequities.

In addition to all the above, ethical governance represents a critical pillar of sustainable AI adoption. Abbas et al. (2023) identify the absence of transparent accountability structures as a pervasive inhibitor of trust. European Commission guidelines (2019) specify principles of fairness, explainability, and accountability as preconditions for responsible AI integration. Serbia's Ethical Guidelines for AI Development (Government of the Republic of Serbia, 2025) align with EU norms, but implementation in higher education remains embryonic. A salient gap in the literature concerns how these principles are operationalized at the meso-level (i.e., within institutions), including the articulation of faculty roles in algorithmic decision-making. Moreover, cultural particularism may shape interpretations of ethical legitimacy. Trompenaars (1993) argues that in contexts emphasizing relational governance, abstract principles are often subordinated to context-specific norms — a tension that requires deliberate mediation.

This brief literature review sheds light onto the variables and conceptual lenses that will shape the design, instrumentation, and interpretation of our forthcoming nationwide survey, the principal empirical phase of this research project. The literature reveals a significant body of research on Artificial Intelligence implementation in Higher Education globally but a paucity of studies in Southeast Europe, particularly Serbia. Existing studies focus predominantly on Western or high-income contexts, with limited attention to middle-income countries facing unique infrastructural and cultural challenges (Kuleto et al., 2021; Pisica et al., 2023). Furthermore, while quantitative methods dominate Artificial Intelligence implementation in Higher Education research (Zawacki-Richter et al., 2019), there is a need for mixed-methods approaches that integrate qualitative insights into cultural and institutional dynamics, as proposed in our study. The lack of localized strategies for AI governance and ethical implementation in Higher Education Institutions, especially in collectivist societies, further justifies our research's focus on Serbia. By systematically mapping international and regional evidence onto Serbia's institutional context, we aim to ensure that the survey captures all critical dimensions, organizational strategy, governance maturity, technological capacity, faculty and student competences, cultural norms, and ethical safeguards, thereby maximizing its explanatory power and laying the groundwork for a data driven readiness framework. The findings will contribute to the global Artificial Intelligence implementation in Higher Education literature by providing a culturally grounded perspective and informing ethical governance frameworks tailored to Serbia's higher education landscape. While the models mentioned above guided our darting of the questionnaire, the first step in our study will be explorative in nature, while further, more in-depth, analysis will be planned and performed upon gaining a better picture of the current state of AI

readiness in the surveyed institutions. More information about the questionnaire can be found in the following section.

2. Methodology:

2.1 Research Design

This study will employ a mixed-methods exploratory research design to assess the readiness for artificial intelligence (AI) implementation in higher education at the Faculty of Organizational Sciences, University of Belgrade, comparing it with other Serbian universities as well. The research combines quantitative data from a structured questionnaire and qualitative insights from open-ended questions within the survey, as well as from the institutional document review, to identify key organizational, technological, and human factors influencing AI integration.

2.2 Data Collection

The questionnaire was developed based on a synthesis of recent literature on AI readiness in education, digital transformation frameworks, and institutional innovation in higher education, as outlined above. Key thematic areas were identified through a review of existing models (e.g., digital competence frameworks, ethical AI governance principles, and technology adoption theories) and tailored to reflect the specific context of Southeast European academic institutions.

The instrument was iteratively refined in consultation with academic staff and experts in higher education, digital learning, and organizational psychology. This ensured both content validity and contextual appropriateness. The finalized version comprises 40 items grouped into the following thematic sections: Demographic and institutional background, AI awareness, Digital competencies, Ethical concerns and governance, Perceived usefulness of AI in higher education, Cultural and organizational norms and Interest in training and implementation involvement.

The questionnaire includes both Likert-scale items and open-ended questions to capture perceptions, knowledge, concerns, and motivations related to AI implementation.

The institutional documentation will be collected and reviewed in collaboration with the relevant academic institution management staff, using semi-structured interview techniques and document/ICT infrastructure assessment where applicable and appropriate.

After receiving the first results from the institutions from the sample, detailed structured interviews with the relevant faculty management staff will be planned to gain more insights into AI readiness particularity.

2.3 Sampling

Data collection will be conducted using an online survey platform, with the questionnaire distributed to academic and administrative staff, students, and faculty leadership. A purposive sampling strategy will be implemented to ensure role-based representation across the institution. Participation will be voluntary, anonymous, and aligned with institutional ethical guidelines.

In parallel, institutional documents such as digitalization strategies, ICT infrastructure reports, and internal communication on innovation initiatives will be reviewed to contextualize the self-reported data and identify gaps between policy and perception.

2.4 Data Analysis

Quantitative data will be analyzed using descriptive statistics, exploratory factor analysis, and between-group comparisons (e.g. ANOVA) to explore role-based differences in readiness. Qualitative responses will be analyzed thematically to uncover key concerns, expectations, and perceived opportunities. Document review findings will be used to triangulate and enrich survey data, enabling a holistic assessment of institutional AI readiness.

3. Findings and Limitations:

Based on the concepts discussed above, we expect preliminary findings to reveal significant role-based disparities in AI awareness and literacy across surveyed Serbian universities. Students will likely demonstrate higher familiarity with generative AI tools, while faculty and administrative staff may report limited competence, particularly outside of technical disciplines. This gap reflects broader global trends and underscores the need for targeted, role-specific training programs. From an infrastructural standpoint, the research anticipates limited digital readiness, with many institutions constrained by legacy systems and underdeveloped ICT frameworks. Despite formal alignment with national and EU strategies, implementation gaps are expected to emerge, particularly in the operationalization of AI policies at the institutional level. Culturally, the findings will likely highlight ambivalence toward innovation, shaped by high power distance and collectivist norms. Adoption may be contingent on top-down endorsement, with faculty expressing ethical concerns about data privacy, depersonalization, and algorithmic bias. Yet, there is expected to be a strong interest in professional development, especially when initiatives are well-structured, contextualized, and institutionally supported. Overall, the study is expected to identify strategic entry points for responsible AI integration, beginning with administrative services and select STEM curricula, while offering policy recommendations that account for Serbia's institutional, cultural, and infrastructural particularities.

Despite the study's systematic design, there are several constraints. The presented literature review is dominated by research papers from high-income settings, Western Europe, North America, and East Asia, where digital infrastructure and funding environments differ markedly from those in Serbia. Although regional studies from South-East Europe were deliberately included, their number and methodological plurality remain modest, risking an over-reliance on externally derived perspectives that may not capture Serbia's distinctive institutional and cultural configurations. Further, core models such as TAM, DOI, TPB and Sociotechnical Systems Theory, alongside practice-oriented maturity frameworks from MIT CISR, BCG, Gartner, McKinsey and, soft, were conceived in corporate or broadly international contexts. They may not map neatly onto transitional higher-education systems. Thus, the study's theoretical adaptations should be interpreted as exploratory rather than definitive. For the moment, all conclusions are drawn from secondary sources and serve only to support the forthcoming nationwide survey. Until that empirical phase is completed, statements about AI readiness in Serbian universities remain provisional. The planned purposive sampling strategy seeks balanced participation from faculty, administrators and students, yet voluntary response patterns could over-represent digitally engaged stakeholders. Stratified invitations, reminders and assurances of anonymity will mitigate but cannot eliminate this bias. AI tools, governance guidelines and national digital strategies evolve quickly. Consequently, both the review findings and subsequent survey results may require periodic updating to maintain relevance. A Serbia-specific AI-adoption readiness framework will only be finalized once survey data are analyzed. Any references to the framework in this paper are therefore indicative and developmental rather than conclusive.

4. Conclusion:

Addressing the gaps in literature discussed above will require culturally attuned leadership, ethical frameworks, and systematic faculty development — areas our survey aims to further explore. AI can offer a transformative opportunity for Serbian universities, from personalized learning to improved

research and campus operations. However, meaningful adoption depends on institutional readiness, not just technology acquisition. The AI Adoption Readiness Framework developed through this research will help universities assess their current capacities and guide strategic, inclusive implementation. By learning from global best practices and adapting them to local realities, Serbian institutions can build a supportive ecosystem for AI that advances innovation, collaboration, and equity. Ultimately, AI adoption in Serbian higher education must balance technological progress with ethical, cultural, and cognitive considerations to ensure long-term impact.

Annexes: AI-Readiness Survey for Higher Education

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