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A Digital Maturity Model for Turkish Universities, Reflections from YÖKAK Institutional Self-Evaluation Reports

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Abstract
This study proposes a digital maturity (DM) model and delves into its reflections from Institutional Internal Evaluation Reports (KIDR) from Turkish Universities. The objectives are to: identify the dimensions relevant to a DM model for Turkish HEIs, extract DM indicators from KIDR reports, assess institutions' DM levels based on indicators, and determine whether DM differs across the four domains; Leadership & Governance, Teaching & Learning, Research & Development, and Service to Society. We employed a mixed method design consisting of qualitative content analysis and descriptive survey design. The study generates a DM model based on qualitative content analysis of already developed models. Using a 1–5-point rubric, all KİDR 2024 reports were analyzed with MAXQDA Analytics Pro. The maturity scores were entered into SPSS for descriptive and inferential statistics. The level of maturity on Leadership, Governance and Quality; Learning and Teaching; Research and Development; and Service to Society were compared statistically.

Keywords: Digital transformation; digital maturity; Digital Maturity Index (DMI); YÖKAK; KİDR

1. INTRODUCTION

The 21st century has introduced both significant opportunities and complex challenges for higher education institutions (HEIs), shaped by rapid technological advancements and globalization. As universities play a vital role in building society's future, they are compelled to rethink and adjust their educational strategies (Özcan et al., 2022). COVID-19 pandemic accelerated the digital transformation of higher education, with digitalization emerging as a key strategy to address persistent barriers to student participation and enhance the flexibility and appeal of higher education systems (OECD, 2023). Pressures in Türkiye have spurred the rise of new-generation universities, which prioritize interdisciplinary programs, tech-focused

curricula, and industry links to ready students for a complex future. These institutions aim to build adaptable, student-centric learning environments that develop knowledge and skills by creating high-quality digital processes.

Quality assurance is vital for maintaining standards and boosting global competitiveness; furthermore, its comprehensive nature often coincides with digitalization models offered for HEIs. Consequently, it may be an inquiry to reveal how digital maturity indicators align with institutional quality assurance aspects. Aligning higher education institutions (HEIs) with traditional quality frameworks is particularly complex due to their inherent flexibility, which challenges compliance (ISER/KIDR Guide, Section 3.2.1) (YÖKAK, 2025). Besides, Türkiye's specific higher education conditions—including rising demand for skilled professionals, digitally literate student populations, and specific regulatory expectations—exacerbate the challenges of implementing effective quality assurance systems (Durmuş Şenyapar & Bayındır, 2024). As institutions work through the complexities of digital transformation, identifying the factors that shape successful technology integration becomes increasingly important (Nielsen, 2024).

Technological developments continue to reshape nearly every aspect of daily life (Díaz-García et al., 2022). The current societal and educational changes, accelerated by emerging technologies, further influence how education systems evolve (Kupilas et al., 2022). Digital transformation, a defining component of the Fourth Industrial Revolution, has the potential to redefine the future landscape of education significantly (Marks et al., 2020). To better understand and evaluate digital maturity within HEIs, researchers have introduced various conceptual models. Assessing digital maturity involves using indicator systems to help institutions track their digital progress and inform decision-making. Digital maturity is widely recognized as a valuable tool for benchmarking, enhancing quality, and measuring advancement toward established best practices (Alfirević, 2025).

Despite numerous studies on digital transformation and digitalization, there is limited scholarly work on the level of digital maturity indexes (DMI) within HEIs. Specifically, the indicators of digital maturity in nationwide institutional self-evaluation reports have not yet been investigated. Therefore, this study was conducted to propose a digital maturity model, and to reveal its alignment with key indicators of organizational performance outputs reported in institutional self-evaluation reports (KIDR) of Turkish higher education system. To achieve this goal, first, digital maturity is conceptualized based on available frameworks, and then, using the newly developed framework, key operational indicators were constructed. After that, the institutional self-evaluation reports (KIDR) for the year 2024 were analyzed to assess the digital maturity based on KIDR.

2. LITERATURE REVIEW AND CONCEPTUAL BACKGROUND

2.1. Digital Transformation in Higher Education

HEIs worldwide are undergoing profound transformation driven by globalization, rapid technological improvements, shifting learner expectations, and increasing societal demands for equitable access and participation (Özcan et al., 2022). Organization evolves through a series of evolutionary (Alfirević et al., 2025) stages, digital transformation (DT), once perceived primarily as the adoption of new technologies, now represents a strategic redefinition of institutional processes, a critical factor for organizational success (Hlel et al., 2025), organizational culture, and value creation mechanisms (Williams et al., 2019). In this context, DT emphasizes institutional evaluation, accountability, and the delivery of value across all levels of the organization (Mabić & Praničević, 2023; Fuster-Guillén et al., 2025). Effective transformation necessitates adaptive governance that can proactively address emerging priorities, national strategies, and stakeholder expectations. Effective transformation demands adaptive governance that proactively addresses

emerging priorities and stakeholder expectations, supported by mechanisms like change management, benchmarking, and innovation practices (ISER/KIDR Guide, Section 3.2.1) (YÖKAK, 2025). Digital leadership, therefore, plays a pivotal role, requiring sophisticated competencies to guide technological innovation and integrate digital practices in both academic and administrative domains (Altbach & de Wit, 2018; Habeeb & Eyupoglu, 2024). As institutions increasingly integrate digital capabilities across teaching, research, governance, and societal engagement, assessing their progression becomes crucial for understanding their readiness to navigate and sustain transformation.

2.2 Digital Maturity Models (DMMs) in HEIs

DM represents the extent to which an institution has embedded digital transformation principles into its structures, processes, and organizational culture (Kampylis et al., 2015; EDUCAUSE, 2022). It reflects not only technological adoption but also the strategic and cultural integration of digital capabilities that enable continuous improvement, accountability, and long-term institutional effectiveness. Maturity theory conceptualizes organizational progress as a staged evolution in which institutions develop increasingly sophisticated digital capabilities over time (North et al., 2019). DMMs support this process by identifying capability gaps, prioritizing development areas, and guiding transformation pathways (Berghaus & Back, 2016; Anderson & Ellerby, 2018; Teichert, 2019; Ochoa-Urrego & Peña Reyes, 2021). Several established frameworks shape current understanding of digital maturity in higher education. The DigCompOrg Framework highlights leadership, digital pedagogy, infrastructure, professional development, and data-driven improvement as central maturity domains (Kampylis et al., 2015; EDUCAUSE, 2022). The EDUCAUSE Dx Framework emphasizes leadership, institutional culture, technological foundations, and analytics capability as key enab.lers of transformation (EDUCAUSE, 2020, 2022). Jisc's digital capability and assessment models extend this perspective by focusing on staff and student competencies, curriculum innovation, learning analytics, and digital assessment (Jisc, 2020, 2023, 2025). Similarly, the Digital Maturity Framework for Higher Education Institutions identifies strategy, governance, teaching, research infrastructure, ICT services, and collaboration as essential domains (Đurek et al., 2017). Collectively, these frameworks establish a set of core maturity dimensions that guide the conceptualization of this study.

2.3. The Turkish Higher Education Quality Assurance System (THEQC/YÖKAK)

The Turkish Higher Education Quality Council (THEQC/YÖKAK) administers a national quality assurance system grounded in institutional evaluation, accreditation, and continuous improvement. Its Institutional Self-Evaluation Report (ISER/KIDR) framework (see Appendix A) comprises 14 criteria and 46 sub-criteria organized into four major domains: Leadership, Governance and Quality; Learning and Teaching; Research and Development; and Service to Society. These domains embody a holistic perspective of institutional functionality and strategic development within Türkiye's HEIs. The ISER/KIDR documents serve as comprehensive self-assessment reports in which universities provide evidence of performance, stakeholder engagement, quality assurance mechanisms, and strategic alignment. They also serve as the basis for external evaluation processes conducted by YÖKAK. Because these sub-criteria include governance, management systems, teaching processes, research performance monitoring, and community engagement mechanisms, they provide a meaningful foundation for examining digital maturity within the national context (YÖKAK, 2025).

2.4. Intersection Between Digital Maturity and Quality Assurance

DM and institutional quality assurance are interconnected concepts that mutually support each other in HEIs. Digital maturity indicates how well digital capabilities are systematically

incorporated into institutional strategies, decision-making, and organizational culture (North et al., 2019; EDUCAUSE, 2020). Meanwhile, quality assurance assesses how effectively an institution plans, executes, monitors, and enhances its functions according to established standards (YÖKAK, 2025). Advanced digital systems improve the reliability, transparency, and efficiency of quality processes, allowing for stronger evidence-based governance and ongoing improvement. Conversely, solid internal quality assurance mechanisms—such as stakeholder feedback cycles, data-driven monitoring, and performance evaluations—support digital transformation by establishing structured processes and fostering a culture of continuous improvement (Kampylis et al., 2015; Jisc, 2025).

International digital maturity models (DMMs), like DigCompOrg, EDUCAUSE, and Đurek et al.'s framework, explicitly include elements such as governance, analytics capabilities, professional development, and continuous improvement, showing that digital maturity is fundamentally a quality function. DM is a critical element that strengthens quality assurance (QA) systems in higher education by making teaching, assessment, and management processes more flexible, accessible, and measurable (Talu & Tezci, 2025). Thus, the alignment between digital maturity and quality assurance provides the theoretical foundation for integrating international maturity dimensions into Türkiye's national quality assurance system. Accreditation processes in Turkish higher education increasingly rely on digital systems for documentation, monitoring, and evidence-based evaluation. Agencies such as THEQC/YÖKAK and program-specific accreditation bodies require institutions to demonstrate transparent data management, systematic performance monitoring, and continuous improvement—elements that closely align with the digital maturity dimensions. On the other hand, accreditation is essentially the outcome of a strong quality assurance system, as institutions that consistently meet high-quality standards are most likely to achieve accredited status.

2.5. Institutional Quality Dimensions Relevant to Digital Maturity

2.5.1. Leadership, Governance, and Quality Assurance

Leadership, governance, and quality assurance form the core of institutional digital maturity, as acknowledged across various digital transformation frameworks (EDUCAUSE, 2020). Digitally advanced institutions implement agile, proactive governance systems that adapt to technological changes, align transformation efforts with national and global priorities, and embed a strategic digital vision across institutional functions (Kampylis et al., 2015; EDUCAUSE, 2020). Effective governance entails strategic clarity, stakeholder-informed decision-making, and continuous improvement driven by structured quality assurance processes such as the Plan-Do-Check-Act (PDCA) cycle (Deming, 1986). Institutions that establish clearly articulated mission, vision, and policy frameworks—supported by transparent information management systems—are better equipped to utilize digital capabilities for planning and decision-making. Documented workflows, clear accountability mechanisms, internationalization strategies, and stakeholder involvement further demonstrate higher levels of digital maturity (ISER/KIDR Guide, Section 3.2.1)(YÖKAK, 2025). Digital leadership also demands advanced competencies to integrate technological innovation into both academic and administrative practices, shaping institutional culture and enabling sustainable transformation (Altbach & de Wit, 2018; Habeeb & Eyupoglu, 2024).

2.5.2. Learning and Teaching

Learning and teaching are key aspects of a university's digital maturity. Universities need to design and implement programs aligned with national qualification standards and changing societal demands. DM in this area includes student-centered teaching methods, competence-based learning, flexible learning options, and innovative assessment methods supported by

digital tools (Özdemir et al., 2023; Alfirević, 2025). To facilitate effective digital teaching, institutions need strong infrastructure, comprehensive learning resources, robust student support systems, and ongoing professional development for faculty (ISER/KIDR Guide, Section 3.2.1)(YÖKAK, 2025). International frameworks emphasize the importance of developing digital skills, adopting flexible teaching practices, and creating technology-rich learning environments that boost student engagement and achievement (Yulin & Danso, 2025; Jisc, 2023). Aligning institutional structures and processes is crucial to ensuring continuous improvement in program quality, course design, and teaching effectiveness (European University Association, 2015). Ultimately, high-quality teaching depends on faculty expertise, well-organized course materials, and motivation for independent learning (Szymenderski et al., 2015).

2.5.3. Research and Development

Research and development (R&D) is another key aspect of digital maturity, as universities are responsible for creating knowledge, fostering innovation, and advancing societal progress (Nkosi & Mutula, 2021). Digital transformation allows for better assessment of research processes and helps institutions identify performance gaps, improve workflows, and adopt new technologies (Cram & Michalak, 2019; Kupilas et al., 2022; Pinheiro et al., 2023). Mature research environments need strong physical and digital infrastructure, platforms for interdisciplinary collaboration, secure funding sources, and ongoing training for researchers. Institutions also must implement rigorous systems to track research outputs, analyze performance metrics, and use data to guide strategic decisions (ISER/KIDR Guide, Section 3.2.1) (YÖKAK, 2025).

2.5.4. Service to Society

The Service to Society dimension emphasizes universities' duty to generate societal value through community engagement, digital outreach, and knowledge transfer. Digitally advanced institutions use digital tools and platforms to coordinate community programs, improve accessibility, and deliver services aligned with broader development objectives (Pasichnyi et al., 2024). Ongoing monitoring and assessment ensure that societal efforts stay true to the university's mission and positively impact public welfare (YÖKAK, 2025). Digital transformation greatly influences societal engagement by boosting employability skills, enhancing institutional credibility, supporting national digital initiatives, and lowering educational barriers (Bravo-Jaico et al., 2025). Human resources are essential in driving this transformation by fostering adaptable curricula, developing digital skills, and encouraging community-based innovation (Castro Benavides et al., 2020).

3. ANALYTICAL/OPERATIONAL FRAMEWORK

3.1 Integrating International Digital Maturity Models with the Turkish Quality Assurance Structure

Study develops a Digital Maturity Index (DMI) specifically designed for the Turkish higher education context. It builds on well-established digital maturity and transformation models in higher education (Kampylis et al., 2015; EDUCAUSE, 2020; Đurek et al., 2017). The framework implements the DMI by combining global concepts of digital maturity with Türkiye's national quality assurance structure. This approach is commonly used in higher education maturity assessments to ensure both theoretical grounding and contextual relevance (Berghaus & Back, 2016; Teichert, 2019; EDUCAUSE, 2020). The integration is guided by THEQC's four core quality areas: Leadership, Governance and Quality; Learning and Teaching; Research and Development; and Service to Society. These areas align closely with the maturity dimensions identified in international frameworks, which include strategic leadership, digital pedagogy, research infrastructure, collaboration, and community engagement (Kampylis et al., 2015; EDUCAUSE,

2020; Đurek et al., 2017). Each domain in the DMI is represented by indicators derived from YÖKAK sub-criteria. These indicators reflect key components of institutional digital transformation, such as the implementation of digital strategies, information management, data-informed decision-making, innovation in teaching and learning, and digital research capacity, as highlighted in previous digital maturity models (Kampylis et al., 2015; Jisc, 2023; EDUCAUSE, 2020). This alignment enables the assessment of digital maturity within a nationally recognized quality assurance framework, ensuring consistency with international maturity standards and a staged development logic (North et al., 2019; Teichert, 2019). The resulting composite DMI provides an overall measure of institutional digital maturity. Additionally, the domain-specific indicators highlight strengths and areas for improvement across the core functions of higher education institutions (Đurek et al., 2017; EDUCAUSE, 2020).

***Research Objectives*;** this study aims to develop and apply a Digital Maturity Index (DMI) to evaluate the level of digital transformation in Turkish HEIs. Guided by international digital maturity frameworks and grounded in empirical evidence from KIDR reports, the study examines digital maturity at both the dimensional and indicator levels. The research questions (RQ) are: **RQ1** *What dimensions should be included in a digital maturity model for Turkish universities?* **RQ1.1** *Which digital maturity indicators can be extracted from KIDR reports as evidence of institutional digital maturity?* **RQ2** *What are the digital maturity scores of universities based on KIDR reports?* **RQ3** *Do digital maturity scores differ across four institutional dimensions (1) Leadership & Governance, (2) Teaching & Learning, (3) Research & Development, and (4) Service to Society?*

4. METHODOLOGY

4.1 Research Design

This study utilizes a mixed-method research design that combines descriptive content analysis with quantitative scoring to evaluate the digital maturity of Turkish HEIs. The analytical process is based on internationally recognized digital maturity frameworks—DigCompOrg, the EDUCAUSE Framework, and Jisc digital capability models (Kampylis et al., 2015; EDUCAUSE, 2020; Jisc, 2023)—and aligns with the four domains of the YÖKAK ISER/KIDR structure. Narrative evidence from the 2024 KIDR reports was systematically extracted, coded, and categorized under 18 predefined digital maturity sub-criteria. This qualitative coding was then transformed into quantitative measures using a standardized 1–5 scoring rubric derived from international models and mapped to corresponding YÖKAK sub-criteria.

4.2 Sample, Data Sources and Materials

The study sample consisted of 205 Institutional Self-Evaluation Reports (ISERs) submitted to the Higher Education Quality Council of Türkiye (YÖKAK, 2025) during the 2024 evaluation cycle. These reports cover the full population of Turkish state and foundation universities. The ISER reports were used solely as sources of narrative evidence reflecting institutional structures, digital practices, and maturity levels. The analytical framework applied to these reports was based on the 18 DMI sub-criteria developed in Section 2, which were constructed by extracting internationally recognized digital maturity dimensions and identifying how they manifest within the narrative content of institutional reports. Each ISER was downloaded, reviewed, and coded to identify textual evidence corresponding to the 18 sub-criteria, which then formed the basis for DMI scoring.

All data used in the study were obtained from publicly available secondary sources. The primary materials comprised the 205 ISER 2024 reports, which document institutional processes, practices, and quality assurance activities. The digital maturity indicators informed the coding structure

used during analysis. Python scripts were used for automated text extraction, MAXQDA for qualitative coding, Excel for data organization, and SPSS Version 27 for quantitative analysis.

4.3 Data Collection Procedure

Data collection followed a structured multi-stage workflow. First, all ISER 2024 reports were downloaded from the official YÖKAK website and converted into machine-readable formats. Python was used to extract text segments based on keyword sets aligned with the 18 digital maturity indicators. These extracted text blocks were then imported into MAXQDA for qualitative coding. Each text segment was assigned to one of the four DMI domains: Leadership and Governance, Learning and Teaching, Research and Development, and Service to Society. After coding, each sub-criterion was evaluated and scored on a 1–5 maturity scale based on the clarity, depth, and institutionalization of the evidence. The scores were then exported to Excel and SPSS for descriptive and inferential analyses, including comparisons across the four domains.

4.4 Measurement Framework (DMI Rubric)

The measurement framework used in this study is grounded in the Higher Education Quality Council of Türkiye (YÖKAK, 2025) guidelines, which are structured according to the Plan–Do–Check–Act (PDCA) cycle (Deming, 1950; Kupilas et al., 2022). Digital Maturity Levels (DML) were assessed using a five-point rubric, with 1 indicating the absence of formalized processes and 5 representing fully institutionalized, systematically implemented, and continuously improved practices. The Digital Maturity Index (DMI) consists of four domains—Leadership, Governance and Quality; Learning and Teaching; Research and Development; and Service to Society—each evaluated through YÖKAK's sub-criteria. Keyword lists and indicator sets were developed for each domain to guide evidence extraction from ISER 2024 reports (YÖKAK, 2025).

4.5 Validity and Reliability

In qualitative studies, the concept of validity is defined as the ability to present the researched subject impartially and accurately (Kirk & Miller, 1998). Data consistency was verified, and consensus among coders was reached (Best & Khan, 2003). To establish the transferability of the research, the methods for validity and sample selection, along with the reasons for choosing them, were explained in detail in accordance with the literature (McMillan & Schumacher, 2010). In scientific research, reliability is defined as the reproducibility of results within the study's scope (Merriam, 1998). Content validity was ensured by grounding scoring decisions in the YÖKAK rubric. Construct validity was supported through rubric-aligned keyword extraction and domain-based coding. Reliability was further strengthened through manual re-checking of data from 10 randomly selected universities, repeated coding cycles in MAXQDA, cross-comparison of extracted evidence, and SPSS-based checks for scoring consistency.

4.6 Data Analysis

Qualitative evidence extracted from the ISER reports was converted into quantitative scores using a rubric-based maturity assessment approach. Each coded segment related to one of the 18 digital maturity sub-criteria was assigned a score between 1 and 5 based on the maturity of the described practice. Domain-level DMI scores were calculated as the mean of the sub-criteria within each domain, and the overall institutional DMI was computed as the average of the four domain scores. Descriptive statistics were used to determine the overall digital maturity levels of universities (addressing RQ2), and inferential statistics (one-way ANOVA) were used to examine differences across the four domains (addressing RQ3). This systematic scoring and analysis procedure ensured methodological transparency and interpretive rigor.

4.7 Ethical Considerations

The study relied solely on publicly accessible institutional documents, so ethical approval was unnecessary. No personal or confidential information was involved. Analyses were carried out responsibly, following academic integrity standards.

5. RESULTS AND DISCUSSION

This section presents the consensus model, aligning ISER/KIDR aspects, and empirical findings of the digital maturity assessment conducted on 205 Turkish universities based on their 2024 Institutional Self-Evaluation Reports (ISER). The results include a proposed conceptual model, descriptive and inferential statistics. The distribution of Digital Maturity Index (DMI) scores across the four domains, and key differences observed between public and foundation universities. The discussion links these findings to the YÖKAK digital evaluation framework and broader international literature on digital transformation in higher education.

5.1 The Proposed Consensus Model for Digital Maturity

The developed model in this study is based on eight core dimensions commonly identified across major international digital maturity frameworks, including DigCompOrg (Kampylis et al., 2015), the EDUCAUSE Framework (2020), and Jisc's digital capability models (2020, 2023, 2025). These frameworks consistently highlight leadership, digital infrastructure, innovative teaching, staff competence, student experience, data governance, institutional collaboration, and ethical and secure digital engagement as essential elements of digital transformation. By synthesizing these shared dimensions into a unified structure, the model provides a concise and theoretically grounded foundation for assessing institutional digital maturity in higher education. See Table 1 for the details.

Table 1. The Conceptual Model for Digital Maturity

Dimension	Indicators	Description / Evaluation Criteria	Source
1. Leadership & Governance	• Strategic alignment •Governance structure • Policy integration	Existence of an institutional digital transformation strategy aligned with mission and vision; leadership commitment; integration of policies on inclusion, ethics, and sustainability.	DigCompOrg framework Kampylis et al., 2015; EDUCAUSE, 2020; Jisc, 2025
2. Digital Infrastructure & Resources	• Infrastructure maturity • Cloud & data services •Accessibility & sustainability	Robust ICT infrastructure; cloud adoption and interoperability; compliance with accessibility standards; environmentally sustainable technology.	EDUCAUSE, 2020; Knight & Birkett, 2023 *Jisc, 2023*, 2025
3. Teaching & Learning Innovation	• Digital pedagogy • Learning analytics •Assessment innovation	Integration of digital tools and analytics into teaching; innovative digital assessments; pedagogy informed by evidence and feedback.	Fernández-Miravete & Prendes-Espinosa, 2022. DigCompOrg framework Kampylis et al., 2015; Jisc, 2023, 2025
4. Staff & Faculty Digital Competence	•Professional development •Competence frameworks	Structured digital-skills programs for staff; use of frameworks like DigCompEdu; incentives and	Jisc, 2020; DigCompOrg framework Kampylis et al., 2015; EDUCAUSE, 2020

	•Incentives and recognition	recognition for digital innovation.	
5. Student Digital Experience	•Engagement and feedback • Digital inclusion •Co-creation in learning	Mechanisms for student feedback on digital tools; ensuring equitable access; involving students in co-designing digital experiences.	Jisc, 2023; EDUCAUSE, 2020; DigCompOrg framework Kampylis et al., 2015
6. Data & Evidence-Based Decision-Making	• Data governance • Analytics capability • Continuous improvement	Secure, ethical data governance; data dashboards for learning and operations; continuous improvement loops.	EDUCAUSE, 2020; Đurek et al., 2017; Jisc, 2025
7. Culture of Innovation & Collaboration	• Innovation processes •Collaboration networks • Change readiness	Presence of innovation units, cross-departmental collaboration, and institutional agility and openness to change.	DigCompOrg framework Kampylis et al., 2015; Knight & Birkett, 2023; EDUCAUSE, 2020
8. Security, Ethics & Well-being	• Cybersecurity management • Digital ethics • Digital well-being	Institutional cybersecurity framework; policies on responsible tech use; promoting healthy and balanced digital engagement (sustainability and accessibility).	EDUCAUSE, 2020; Jisc, 2025; OECD, 2023

International maturity frameworks, including DigCompOrg, the EDUCAUSE Framework, Jisc models, and the Digital Maturity Framework for HEIs (Đurek et al., 2017), combine governance, data management, continuous improvement, and capacity-building, demonstrating that digital maturity is mainly a quality function. Therefore, institutional maturity indicates the extent to which digital processes are integrated into the overall quality cycle, providing the foundation for aligning international maturity dimensions with YÖKAK's evaluation criteria in this study. Building on the theoretical basis and conceptual model from the previous section, the following Analytical Framework operationalizes the Digital Maturity Index (DMI) for practical assessment.

5.2 Alignment Between Conceptualized DM and YÖKAK/KIDR Domains

A structured comparison (Table 2) demonstrates a high degree of alignment between the proposed DM and the quality assurance domains used in the KIDR.

Table 2. Integration of YÖKAK Evaluation Criteria Into The DM Framework

YÖKAK Heading	Sub-Criteria	Short Rationale / Link
A. Leadership, Governance & Quality	A.1 Institutional Transformation Capacity	Evaluates how the institution manages change and innovation, which is also essential for leading digital transformation.
	A.2 Internal Quality Assurance Mechanisms	Focuses on systematic monitoring and improvement, directly related to data-driven and evidence-based digital management.
	A.3 Mission, Vision, and Policies	Requires clear strategic direction, like defining a digital vision and aligning policies for digital development.
	A.4 Information Management System	Involves collecting, securing, and using data, which aligns with core functions of digital data governance.

	A.5 Process Management	Looks at improving workflows and efficiency, reflecting the role of digital tools and automation in institutional processes.
	A.6 Stakeholder Involvement	Encourages participatory and collaborative practices, like co-creation and digital collaboration cultures.
	A.7 Internationalization	Digital tools support virtual mobility and global cooperation, strengthening internationalization efforts.
B. Learning and Teaching	B.1 Program Design & Approval	Integrates blended and digital learning, matching principles of digital pedagogy and innovative program design.
	B.2 Course Objectives Alignment	Ensures learning outcomes fit digital and hybrid delivery, linking to modern digital teaching design.
	B.3 Student Workload-Based Design	Balances workload across modalities and supports accessible, student-centered digital learning.
	B.4 Program Follow-up & Update	Use data and feedback from digital learning systems for continuous improvement.
	B.5 Management of Learning & Teaching	Requires coordinated management of technologies and learning environments used in digital education.
C. Research and Development	C.1 Internal & External Resources	Digital and technical infrastructure are essential for supporting research activities.
	C.2 Joint Programs & Research Units	Collaboration relies on shared digital platforms and online communication tools.
	C.3 Research Performance Evaluation	Involves analytics and KPIs, aligning with data-based research performance monitoring.
	C.4 Staff Performance Evaluation	Includes assessment of digital skills and professional development related to digital research practices.
D. Service to Society	D.1 Resources for Service to Society	Digital systems and tools enhance outreach, access, and community engagement.
	D.2 Service Performance Evaluation	Monitoring societal impact often uses digital data, ethical standards, and responsible technology use.

Leadership, Governance, and Quality measures how digital strategies are integrated into institutional governance, information management, and quality assurance processes, including transformation capacity and stakeholder involvement. The second domain, Learning and Teaching, evaluates the digitalization of the educational mission through indicators related to digital pedagogy, learning management systems, learning analytics, program oversight, and innovative assessment methods (Jisc, 2023). The third domain, Research and Development, assesses the maturity of digital research infrastructure, performance monitoring systems, and platforms that support collaborative knowledge creation. The fourth domain, Service to Society, considers how digital tools and platforms are used to improve community engagement, societal outreach, and performance tracking of service activities. Together, these four domains create a comprehensive and contextually relevant DMI model that aligns YÖKAK's sub-criteria with international digital maturity concepts, enabling a strong evaluation of digital transformation efforts in Turkish HEIs.

5.3 Descriptive Results

Digital Maturity Index (DMI) were calculated on a five-point scale, ranging from 1 (no defined digital practice) to 5 (fully institutionalized and systematically applied practice). The sample included 205 higher education institutions—167 state universities (81.5%) and 38 foundation universities (18.5%)—reflecting the overall structure of the Turkish higher education system. The results show that universities generally exhibit moderate to advanced levels of digital maturity, with scores ranging between Level 3 and Level 5. Most institutions (77.6%) were categorized at

Level 4, indicating that digital processes are structured, established, and consistently applied. A smaller proportion (14.6%) was at Level 3. Also 7.8% reached Level 5, indicating that fully optimized DM remains relatively rare. Across institutional types, state universities showed a similar pattern: 76% were at Level 4, 15% at Level 3, and 9% at Level 5. Foundation universities showed an even stronger concentration at Level 4 (84.2%), although very few achieved Level 5 (2.6%) and 13.2% remained at Level 3. Table 3 summarizes the distribution of digital maturity levels across university types.

Table 3. Distribution of overall digital maturity levels by university type

Category	Group / Level	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
University Type	Foundation	38	18.5	18.5	18.5
	State	167	81.5	81.5	100.0
	Total (Type)	**205**	**100.0**	**100.0**	—
Overall Digital Maturity Scores	Level 3.00	30	14.6	14.6	14.6
	Level 4.00	159	77.6	77.6	92.2
	Level 5.00	16	7.8	7.8	100.0
	Total, Overall DMI	**205**	**100.0**	**100.0**	—
State Universities (n = 167)	Level 3.00	25	15.0	15.0	15.0
	Level 4.00	127	76.0	76.0	91.0
	Level 5.00	15	9.0	9.0	100.0
	Total (State)	**167**	**100.0**	**100.0**	—
Foundation Universities (n = 38)	Level 3.00	5	13.2	13.2	13.2
	Level 4.00	32	84.2	84.2	97.4
	Level 5.00	1	2.6	2.6	100.0
	Total (Foundation)	**38**	**100.0**	**100.0**	—

To address the research question concerning the relative emphasis placed on the digital maturity indicators, descriptive statistics were computed for all 18 indicators across the four domains. Mean scores were used to identify which indicators appeared most prominently in the institutional reports. As shown in the table, indicator **C.1** (within the Research and Development domain) received the most significant emphasis, with a mean score of **4.48**, suggesting a well-developed and consistently implemented practice in this area. Several indicators from the Learning and Teaching domain—especially **A.6** (M = 4.31) and **A.4** (M = 4.02)—also ranked highly, indicating strong institutional focus on pedagogical digital integration.

Table 4. Descriptive Statistics of the Main Indicators (18 indicators)

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
A.1	Total	205	3.33	1.298	.091	3.15	3.51
A.2	Total	205	3.67	.921	.064	3.55	3.80
A.3	Total	205	3.63	1.375	.096	3.44	3.82

A.4	Total	205	4.02	1.022	.071	3.88	4.17
A.5	Total	205	3.43	1.495	.104	3.22	3.64
A.6	Total	205	4.31	1.014	.071	4.17	4.45
A.7	Total	205	3.20	1.731	.121	2.97	3.44
B.1	Total	205	3.93	1.251	.087	3.76	4.10
B.2	Total	205	4.31	1.084	.076	4.16	4.46
B.3	Total	205	4.23	1.090	.076	4.08	4.38
B.4	Total	205	4.42	.985	.069	4.28	4.56
B.5	Total	205	4.40	1.059	.074	4.25	4.54
C.1	Total	205	4.48	.953	.067	4.35	4.61
C.2	Total	205	3.71	1.634	.114	3.48	3.93
C.3	Total	205	3.22	1.461	.102	3.02	3.43
C.4	Total	205	3.98	1.238	.086	3.81	4.15
D.1	Total	205	3.37	1.768	.123	3.12	3.61
D.2	Total	205	3.93	1.649	.115	3.70	4.16

In contrast, indicator **A.7** (Leadership and Quality domain) received the lowest mean score of **3.20**, reflecting comparatively limited attention or inconsistent development in this dimension. Other lower-scoring indicators included **C.3** (M = 3.22) and **D.1** (M = 3.37), suggesting these areas may represent early-stage or unevenly implemented digital practices across institutions.

Overall, the results illustrate considerable variation in the emphasis on digital maturity across domains. Indicators associated with structured operational and pedagogical practices tended to score highest, whereas indicators linked to strategic leadership or early-stage digital capabilities scored lower. These findings point to a strong institutional focus on technology-supported teaching and research processes, accompanied by weaker development in leadership-driven or foundational digital competencies.

5.4 Statistical Result

To address the research questions concerned with digital maturity levels and differences across dimensions, parametric inferential tests were employed. The distribution of the Digital Maturity Index (DMI) was first examined. A one-sample Kolmogorov–Smirnov (K–S) test was conducted on the overall mean DMI score derived from the 18 indicators to assess whether the data followed a normal distribution—an essential assumption for applying parametric statistical procedures. The results given in Table 5 indicated no significant deviation from normality, thereby supporting the use of parametric tests.

Following the confirmation of normal distribution, a one-sample t-test was used to address research question which examine the overall level of digital maturity reflected in the KIDR reports. This test evaluated whether the overall mean DMI score was significantly higher than the neutral midpoint of the scale. To explore next research question which investigates whether digital maturity scores differ across institutional dimensions, additional inferential analyses were conducted. Collectively, these analyses provide a more comprehensive understanding of how digital maturity is represented within the university reports and how it varies across the different institutional dimensions.

Table 5. Kolmogorov-Smirnov Test

One-Sample Kolmogorov-Smirnov Test		
		TOTAL
N		205
Normal Parameters[a,b]	Mean	3.8649
	Std. Deviation	.37131
Most Extreme Differences	Absolute	.059
	Positive	.059
	Negative	-.034
Test Statistic		.059
Asymp. Sig. (2-tailed)[c]		.076

Based on the table above, the sample comprised 205 universities, and the descriptive statistics included a mean score of 3.86 (standard deviation = 0.37). The K–S test statistic was 0.059, with a significance level of 0.076. Since the p-value is greater than 0.05, the distribution of the data can be considered normal. This result indicates a relatively homogeneous level of digital maturity across the KIDR reports of the universities examined, and minor deviations (such as the positive difference of 0.059) can be interpreted as natural fluctuations. Overall, the normal distribution of the data provides a solid foundation for addressing the study's research questions.

To address *digital maturity scores of universities based on KIDR reports*—a one-sample t-test was performed on the overall DMI score, calculated from the 18 indicators. This test assessed whether the overall mean DMI score differed significantly from the neutral midpoint value of 3 on the 1–5 scale. Table 10 presents the results of this analysis

Table 6. One-Sample Test

One-Sample Test						
	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
TOTAL	33.350	204	.000	.86488	.8137	.9160

The one-sample t-test results showed that the mean DMI score differed significantly from the neutral midpoint value of 3. The test produced a t-statistic of 33.350 with 204 degrees of freedom, and the significance level was $p < .001$, indicating a highly significant deviation from the test value. The mean difference of 0.8649, with a 95% confidence interval ranging from 0.8137 to 0.9160, was entirely positive. These results demonstrate that the overall mean DMI score (3.865) is significantly above the midpoint, suggesting that digitalization-related practices are clearly and consistently represented in the KIDR reports. Overall, the findings indicate a medium-to-high level of digital maturity across the universities in the samples.

Table 7. Descriptives Based on Categories

Categories	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
LeadGovQual	205	2.00	5.00	3.6571	0.58194	-0.062	-0.309
LearnTeach	205	2.60	5.00	4.2566	0.51897	-0.679	0.249
ResearcDev	205	1.75	5.00	3.8476	0.66807	-0.394	-0.051

Categories	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
ServSoc	205	1.00	5.00	3.6488	1.12505	-0.236	-0.815
Valid N (listwise)	205	—	—	—	—	—	—

Results show that universities have highest maturity scores on learning and teaching dimension, and the lowest form service to society. We may attribute this to previous experiences of HEIs, from past to today majority of their activities are about teaching and learning, and service to society dimension was the latest aspect added to KIDR aspects. This implies that the HEIs have not yet possesses enough experience about digital process of service to society.

5.5 Interpretation of Findings

The results show that digital maturity in Turkish universities is generally moderate to high, with most institutions positioned at Level 4, indicating structured and consistently implemented digital practices. The one-sample t-test confirmed that digitalization is emphasized above the neutral level in KIDR reports. However, no significant differences were found between state and foundation universities, suggesting similar levels of digital engagement across institution types. At the indicator level, maturity is strongest in teaching and program management, while areas such as community engagement remain less digitally developed.

6. CONCLUSION, IMPLICATION, AND LIMITATION

6.1 Conclusion

This study assessed the digital maturity of 205 Turkish universities using the ISER 2024 reports and the YÖKAK Digital Maturity Rubric (3.2.1). The analysis demonstrates that digital maturity across the sector is generally moderate, with most institutions at Level 4, indicating managed and systematically implemented digital practices. However, only a small proportion of universities have reached fully optimized, continuously improving digital systems. State universities show slightly higher maturity levels than foundation universities, reflecting differences in institutional capacity and resources. Across domains, Learning and Teaching achieved the highest maturity scores, supported by widespread digital pedagogy and monitoring tools. Leadership demonstrates moderate integration, with variability across sub-indicators, while Research and Development presented uneven progress. The lowest maturity appeared in the Service to Society domain, indicating limited digitalization of outreach activities. Overall, the findings suggest that Turkish universities have made meaningful advances in digital transformation, but further development—particularly in research infrastructure, community engagement, and integrated digital governance—is required to achieve higher levels of maturity.

6.2 Implications

6.2.1. Practical Implications for Universities

The results indicate that universities should strengthen their digital strategies by extending efforts beyond teaching. Conceptually, the results show that KIDR covers core structural aspects of digital maturity but does not yet reflect newer global dimensions such as cybersecurity, digital well-being, accessibility, and advanced data governance. Recognizing these gaps helps indicate where Türkiye's quality model can further align with international digital transformation standards which shows the highest maturity to areas such as research infrastructure and community engagement, where digitalization remains limited. Investing in integrated information systems, improving data governance, and enhancing digital competencies among staff and students will help institutions move beyond moderate maturity levels. Coordinating

digital initiatives with institutional goals and fostering cross-unit collaboration are essential for achieving more advanced and sustainable digital transformation.

6.2.2 Implications for Policy and Governance

At the national level, the results highlight the importance of ongoing guidance and capacity-building by YÖKAK and related organizations. Policymakers might consider creating targeted digital transformation support programs, especially for lower-capacity institutions like foundation universities. Improving national digital-readiness standards and promoting collaboration between universities can help ensure more consistent sectoral growth.

6.2.3 Implications for Research

The study advances existing literature by showing how self-evaluation reports can be systematically analyzed to assess digital maturity. It also demonstrates that qualitative institutional narratives can be converted into measurable indicators, providing a repeatable model for future national and international digital maturity evaluations. Additionally, the study offers a conceptual contribution by introducing a digital maturity model specifically adapted to the Turkish higher education context and integrating international maturity dimensions with YÖKAK's quality assurance structure through measurable indicators.

6.3. Limitations

There are some limitations to the proposed approach. First, the study relies solely on secondary data from ISER 2024 reports; therefore, the findings reflect how universities choose to present their digitalization efforts rather than direct observations of practice. Second, although the scoring system is based on validated rubric, it must also be evaluated by more field experts.

6.4 Recommendations for Future Research

Future studies may incorporate mixed data sources—including surveys, interviews, and system-level digital-usage data—to more comprehensively triangulate institutional performance. Longitudinal analyses could also track institutional progress in digital maturity over multiple years, while comparative studies across countries may reveal broader regional or global patterns. In addition, future research would benefit from expanding the evaluation framework to include internationally recognized dimensions such as Sustainability & Accessibility and Security, Ethics & Well-being, which are increasingly considered essential components of digital transformation in higher education. Integrating these additional domains would provide a more holistic understanding of institutional digital capacity and align the assessment with emerging global standards.

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