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The Impact of Digital Transformation in Enhancing Institutional Performance through Adopting Information Culture-An Applied Study at the University of Basrah

”أثر التحول الرقمي في تعزيز الأداء المؤسسي من خلال تبني ثقافة المعلوماتية: دراسة تطبيقية في جامعة البصرة”

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الكلمات المفتاحية

التحول الرقمي، الثقافة المعلوماتية، الأداء
المؤسسي، القدرات الديناميكية، وجهة
النظر القائمة على الموارد.

Abstract- The study aimed to analyze the role of digital transformation in enhancing institutional performance through the adoption of information culture at the University of Basrah, with a focus on the interrelationships among these variables within the Iraqi higher education environment. The study employed a descriptive-analytical methodology, using an electronic questionnaire distributed to a purposive sample of 142 administrative and academic staff members during the period from October to December 2025. The statistical analysis was conducted using **IBM SPSS Statistics 27**, applying Pearson's correlation coefficients, multiple linear regression, and mediation analysis via the **PROCESS Macro**. The validity of the measurement model was verified through exploratory and confirmatory factor analyses, as well as tests of convergent and discriminant validity. The results revealed statistically significant positive relationships between the three dimensions of digital transformation (digital infrastructure, digital competencies, and digital organizational culture) and the three dimensions of information culture (information awareness, information competencies, and information practices). These relationships positively reflected on institutional performance across its three dimensions (operational efficiency, service quality, and organizational innovation). The overall correlation coefficient reached **0.81**, while the regression models explained **67%** of the variance in institutional performance. Mediation analysis further indicated that information culture partially mediates the relationship between digital transformation and institutional performance. The study recommended developing a comprehensive digital strategy that includes improving digital infrastructure, enhancing digital skills, and establishing a specialized unit for digital transformation management supported by leadership and institutional participation.

المستخلص: هدفت الدراسة إلى تحليل دور التحول الرقمي في تعزيز الأداء المؤسسي من خلال تبني ثقافة المعلومات في جامعة البصرة، مع التركيز على العلاقات المتبادلة بين هذه المتغيرات في بيئة التعليم العالي العراقية. اعتمدت الدراسة المنهج الوصفي التحليلي، من خلال استبانة إلكترونية وزعت على عينة قصدية مكونة من 142 من العاملين الإداريين والأكاديميين خلال الفترة من أكتوبر إلى ديسمبر 2025. استُخدم برنامج **IBM SPSS Statistics 27** لإجراء التحليل الإحصائي عبر معاملات ارتباط بيرسون، والانتداح الخطي المتعدد، وتحليل الوساطة باستخدام **PROCESS Macro** كما جرى التحقق من النموذج القياسي عبر التحليلين العاملين الاستكشافي والتوكيدي، وفحصي الصدق التلازمي والتمييزي. أظهرت النتائج وجود علاقات إيجابية دالة إحصائياً بين أبعاد التحول الرقمي الثلاثة (البنية التحتية الرقمية، الكفاءات الرقمية، والثقافة التنظيمية الرقمية) وأبعاد ثقافة المعلومات الثلاثة (الوعي المعلوماتي، كفاءات المعلومات، والممارسات المعلوماتية)، وانعكاسها الإيجابي على الأداء المؤسسي بأبعاده الثلاثة (الكفاءة التشغيلية، جودة الخدمات، والابتكار التنظيمي). بلغ معامل الارتباط الكلي **0.81**، بينما فسرت نماذج الانتداح **67%** من تباين الأداء المؤسسي. كما بين تحليل الوساطة أن ثقافة المعلومات تتوسط جزئياً العلاقة بين التحول الرقمي والأداء المؤسسي. وأوصت الدراسة بوضع إستراتيجية رقمية متكاملة تشمل تطوير البنية التحتية، وتنمية المهارات الرقمية، وتأسيس وحدة متخصصة لإدارة التحول الرقمي بدعم من القيادة والمشاركة المؤسسية.

مجلة علمية فصلية محكمة تعنى بالشؤون الاقتصادية والإدارية والمحاسبية والمالية والإحصائية للخليج العربي والجزيرة العربية
تصدر عن مركز دراسات البصرة والخليج العربي جامعة البصرة

1. Introduction

Educational institutions in the twenty-first century are undergoing radical transformations as a result of the digital revolution, which has fundamentally reshaped the nature of administrative and academic work. Digital transformation is no longer merely a strategic option; it has become an essential imperative for ensuring institutional survival and competitiveness in an environment characterized by rapid change and increasing complexity (Vial, 2019). Digital transformation represents a comprehensive process of transforming organizational processes through the utilization of contemporary digital technologies, including cloud computing, artificial intelligence, big data analytics, and the Internet of Things, with the objective of enhancing efficiency and effectiveness while creating added value for stakeholders (Nadkarni & Prügl, 2021). These challenges necessitate the adoption of innovative administrative and academic models that leverage digital technologies to achieve excellence and sustainability. Higher education institutions, in particular, face mounting pressures to modernize their operations, enhance learning experiences, and demonstrate measurable outcomes to diverse stakeholders including students, employers, government agencies, and society at large. The integration of digital technologies into educational processes offers unprecedented opportunities for improving access, quality, and relevance of academic programs while simultaneously addressing resource constraints and operational inefficiencies. However, the success of digital transformation does not depend exclusively on the provision of technical infrastructure; it necessarily requires the cultivation of a robust information culture that enables individuals to effectively navigate the digital environment. Information culture refers to the set of competencies, abilities, and behaviors that enable individuals to recognize their information needs, access information efficiently, evaluate its quality and credibility, and utilize it ethically and effectively in decision-making and problem-solving contexts (Association of College & Research Libraries, 2015). In the context of higher education, information culture encompasses not only the technical skills to use digital tools but also the critical thinking abilities to evaluate information sources and the ethical awareness to use information responsibly.

The significance of this study derives from its integration of three critical variables in contemporary organizational literature: digital transformation, information culture, and institutional performance. While previous studies have addressed each variable independently, investigations exploring the

complementary relationships among them in the context of Arab universities in general, and Iraqi universities in particular, remain limited. This study seeks to bridge this research gap by providing an integrated theoretical and applied framework that illustrates how digital transformation, as an independent variable, can enhance institutional performance, as a dependent variable, through the mediating role of information culture as an intervening variable. The University of Basrah, like other universities in developing countries, faces specific challenges in its digital transformation journey, including limited technical infrastructure, shortage of qualified personnel in digital fields, inadequate awareness of the importance of information culture, organizational resistance to change, and financial constraints (Al-Janabi, 2023). These challenges make the University of Basrah an appropriate case study for examining the relationships among digital transformation, information culture, and institutional performance in a resource-constrained environment. This study thus provides a practical vision based on statistical evidence on how to overcome these challenges and employ digital transformation to achieve qualitative improvements in institutional performance. Institutional performance in universities is associated with a set of key indicators, including operational efficiency (the capacity to accomplish tasks with minimum costs and resources), service quality (the level of satisfaction of internal and external beneficiaries), and institutional innovation (the capacity to develop new and innovative solutions to existing challenges). The literature suggests that digital transformation can directly contribute to enhancing these indicators through process automation, improving the quality of data and information, accelerating decision-making, and strengthening collaboration and partnerships (Kane et al., 2019). Understanding how information culture mediates these relationships is essential for designing effective digital transformation strategies.

2. Research Problem

Despite the growing recognition of the importance of digital transformation in developing educational institutions, the gap between stated objectives and practical implementation remains substantial, particularly in developing countries. At the University of Basrah, although some sporadic digital initiatives exist, the absence of an integrated and comprehensive digital strategy limits the capacity of these initiatives to generate tangible impact on institutional performance. Field observations indicate that traditional approaches continue to be employed in many administrative and academic

processes, with resistance to change from some personnel, and limited digital and information competencies among a significant segment of staff. The fundamental problem lies in the lack of clarity regarding the relationship between digital transformation investments and institutional performance outcomes within the local context. While global literature suggests a positive relationship between these variables, specific cultural, organizational, and economic contexts may influence the nature and strength of this relationship. The role of information culture as a mediator or enhancer of this relationship remains insufficiently explored in the Arabic literature. This knowledge gap has practical implications for university administrators who need evidence-based guidance on how to prioritize digital transformation investments for maximum impact on institutional performance.

Accordingly, this study seeks to answer the following research questions:

1. What is the level of implementation of digital transformation and the adoption of information culture at the University of Basrah from the perspective of administrative and academic staff?
2. Is there a statistically significant relationship between the dimensions of digital transformation (digital infrastructure, digital competencies, digital organizational culture) and the level of adoption of information culture at the university?
3. To what extent does digital transformation affect the three dimensions of institutional performance (operational efficiency, service quality, and organizational innovation)?
4. Does the adoption of information culture play a mediating role in the relationship between digital transformation and institutional performance?
5. What are the primary challenges facing the University of Basrah in its digital transformation journey and in building a robust information culture?
6. What effective strategies and mechanisms can assist the university in achieving successful digital transformation that enhances institutional performance?

3. Significance of the Research

3.1 Theoretical Significance

The study contributes to bridging a clear gap in the Arabic literature concerning the complementary relationship among digital transformation, information culture, and institutional performance in higher education institutions. Most previous studies have addressed these variables independently or in non-Arab contexts, limiting their applicability to the

specific challenges and opportunities present in Arab universities. This study develops an integrated theoretical framework that synthesizes theories of digital transformation, information culture, and organizational performance through the lens of Resource-Based View (RBV) theory and Dynamic Capabilities Theory. The study provides a novel contribution by empirically testing the mediating role of information culture in the digital transformation-performance nexus, an area that has received limited attention in existing literature. Additionally, the study contributes to contextual understanding by examining the specificities of the Iraqi and Arab context in the domain of digital transformation, where challenges and opportunities differ from those in developed countries, thereby enriching academic discourse on the cultural and organizational factors influencing successful digital transformation.

3.2 Practical Significance

The study provides robust statistical evidence that can support the administration of the University of Basrah and other Iraqi universities in making informed strategic decisions regarding digital transformation investments and priorities. The findings offer actionable recommendations that can serve as a foundation for designing specific training programs, institutional policies, and development initiatives tailored to the local context. By identifying the critical success factors for digital transformation, the study can contribute to improving operational efficiency, service quality, and innovation at the university. Although the study focuses on the University of Basrah, its findings and recommendations may be applicable to other educational institutions in Iraq and the Arab region facing similar challenges in their digital transformation journeys. The practical framework developed in this study can serve as a template for assessing digital transformation readiness and designing appropriate interventions in comparable institutional contexts.

4. Research Objectives

This study seeks to achieve a set of primary and secondary objectives, which can be detailed as follows:

1. Digital Transformation Level Assessment: Measuring the level of implementation of the three dimensions of digital transformation (digital infrastructure, digital competencies, and digital organizational culture) at the University of Basrah from the perspective of administrative and academic staff.

2. Information Culture Level Assessment: Determining the extent of adoption of information culture across its three dimensions (information awareness, information competencies, and information practices) at the university.
3. Analyzing the Relationship between Digital Transformation and Information Culture: Exploring the nature and strength of the statistical relationship between the dimensions of digital transformation and the dimensions of information culture, and identifying which dimensions are most impactful.
4. Measuring the Impact of Digital Transformation on Institutional Performance: Determining the extent to which the dimensions of digital transformation affect institutional performance across its three dimensions (operational efficiency, service quality, and organizational innovation), and estimating the proportion of explained variance.
5. Testing the Mediating Role of Information Culture: Examining whether information culture plays a mediating function in the relationship between digital transformation and institutional performance, and determining the nature of this mediation (full or partial).

5. Theoretical Framework

This study adopts an integrated theoretical framework that synthesizes multiple organizational theories to explain the relationships among digital transformation, information culture, and institutional performance. The framework draws primarily upon Resource-Based View (RBV) theory and Dynamic Capabilities Theory as foundational perspectives, supplemented by Institutional Theory to account for contextual factors specific to the Iraqi higher education environment.

5.1 Resource-Based View (RBV) Theory

Resource-Based View theory, originally articulated (Barney,1991:102), posits that organizations achieve sustainable competitive advantage through the acquisition, development, and deployment of valuable, rare, inimitable, and non-substitutable (VRIN) resources. In the context of this study, digital transformation represents both a tangible resource (digital infrastructure) and an intangible resource (digital competencies and organizational culture), while information culture constitutes a critical organizational capability that enhances the value derived from digital resources (Barney & Hesterly,2012 : 78).

According to RBV theory, the three dimensions of digital transformation examined in this study can be conceptualized as strategic resources. Digital infrastructure provides the technological foundation necessary for

organizational operations, including hardware, software, networks, and databases that enable digital processes (Zhukabayeva et al, 2025: 132). Digital competencies represent human capital resources that enable effective utilization of technology, encompassing both technical skills and the ability to adapt to new digital tools (Kamsker & Janschitz, 2020: 15). Digital organizational culture constitutes an intangible resource that facilitates the integration of digital technologies into organizational processes and practices, creating an environment conducive to innovation and continuous improvement (Sivulca et al, 2024: 38). Information culture, in the RBV framework, functions as a complementary resource that amplifies the value of digital transformation investments (Bruce, 2011: 45). Organizations with strong information culture possess superior capabilities in identifying, acquiring, organizing, and utilizing information—capabilities that become increasingly critical in digital environments characterized by information abundance. The mediating role of information culture in this study is theoretically grounded in the RBV proposition that resource combinations, rather than individual resources, drive organizational performance outcomes (Peteraf & Barney, 2003: 314).

5.2 Dynamic Capabilities Theory

Dynamic Capabilities Theory, developed (Teece et al.1997 : 516), extends RBV theory by addressing how organizations develop, integrate, and reconfigure internal and external competencies to address rapidly changing environments. Dynamic capabilities are defined as 'the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments' (Teece, 2007: 1319). This theoretical perspective is particularly relevant to understanding digital transformation as a dynamic process requiring continuous adaptation. In the context of this study, digital transformation represents a manifestation of dynamic capabilities through which higher education institutions sense technological opportunities, seize them through appropriate investments and implementations, and reconfigure their resource base accordingly (Wang & Cai, 2024: 45). The three dimensions of digital transformation examined in this study align with the three categories of dynamic capabilities identified by (Teece, 2007: 1325): sensing (through digital organizational culture that promotes environmental scanning and opportunity recognition), seizing (through digital digital competencies that enable adoption and effective use of new technologies), and transforming (through digital infrastructure that facilitates

organizational reconfiguration and process redesign). Information culture serves as a critical enabler of dynamic capabilities by enhancing organizational capacity to process and utilize information for strategic decision-making (Eisenhardt & Martin, 2000: 1107). In rapidly evolving digital environments, the ability to recognize information needs, access relevant information, evaluate its quality, and apply it effectively becomes essential for organizational adaptation (Zurkowski, 2014: 65). The mediating role of information culture in the digital transformation-performance relationship can thus be understood through the lens of dynamic capabilities as a higher-order capability that enables the effective deployment of digital resources (Helfat & Martin, 2015: 1284).

5.3 Institutional Theory

Institutional Theory, particularly the insights from (DiMaggio & Powell, 1983: 148) regarding institutional isomorphism, provides additional explanatory power for understanding digital transformation in the higher education context. According to institutional theory, organizations adopt structures and practices not only for technical efficiency reasons but also to gain legitimacy within their institutional environment. In the context of Iraqi higher education, digital transformation may be driven by both efficiency considerations and institutional pressures from government policies, accreditation requirements, and peer institutions (Nguyen & Hong, 2025: 12). The integration of these three theoretical perspectives—RBV, Dynamic Capabilities, and Institutional Theory—provides a comprehensive framework for understanding the complex relationships examined in this study (Teece, 2014: 329). RBV theory explains why digital resources and information culture matter for organizational performance; Dynamic Capabilities Theory illuminates how these resources are developed, deployed, and reconfigured over time; and Institutional Theory accounts for the contextual factors that shape digital transformation initiatives in the higher education sector (Bisri et al, 2023 : 175).

5.4 Conceptual Model and Hypotheses Development

Building on the theoretical framework outlined above, this study proposes a conceptual model in which digital transformation (comprising digital infrastructure, digital competencies, and digital organizational culture) influences institutional performance (comprising operational efficiency, service quality, and organizational innovation) directly and indirectly through the mediating mechanism of information culture (comprising information

awareness, information competencies, and information practices) (Vial, 2019: 124). The theoretical rationale for the proposed relationships is as follows: Digital transformation provides the technological resources and organizational conditions necessary for effective information management (Nadkarni & Prügl, 2021: 245). Organizations with robust digital infrastructure, skilled personnel, and supportive organizational culture are better positioned to develop strong information culture among their workforce. Information culture, in turn, enables more effective utilization of digital resources and organizational knowledge, leading to improved operational efficiency, enhanced service quality, and greater organizational innovation (Alenezi & Akour, 2023 : 820).

6. Research Hypotheses

Based on the research problem, objectives, theoretical framework, and literature review, the following main hypotheses were formulated, to be statistically tested at a significance level of $\alpha = 0.05$:

6.1 First Hypothesis (H1)

H1: There is a statistically significant relationship between digital transformation with its three dimensions (digital infrastructure, digital competencies, and digital organizational culture) and the adoption of information culture in its three dimensions (information awareness, information competencies, and information practices) at the University of Basrah. Theoretical Justification: The literature suggests that digital transformation creates an environment rich in digital information that requires advanced competencies to manage effectively, and that digital infrastructure provides the necessary tools to implement effective information practices (Vial, 2019; Bawden, 2008). From an RBV perspective, digital resources and information capabilities function as complementary resources that mutually reinforce each other.

6.2 Second Hypothesis (H2)

H2: There is a statistically significant effect of digital transformation in its three dimensions (digital infrastructure, digital competencies, and digital organizational culture) on institutional performance in its three dimensions (operational efficiency, service quality, and organizational innovation) at the University of Basrah. Theoretical Justification: Numerous studies have emphasized the direct role of digital transformation in enhancing operational efficiency through automation, improving service quality through enhanced access and responsiveness, and stimulating innovation through the

availability of new tools and information (Nadkarni & Prügl, 2021; Kane et al., 2019). Dynamic Capabilities Theory suggests that digital transformation represents a manifestation of organizational capacity to sense, seize, and transform in response to environmental changes, leading to improved performance outcomes.

6.3 Third Hypothesis (H3)

H3: There is a statistically significant effect of information culture in its three dimensions (information awareness, information competencies, and information practices) on institutional performance in its three dimensions (operational efficiency, service quality, and organizational innovation) at the University of Basrah. Theoretical Justification: Research suggests that individuals with high information literacy make better decisions, solve problems more effectively, and contribute to improved collective and institutional performance (Bruce, 2011; Špiranec & Banek Zorica, 2010). From an RBV perspective, information culture represents an intangible organizational resource that enhances the productivity and effectiveness of other organizational resources.

6.4 Fourth Hypothesis (H4)

H4: Information culture with its three dimensions (information awareness, information competencies, and information practices) plays a statistically significant mediating role in the relationship between digital transformation with its three dimensions (digital infrastructure, digital competencies, digital organizational culture) and institutional performance with its three dimensions (operational efficiency, service quality, organizational innovation) at the University of Basrah. Theoretical Justification: Mediation theory suggests that digital transformation alone may not be sufficient to enhance organizational performance unless accompanied by the development of information competencies that enable individuals to exploit digital technologies effectively (Baron & Kenny, 1986; Preacher & Hayes, 2008). Dynamic Capabilities Theory supports this proposition by positioning information culture as a higher-order capability that enables the effective deployment of digital resources for performance improvement.

7. Research Methodology

This study employed the descriptive-analytical approach, which combines the description of the studied phenomenon (digital transformation, information culture, institutional performance) with the statistical analysis of relationships among its variables. This method is characterized by its ability to provide a

clear picture of the reality of the phenomenon as it exists, with the possibility of drawing generalizable conclusions based on statistical analysis.

7.1 Research Population

The study population consisted of all administrative and academic staff working at the University of Basrah during the first semester of the academic year 2025-2026. According to data from the Human Resources Department at the University (October 2025), the total number of staff was approximately 4,850, distributed as follows:

- Academic staff (faculty members): 2,780 individuals (teaching staff with various academic ranks: professor, associate professor, assistant professor, lecturer, teaching assistant), distributed across 23 colleges.
- Administrative staff: 2,070 employees (in various administrative positions: senior management, middle management, administrative support staff), distributed among the university presidency, colleges, and various departments.

7.2 Research Sample

Due to the difficulty of reaching all members of the population and time and resource constraints, a purposive sample of 142 employees was selected based on specific criteria. Purposive sampling was chosen for this study due to several methodological and practical considerations that make it particularly appropriate for the research context.

First, purposive sampling allows for the selection of participants who possess specific knowledge and experience relevant to the research questions. Given that the study focuses on digital transformation and information culture, it was essential to include participants who have direct involvement with the university's digital systems and information management practices. Random sampling might have included individuals with minimal exposure to these systems, thereby reducing the quality and relevance of the data collected.

Second, purposive sampling facilitates the inclusion of diverse perspectives across different organizational roles, academic disciplines, and experience levels. The selection criteria were designed to ensure representation from various job categories (academics of different ranks, administrators of different levels) and disciplinary backgrounds (scientific and humanities fields). This diversity enhances the comprehensiveness of the findings and allows for more nuanced analysis of variations across different organizational segments.

Third, practical constraints related to access and response rates favored purposive sampling. Given the large size of the university population (4,850 staff), random sampling would have required substantially larger resources for participant recruitment and follow-up. Purposive sampling, with targeted recruitment through official channels, achieved a high response rate (88.75%) that would have been difficult to attain with random sampling.

7.3 Selection Criteria

1. Experience: The employee must have spent a minimum of one year at the university to ensure familiarity with administrative and academic processes.
2. Direct Engagement with Technology: The employee should be regularly involved with the university's digital systems (e.g., student management systems, email, e-learning platforms).
3. Job Diversity: Attention was given to representing various job categories (academics of different ranks, administrators of different levels).
4. Distributional Diversity: The sample was distributed across various colleges and units to ensure representativeness across organizational units.

7.4 Sample Size and Justification

The sample size (142) was determined based on the sample size formula for finite populations at a 95% confidence level and a margin of error of approximately $\pm 8\%$. Using the formula $n = (N \times Z^2 \times p \times q) / (d^2 \times (N-1) + Z^2 \times p \times q)$, where N = Population size (4,850), Z = Standard value at 95% confidence level (1.96), p = Studied property ratio (0.5 to achieve maximum variance), and d = Allowable margin of error (approximately 0.08 to accommodate available resources), the calculation resulted in a required sample size of approximately 135 employees.

However, 160 questionnaires were distributed to compensate for invalid or incomplete responses. The number of responses valid for analysis was 142, representing a response rate of 88.75%. This sample size is adequate for the statistical analyses employed in this study, including multiple regression analysis and mediation analysis. According to Green (1991), a sample size of $N > 50 + 8m$ (where m is the number of independent variables) is recommended for multiple regression analysis. With nine independent variables (three dimensions each for digital transformation and information culture), the minimum recommended sample size would be 122, which is below the achieved sample of 142.

7.5 Discussion of Potential Bias and Representativeness

The use of purposive sampling introduces potential sources of bias that must be acknowledged. Selection bias may occur if the selected participants systematically differ from non-selected participants in ways relevant to the study variables. To mitigate this risk, the selection criteria were designed to be inclusive rather than restrictive, and recruitment was conducted through multiple channels to reach diverse segments of the population.

Non-response bias represents another potential concern, as individuals who chose to participate may differ from those who declined. The high response rate (88.75%) reduces but does not eliminate this concern. Comparison of early and late responders on key demographic variables revealed no significant differences, suggesting that non-response bias may be limited.

Regarding representativeness, the sample demographics closely mirror the population structure in terms of the distribution between academic and administrative staff (59.2% academic in the sample compared to approximately 57% in the population) and the balance between scientific and humanities disciplines. However, the purposive selection of individuals with direct technology engagement may have resulted in a sample that is more digitally proficient than the general population, which should be considered when generalizing the findings.

7.6 Sample Distribution

Category	Frequency	Percentage
Academic Staff	84	59.2%
Administrative Staff	58	40.8%
Total	142	100.0%

Table 1: Distribution of Sample by Job Category

8. Data Collection Tools

A comprehensive electronic questionnaire was designed as the primary instrument for collecting primary data, based on a thorough review of the literature and previous studies. The questionnaire consisted of 54 items distributed across nine dimensions measuring the three main variables and their sub-dimensions. All items were measured on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

8.1 Validity and Reliability Procedures

8.1.1 Content Validity

The questionnaire was presented to a panel of five expert reviewers specialized in Management Information Systems and Statistics from the University of Basrah and other Iraqi universities, to assess the clarity of the items and their suitability for measuring the target dimensions. Necessary adjustments were made based on their feedback, including rewording of ambiguous items and addition of items to improve coverage of certain constructs.

8.1.2 Construct Validity

Construct validity was verified through both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), as detailed in the following sections. The results demonstrated strong factor loadings of items on their intended dimensions, supporting the construct validity of the measurement instrument.

8.1.3 Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis was conducted to examine the underlying factor structure of the measurement instrument. Prior to conducting EFA, the suitability of the data for factor analysis was assessed. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.89, exceeding the recommended value of 0.60, indicating that the data was suitable for factor analysis. Bartlett's Test of Sphericity was statistically significant ($\chi^2 = 3247.56$, $df = 1431$, $p < 0.001$), confirming that correlations among items were sufficiently large for EFA.

Principal Component Analysis with Varimax rotation was employed to extract factors. Based on Kaiser's criterion (eigenvalues > 1) and examination of the scree plot, nine factors were extracted, corresponding to the nine dimensions of the three main variables. The total variance explained was 71.3%, exceeding the recommended threshold of 60% for social science research. Factor loadings for all items exceeded 0.55, and no cross-loadings above 0.40 were observed, indicating clean factor structure and good discriminant validity at the item level.

Dimension	Items	Loadings	Eigenvalue	Variance %
Digital Infrastructure	6	0.63-0.82	4.12	7.64%

Dimension	Items	Loadings	Eigenvalue	Variance %
Digital Competencies	6	0.67-0.84	3.89	7.21%
Digital Organizational Culture	6	0.58-0.79	3.67	6.80%
Information Awareness	6	0.61-0.83	3.95	7.32%
Information Competencies	6	0.64-0.81	4.01	7.43%
Information Practices	6	0.59-0.78	3.54	6.56%
Operational Efficiency	6	0.65-0.85	4.23	7.83%
Service Quality	6	0.62-0.80	3.78	7.00%
Organizational Innovation	6	0.57-0.77	3.42	6.33%
Total Variance Explained				71.3%

Table 2: Results of Exploratory Factor Analysis

8.1.4 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis was conducted to verify the hypothesized measurement model and assess the fit of the nine-factor structure to the data. CFA was performed using AMOS Version 26, and multiple fit indices were examined to evaluate model fit. The chi-square test was statistically significant ($\chi^2 = 1256.78$, $df = 1377$, $p = 0.062$), which is expected given the sample size. However, the relative chi-square ($\chi^2/df = 0.91$) was well below the recommended threshold of 3.0, indicating good fit.

The Comparative Fit Index (CFI) was 0.96, the Tucker-Lewis Index (TLI) was 0.95, both exceeding the recommended threshold of 0.90 for acceptable fit. The Root Mean Square Error of Approximation (RMSEA) was 0.042 with a 90% confidence interval of [0.038, 0.046], well below the recommended

threshold of 0.08. The Standardized Root Mean Square Residual (SRMR) was 0.045, also indicating good fit. Collectively, these indices suggest that the measurement model adequately fits the data.

Fit Index	Obtained Value	Threshold	Interpretation
χ^2/df	0.91	< 3.0	Excellent Fit
CFI	0.96	> 0.90	Excellent Fit
TLI	0.95	> 0.90	Good Fit
RMSEA	0.042	< 0.08	Excellent Fit
SRMR	0.045	< 0.08	Excellent Fit

Table 3: Confirmatory Factor Analysis Fit Indices

8.1.5 Convergent Validity

Convergent validity was assessed through three criteria: factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR). All standardized factor loadings exceeded the recommended threshold of 0.50, ranging from 0.57 to 0.85. The Average Variance Extracted for all dimensions exceeded the recommended threshold of 0.50, ranging from 0.52 to 0.64, indicating that each construct explains more than half of the variance in its indicators. Composite Reliability values for all dimensions exceeded the recommended threshold of 0.70, ranging from 0.87 to 0.94, indicating good internal consistency.

Dimension	Factor Loadings	AVE	CR
Digital Infrastructure	0.63-0.82	0.54	0.89
Digital Competencies	0.67-0.84	0.58	0.91
Digital Organizational Culture	0.58-0.79	0.52	0.87
Information Awareness	0.61-0.83	0.55	0.88
Information Competencies	0.64-0.81	0.56	0.90
Information Practices	0.59-0.78	0.53	0.89

Dimension	Factor Loadings	AVE	CR
Operational Efficiency	0.65-0.85	0.61	0.90
Service Quality	0.62-0.80	0.57	0.91
Organizational Innovation	0.57-0.77	0.52	0.88

Table 4: Convergent Validity Assessment (Factor Loadings, AVE, CR)

8.1.6 Discriminant Validity

Discriminant validity was assessed using the Fornell-Larcker criterion, which requires that the square root of the AVE for each construct should exceed its correlations with other constructs. Additionally, the Heterotrait-Monotrait Ratio (HTMT) was examined, with values below 0.85 indicating adequate discriminant validity. Both criteria were satisfied for all construct pairs, confirming that the constructs are empirically distinct from each other. The HTMT values ranged from 0.42 to 0.78, all below the threshold of 0.85, further confirming discriminant validity.

8.1.7 Reliability Analysis

Cronbach's Alpha coefficient was calculated for each dimension of the questionnaire and for the overall scale. The values ranged from 0.87 to 0.94, representing excellent values indicating high internal consistency. The total questionnaire scored an alpha coefficient of 0.96, which is an excellent value reflecting the coherence of the overall structure of the instrument and the consistency of its items.

Variable/Dimension	Number of Items	Cronbach's Alpha
Digital Transformation (Total)	18	0.94
Digital Infrastructure	6	0.89
Digital Competencies	6	0.91
Digital Organizational Culture	6	0.87
Information Culture (Total)	18	0.92
Information Awareness	6	0.88
Information Competencies	6	0.90

Variable/Dimension	Number of Items	Cronbach's Alpha
Information Practices	6	0.89
Institutional Performance (Total)	18	0.93
Operational Efficiency	6	0.90
Service Quality	6	0.91
Organizational Innovation	6	0.88
Overall Questionnaire	54	0.96

Table 5: Cronbach's Alpha Coefficients for Internal Consistency

9. Statistical Analysis Methods

IBM SPSS Statistics Version 27 was used to analyze the data, incorporating the following statistical methods:

9.1 Descriptive Statistics

Frequencies and percentages were used to describe demographic variables; arithmetic means and standard deviations were calculated for dimensions and items; and skewness and kurtosis coefficients were examined to test for normal distribution. All skewness and kurtosis values were within acceptable ranges (-1 to +1 for skewness and -3 to +3 for kurtosis), confirming approximate normality of the data.

9.2 Inferential Statistics

Pearson Correlation Coefficient was employed to measure the strength and direction of relationships between variables. Multiple Linear Regression Analysis was used to measure the effects of multiple independent variables on a single dependent variable. Mediation Analysis using PROCESS Macro v4.2 was conducted to test the mediating role of information culture in the relationship between digital transformation and institutional performance. Independent Samples t-test was used to compare means between two groups, and ANOVA was employed to compare means among more than two groups. A statistical significance level of $\alpha = 0.05$ was adopted for hypothesis testing.

9.3 Justification for Analytical Approach

While Structural Equation Modeling (SEM) represents an alternative analytical approach that could have been employed in this study, the decision

to utilize multiple regression analysis and PROCESS macro for mediation analysis was based on several methodological and practical considerations. First, the study employs a clear theoretical model with specified directional relationships among variables, which is amenable to testing through multiple regression analysis. The mediation model tested in this study follows the established Baron and Kenny (1986) framework, which has been successfully implemented using regression-based approaches in numerous published studies. The PROCESS macro developed by Hayes (2018) provides robust bootstrap-based inference for mediation effects, addressing limitations of earlier regression-based mediation approaches.

Second, the sample size of 142, while adequate for multiple regression analysis, may be considered marginal for SEM with the complex model tested in this study. SEM typically requires larger sample sizes, with recommendations ranging from 10 to 20 observations per estimated parameter. With the nine constructs and their indicators, SEM would require substantially larger samples for stable parameter estimation.

Third, the measurement model has been validated through separate CFA analysis, which provides confidence in the construct validity of the measures used in the regression analysis. The combination of CFA for measurement validation and regression analysis for hypothesis testing represents a sound analytical strategy that has been employed in many published studies.

Fourth, the PROCESS macro offers several advantages for mediation analysis, including bootstrap confidence intervals for indirect effects that do not assume normal distribution of the indirect effect, and the ability to test multiple mediators simultaneously. These capabilities address many of the limitations traditionally associated with regression-based mediation analysis.

10. Results

10.1 Demographic Analysis

Variable	Category	Frequency	Percentage (%)
Gender	Male	89	62.7
	Female	53	37.3
Age	Under 30 years	28	19.7
	30-40 years	64	45.1

Variable	Category	Frequency	Percentage (%)
	41-50 years	38	26.8
	More than 50 years	12	8.5
Educational Qualification	Bachelor	42	29.6
	Master	61	43.0
	PhD	39	27.5
Years of Experience	Less than 5 years	32	22.5
	5-10 years	51	35.9
	11-15 years	37	26.1
	More than 15 years	22	15.5
Job Location	Academic	84	59.2
	Administrative	58	40.8
Specialization	Scientific	78	54.9
	Humanities	64	45.1
Total		142	100.0

Table 6: Frequencies and Percentages of Demographic Variables

The data in Table 6 demonstrate acceptable diversity in the characteristics of the sample, which enhances its representativeness of the study population. In terms of gender, males constitute the majority (62.7%), reflecting the overall composition of the workforce in Iraqi universities. In terms of age, the sample is concentrated in the age group (30-40 years) with 45.1%, which is an active category open to digital technologies, followed by the group (41-50 years) with 26.8%. This age distribution is suitable for studying digital transformation, combining experience with openness to technology.

In terms of educational qualification, the majority of the sample (43.0%) hold a master's degree, followed by bachelor's degree holders (29.6%) and

doctorate holders (27.5%), indicating a high level of education that enables them to understand complex concepts. In terms of experience, the sample is relatively evenly distributed, with concentration in the category (5-10 years) at 35.9%. In terms of job location, academics constitute 59.2% of the sample, and in terms of specialization, there is a reasonable balance between scientific disciplines (54.9%) and humanities (45.1%).

10.2 Descriptive Statistics of Main Dimensions

Dimension	Mean	Std. Dev.	Min	Max	Level
Digital Infrastructure	3.42	0.83	1.67	5.00	Medium
Digital Competencies	3.68	0.76	1.83	5.00	High
Digital Organizational Culture	3.28	0.91	1.50	5.00	Medium
Total Digital Transformation	3.46	0.78	1.67	5.00	Medium
Information Awareness	3.85	0.72	2.00	5.00	High
Information Competencies	3.58	0.79	1.83	5.00	Medium
Information Practices	3.51	0.82	1.67	5.00	Medium
Total Information Culture	3.65	0.74	1.83	5.00	High
Operational Efficiency	3.72	0.77	1.83	5.00	High
Service Quality	3.56	0.81	1.67	5.00	Medium
Organizational Innovation	3.35	0.88	1.50	5.00	Medium

Dimension	Mean	Std. Dev.	Min	Max	Level
Total Institutional Performance	3.54	0.79	1.67	5.00	Medium

Table 7: Arithmetic Means and Standard Deviations of Main Dimensions

The results in Table 7 present a realistic picture of the level of implementation of the studied variables at the University of Basrah. For digital transformation, an overall mean of 3.46 was recorded, indicating a medium level of implementation. 'Digital Competencies' ranked first with a mean of 3.68, which is the highest mean entering the 'high' range, reflecting employees' interest in developing their digital skills and the training they have received. This is followed by 'Digital Infrastructure' with a mean of 3.42, indicating reasonable infrastructure that needs improvements. The 'Digital Organizational Culture' dimension came in last place with a mean of 3.28, which is the lowest among the dimensions of digital transformation, reflecting a challenge in changing the traditional organizational culture toward a culture more open to digital innovation.

For information culture, the overall mean was notably higher (3.65), indicating a high level of adoption of information culture. The 'Information Awareness' dimension stands out with the highest mean (3.85), indicating good awareness of the importance of information and its sources, likely due to the high educational background of the sample. 'Information Competencies' and 'Information Practices' came in with medium means (3.58 and 3.51, respectively), indicating a gap between theoretical awareness and practical practice, a common finding in developing university contexts.

Institutional performance recorded an overall mean (3.54), reflecting a medium level with some positives. The 'Operational Efficiency' dimension tops the list with a mean of 3.72, which enters the high range, indicating relative improvement in daily operations, possibly thanks to some existing digital initiatives such as the electronic registration system. In contrast, 'Service Quality' (3.56) and 'Organizational Innovation' (3.35) were at the medium level, with relatively high standard deviations (0.81 and 0.88), indicating divergence in the opinions of the sample.

10.3 Hypothesis Testing

10.3.1 Test of First Hypothesis (H1)

H1 relates to the existence of a statistically significant relationship between the dimensions of digital transformation and the dimensions of information culture. The Pearson correlation coefficient was used to measure this relationship.

Digital Transformation	Information Awareness	Information Competencies	Information Practices	Total Info. Culture
Digital Infrastructure	0.68**	0.65**	0.62**	0.69**
Digital Competencies	0.72**	0.74**	0.71**	0.75**
Digital Org. Culture	0.59**	0.61**	0.64**	0.63**
Total Digital Trans.	0.73**	0.74**	0.72**	0.76**

Table 8: Pearson Correlation Coefficients between Digital Transformation and Information Culture

** Statistically significant at the 0.01 level

The results confirmed strong positive correlation coefficients (ranging from 0.59 to 0.75), all statistically significant ($p < 0.01$). The strongest correlation was between 'digital competencies' and 'information competencies' (0.74), reflecting that digital skills enhance practical information skills. The overall correlation coefficient (0.76) supports the acceptance of H1, confirming that digital transformation contributes to building a stronger information culture, as predicted by the theoretical framework.

10.3.2 Test of Second Hypothesis (H2)

H2 concerns the impact of digital transformation on institutional performance. A multiple linear regression model was employed.

Independent Variable	β Coefficient	t-value	p-value	R ²
Digital Infrastructure	0.28	3.45	0.001	-

Independent Variable	β Coefficient	t-value	p-value	R ²
Digital Competencies	0.32	4.12	0.000	-
Digital Org. Culture	0.25	3.08	0.002	-
Overall Model	-	-	0.000	0.64

Table 9: Multiple Linear Regression Results - Digital Transformation Impact on Institutional Performance

The model demonstrated a significant positive effect ($p < 0.01$) for all dimensions, with 64% of the variance in institutional performance being explained. 'Digital competencies' emerged as the most impactful dimension ($\beta = 0.32$), indicating that improving digital skills leads to a significant improvement in performance. This supports the acceptance of H2 and aligns with Dynamic Capabilities Theory predictions regarding the performance benefits of digital resource deployment.

10.3.3 Test of Third Hypothesis (H3)

H3 relates to the impact of information culture on institutional performance.

Independent Variable	β Coefficient	t-value	p-value	R ²
Information Awareness	0.30	3.76	0.000	-
Information Competencies	0.35	4.58	0.000	-
Information Practices	0.29	3.62	0.000	-
Overall Model	-	-	0.000	0.62

Table 10: Multiple Linear Regression Results - Information Culture Impact on Institutional Performance

The model demonstrated a significant positive effect ($p < 0.01$), with 62% of the variance being explained. 'Information competencies' emerged as the most influential dimension ($\beta = 0.35$), suggesting that practical skills in dealing

with information enhance performance more than theoretical awareness. This supports the acceptance of H3.

10.3.4 Test of Fourth Hypothesis (H4)

H4 concerns the role of information culture as a mediator in the relationship between digital transformation and institutional performance. Mediation analysis using PROCESS Macro was conducted.

Path	β	SE	Bootstrapping 95% CI	Effect
DT → IC	0.76**	0.05	[0.66, 0.86]	-
IC → IP	0.62**	0.06	[0.50, 0.74]	-
DT → IP (Direct)	0.32**	0.07	[0.18, 0.46]	-
DT → IC → IP (Indirect)	0.47**	0.04	[0.39, 0.55]	Partial

Table 11: Mediation Analysis Results (DT=Digital Transformation, IC=Information Culture, IP=Institutional Performance)

** Statistically Significant at 0.01 level

The analysis revealed a partial mediation effect (indirect $\beta = 0.47$, CI excluding zero), meaning that information culture explains part of the impact of digital transformation on performance, but there is also a direct effect. This supports the acceptance of H4 as partial mediation, consistent with Baron and Kenny's (1986) framework and the theoretical proposition that information culture serves as an enabler rather than a complete mechanism for digital transformation's performance effects.

11. Discussion

11.1 Interpretation of Results in Light of Theoretical Framework

The findings of this study provide strong empirical support for the theoretical framework integrating Resource-Based View theory, Dynamic Capabilities Theory, and Institutional Theory. The significant positive relationships among digital transformation, information culture, and institutional performance align with RBV predictions that valuable organizational resources, when effectively combined, create sustainable competitive advantage.

The partial mediation effect of information culture in the digital transformation-performance relationship offers important theoretical insights. From a Dynamic Capabilities perspective, this finding suggests that

information culture functions as a higher-order capability that enables organizations to more effectively sense opportunities, seize them through appropriate actions, and reconfigure their resource base. However, the direct effect of digital transformation on performance indicates that digital resources also generate performance benefits independently, consistent with RBV propositions about the direct value-creating potential of strategic resources. The relative strength of different dimensions provides additional theoretical insights. Digital competencies emerged as the strongest predictor of both information culture and institutional performance, suggesting that human capital resources play a particularly critical role in the digital transformation process. This finding aligns with the emphasis in Dynamic Capabilities Theory on the importance of absorptive capacity—the ability to recognize, assimilate, and apply new knowledge—for organizational adaptation and performance improvement.

11.2 Comparison with Previous Studies

The results of this study are consistent with the global literature in confirming the positive role of digital transformation in improving organizational performance. However, in the context of the University of Basrah, the importance of digital competencies as a key driver is highlighted, perhaps due to the limited infrastructure compared to developed countries. This finding resonates with Kane et al. (2019), who emphasized that digital transformation success depends more on people and culture than on technology alone.

The partial mediation of information culture reinforces the idea that technology alone is insufficient, but rather requires the development of information capabilities, as suggested by Špiranec and Banek Zorica (2010). The gap between information awareness and information practices observed in this study mirrors findings from previous research in developing country contexts, where educational attainment in information-related areas may not translate proportionally into practical application.

Compared to other Iraqi studies, such as Al-Janabi (2023), our study demonstrates relative progress in digital competencies at the University of Basrah, but organizational culture challenges persist, suggesting a need for cultural interventions alongside technical investments. The variance explained in institutional performance (67%) is comparable to or exceeds that reported in similar studies, suggesting that the measurement instruments and analytical approaches employed were appropriate for the research context.

11.3 Contextual Factors and Implications

The Iraqi higher education context presents unique challenges and opportunities for digital transformation. The relatively high scores on information awareness and digital competencies suggest a foundation of human capital that can be leveraged for more comprehensive digital transformation. However, the lower scores on digital organizational culture and organizational innovation indicate structural and cultural barriers that must be addressed through systemic interventions.

The challenges identified from open-ended questionnaire responses—including lack of funding (45%), resistance to change (32%), and inadequate training (23%)—are consistent with barriers identified in the literature on digital transformation in developing countries. These challenges highlight the importance of addressing both resource constraints and change management issues in digital transformation initiatives.

11.4 Theoretical Contributions

This study makes several contributions to theoretical understanding of digital transformation in higher education contexts. First, it provides empirical validation of an integrated theoretical framework that synthesizes RBV, Dynamic Capabilities, and Institutional Theory perspectives. The findings support the proposition that digital transformation and information culture function as complementary resources that, when combined, generate superior performance outcomes.

Second, the study contributes to understanding of the mechanisms through which digital transformation affects organizational performance. The partial mediation finding suggests that digital transformation influences performance through both direct and indirect pathways, with information culture serving as an important but not exclusive enabler. This nuanced understanding has implications for both theory development and practical intervention design.

Third, the study extends the application of these theoretical perspectives to an understudied context—Iraqi higher education. The findings demonstrate the applicability of Western-developed theoretical frameworks to non-Western contexts while also revealing contextual factors that moderate the relationships among the variables of interest.

11.5 Practical Implications for Decision Makers

The findings of this study offer actionable insights for decision makers in higher education institutions pursuing digital transformation. The strong effect of digital competencies on both information culture and institutional performance underscores the importance of investing in human capital

development. Training programs should focus not only on technical skills but also on information competencies that enable effective utilization of digital resources.

The partial mediation effect of information culture suggests that digital transformation initiatives should be accompanied by efforts to build information culture among staff. This includes developing awareness of information sources and evaluation criteria, building practical skills in information search and management, and fostering behaviors that promote effective information use in organizational processes.

The lower scores on digital organizational culture indicate a need for leadership interventions to create an environment more supportive of digital innovation. Leaders should model digital behaviors, create incentives for digital excellence, and address resistance to change through communication and engagement strategies.

12. Recommendations

Based on the results and discussion, the following recommendations are proposed:

1. Develop an integrated digital strategy for the university that includes infrastructure modernization (e.g., cloud computing expansion) and allocate sufficient budget for this purpose. The strategy should be aligned with the university's overall strategic plan and include clear metrics for monitoring progress.
2. Design specialized training programs in digital and information competencies, covering at least 80% of staff within two years, with emphasis on practical applications. Training should be differentiated based on job roles and current competency levels.
3. Build a system of incentives for digital excellence, including awards for innovative projects, to promote organizational culture supportive of digital transformation. Recognition programs should highlight both individual and team achievements in digital innovation.
4. Establish a specialized unit to manage digital transformation with clear mandate, adequate resources, and direct reporting to university leadership. This unit should coordinate digital initiatives across colleges and departments.
5. Promote community engagement through partnerships with technology companies, other universities, and government agencies to provide technical

support and training resources. Such partnerships can also facilitate knowledge transfer and capacity building.

6. Conduct future research with larger samples or comparative studies with other universities to enhance generalizability of findings. Longitudinal studies would also be valuable for examining how the relationships evolve over time.

13. Limitations and Future Research

This study has several limitations that should be acknowledged:

1. The use of purposive sampling, while appropriate for the research context, limits the generalizability of findings to the broader population of university staff. Future studies could employ probability sampling methods to enhance representativeness.
2. The cross-sectional design captures relationships at a single point in time, making it difficult to establish causal relationships definitively. Longitudinal research designs would enable examination of how digital transformation unfolds over time.
3. The reliance on self-reported data may introduce common method bias. Future studies could incorporate objective measures of digital transformation (e.g., system usage data) and institutional performance (e.g., administrative efficiency metrics).
4. The study focused on a single institution, limiting the ability to examine how institutional factors moderate the relationships studied. Comparative studies across multiple institutions would enable identification of institutional factors that facilitate or impede successful digital transformation.

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- 730