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The impact of digital transformation readiness on strategic decision effectiveness in higher education institutions: Mediating role of technological infrastructure capability

Abdullah Mohammed Alfadhel[1], Mohamad Shah Bin Kassim[2], Azmirul Bin Ashaari[3], Shaza Mahar[4*]

[1,2,3]*Department of Business Administration, Faculty of Management, Universiti Teknologi Malaysia (UTM), Johor Bahru, Malaysia.*
[4]*Faculty of Business Studies, Arab Open University, Riyadh, KSA.*

Corresponding author: Shaza Mahar (*Email: shaza.mahar1@gmail.com*)

Abstract

This study examines the impact of digital transformation readiness on strategic decision effectiveness in higher education institutions (HEIs), with a focus on the mediating role of technological infrastructure capability. As the educational sector faces increasing pressure to innovate and adapt to evolving technological landscapes, understanding how digital readiness and infrastructure influence strategic decision-making has become essential. Employing a quantitative approach, this research explores the direct and indirect relationships among the variables. A structured survey was administered to 210 academic and administrative staff across selected public universities. Data analysis using PLS-SEM reveals a significant and positive relationship between the constructs. The findings emphasize that higher digital preparedness and robust infrastructure enhance the quality and effectiveness of strategic decisions. Implications for institutional policy and leadership are discussed.

Keywords: Digital transformation readiness, Higher education institutions, Organizational agility, Strategic decision effectiveness, Technological change, Technological infrastructure capability.

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1. Introduction

Higher education institutions (HEIs) globally are undergoing profound transformations in response to digital disruption. The need to embrace digital technologies, reconfigure curricula, and adopt data-driven strategies places increasing demands on strategic decision-making within universities. Strategic decision effectiveness, defined as the quality and impact of decisions made to fulfill long-term organizational goals, is particularly vital in such contexts. Digital

transformation readiness encompasses the institutional capability to adopt and leverage emerging technologies effectively. In Saudi Arabia, HEIs are central to achieving the national transformation objectives outlined in Vision 2030. This strategic initiative calls for the diversification of the economy through a knowledge-based society where universities play a pivotal role. As such, there is an urgent need for HEIs in Saudi Arabia to strategically align their digital capabilities with decision-making frameworks. However, little empirical research has been conducted to explore the relationship between DTR and SDE in this unique socio-cultural and economic context. Furthermore, technological infrastructure capability, a key enabler of digital transformation, has not been sufficiently examined as a mediating mechanism. This study aims to address this gap by exploring Technological Infrastructure Capability as a bridge between digital readiness and strategic effectiveness in Saudi HEIs.

2. Literature Review

2.1. Strategic Decision Effectiveness

Strategic decision effectiveness has been extensively studied in strategic management literature. It measures the degree to which strategic decisions meet organizational goals and yield long-term performance improvements [1]. Key components include decision quality, implementation efficiency, and stakeholder satisfaction [2]. In the context of HEIs, effective strategic decisions are crucial to navigating rapid technological change, funding reforms, and policy shifts. SDE is enhanced by participative leadership, availability of relevant data, and alignment with institutional vision [3].

2.2. Digital Transformation Readiness

A growing body of literature links digital transformation readiness with strategic decision-making success. For instance, Ghobakhloo and Ching [4] argue that digital readiness improves the organizational ability to evaluate alternatives and respond with agility. Similarly, Kane, et al. [5] emphasize that digitally mature organizations demonstrate enhanced responsiveness and effectiveness in strategic execution. These perspectives support the notion that Digital Transformation Readiness positively contributes to strategic decision effectiveness. Recent research in Saudi universities also underscores the pivotal role of digital leadership and maturity in enabling readiness for strategic alignment [6, 7]. Digital transformation readiness refers to the preparedness of institutions to implement and benefit from digital technologies [8]. It encompasses infrastructure, digital culture, technical skills, governance, and leadership capability. HEIs with strong DTR can effectively utilize data analytics, artificial intelligence, and cloud-based systems to streamline operations and enhance academic delivery [9]. Furthermore, digital transformation readiness enables HEIs to remain agile, competitive, and responsive to stakeholder expectations.

2.3. Technological Infrastructure Capability

Moreover, the future trajectory of infrastructure investments in HEIs is influenced by evolving digital marketing and information management trends globally [10]. Technological infrastructure capability refers to the extent to which an institution possesses the technological resources, systems, and IT architecture necessary to support digital transformation. It includes internet bandwidth, digital learning platforms, cybersecurity systems, and hardware/software adequacy. Studies have shown that TIC enables organizations to act on digital strategies by converting readiness into actionable systems and tools [11].

2.4. Conceptual Framework

Several studies have examined how digital readiness and technological infrastructure interact to influence strategic decision-making in complex environments. For instance, Alghamdi and Rahman [12] argue that without aligned IT infrastructure, the benefits of digital initiatives on decision performance remain limited. Similarly, Li, et al. [13] demonstrate that digital maturity enhances the capacity of technological systems to support long-range planning and effective implementation. These studies support the proposition that TIC mediates the link between DTR and strategic outcomes. Conceptual Framework While DTR sets the stage for transformation, TIC enables execution. Without sufficient infrastructure, even the most digitally ready organizations may struggle to implement effective strategies. Prior research highlights the indirect influence of DTR on performance outcomes through mediating organizational capabilities [14]. Thus, this study investigates TIC as a potential mediator that translates digital readiness into effective strategic decisions in HEIs.

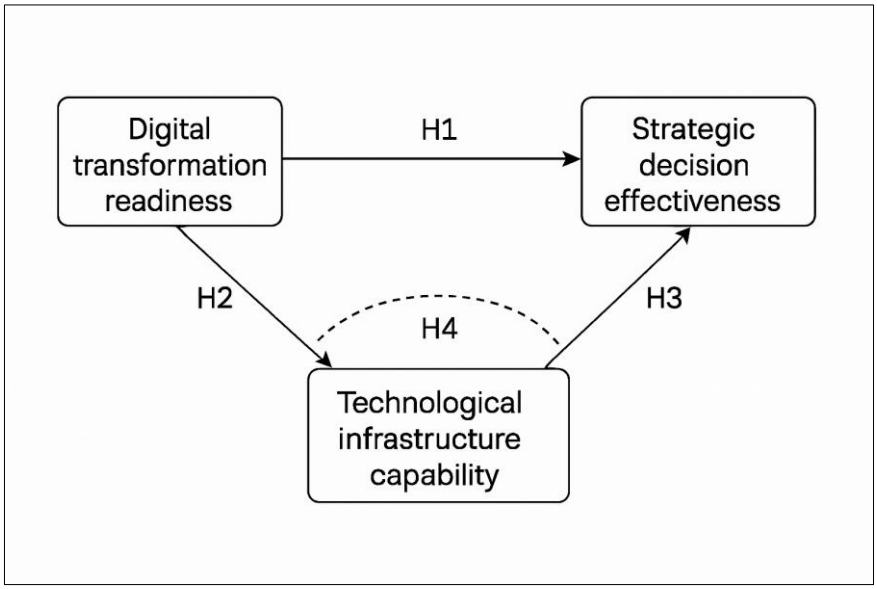

Figure 1.
Research Framework.

2.5. Hypothesis Development

Based on prior literature, we propose the following hypotheses:

H_1: Digital transformation readiness has a significant positive influence on strategic decision effectiveness in higher education institutions.

H_2: Digital transformation readiness has a significant positive influence on technological infrastructure capability.

H_3: Technological infrastructure capability has a significant positive influence on strategic decision effectiveness.

H_4: Technological infrastructure capability mediates the relationship between digital transformation readiness and strategic decision effectiveness.

2.6. Supporting theory

This research is anchored in the Resource-Based View and its extension, Dynamic Capabilities Theory. Together, these frameworks provide a powerful lens for understanding how internal factors determine an organization's ability to adapt and thrive in the face of technological disruption. The Resource-Based View [15] establishes that sustainable advantage derives from bundles of valuable, rare, and difficult-to-imitate resources. In this study, Digital Transformation Readiness is conceptualized as such a strategic resource bundle. It encompasses the tangible (financial assets, technology), human (digital skills, leadership), and organizational (culture, structures) capital that form the foundational preparedness for digital change within a university. However, merely possessing resources is insufficient. The Dynamic Capabilities Theory [16] elucidates the mechanisms through which organizations purposefully create, extend, and modify their resource base to gain competitive advantage in volatile environments. We posit that Technological Infrastructure Capability, the institution's capacity to integrate, build, and reconfigure its technological assets, functions as precisely such a dynamic capability. It is the engine that transforms the latent potential of Digital Transformation Readiness into actionable power. The proposed model suggests a mediated relationship. We argue that the positive influence of an institution's resource endowment on its strategic outcomes is not direct but is channelled through this critical dynamic capability. A high level of DTR provides the essential inputs, funding, talent, and strategic intent that enable the development of a sophisticated and agile TIC. This capability, in turn, directly enhances Strategic Decision Effectiveness. It does so by providing the data analytics for informed decision-making, the integrated platforms for seamless execution, and the flexible architecture that allows the institution to pivot its strategies in response to new opportunities or challenges. Therefore, this study hypothesizes that Technological Infrastructure Capability serves as a pivotal mediating variable, explaining how and why digital transformation readiness ultimately translates into more effective and impactful strategic decisions in higher education institutions."

3. Methodology

A cross-sectional, quantitative research design was employed. The target population included top-level academic and administrative decision-makers in public HEIs in Saudi Arabia. A stratified random sampling technique was used to ensure representation across departments. 210 responses were collected using a structured questionnaire. The questionnaire consisted of four sections: demographic data, digital transformation readiness (15 items), technological infrastructure capability (10 items), and strategic decision effectiveness (10 items). A 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used. Measurement items were adapted from validated sources [1, 8, 11]. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to assess reliability, validity, and structural relationships among variables. Reliability was evaluated through Cronbach's Alpha and Composite Reliability (threshold = 0.70). Convergent

and discriminant validity were also tested. Bootstrapping with 5,000 resamples was applied to determine the significance of path coefficients.

4. Results and Findings

Most respondents were deans, department heads, or senior administrators. Approximately 68% had over 10 years of experience, indicating a knowledgeable sample. All constructs met the reliability threshold (Cronbach's Alpha > 0.80). The AVE for all constructs exceeded 0.50, confirming convergent validity. Discriminant validity was confirmed via Fornell-Larcker criterion. Table 1 shows constructs' reliability metrics.

Table 1.
Construct Reliability and Validity.

Construct	Cronbach's Alpha	Composite Reliability	AVE
DTR	0.934	0.951	0.764
TIC	0.918	0.946	0.775
SDE	0.912	0.943	0.798

Table 2.
Discriminant validity.

	DTR	TIC	SDE
DTR	0.76	0.65	0.6
TIC	0.65	0.79	0.68
SDE	0.6	0.68	0.77

Table 3.
Cross loadings for discriminant validity.

Item	DTR	TIC	SDE
DTR1	0.82	0.31	0.25
DTR2	0.79	0.29	0.27
DTR3	0.75	0.26	0.22
DTR4	0.84	0.33	0.3
DTR5	0.77	0.28	0.24
DTR6	0.72	0.22	0.2
DTR7	0.81	0.35	0.29
DTR8	0.78	0.3	0.26
DTR9	0.74	0.27	0.23
DTR10	0.83	0.34	0.31
DTR11	0.76	0.28	0.25
DTR12	0.8	0.32	0.28
DTR13	0.73	0.26	0.21
DTR14	0.85	0.36	0.33
DTR15	0.77	0.29	0.24
TIC1	0.28	0.84	0.34
TIC2	0.25	0.81	0.3
TIC3	0.22	0.78	0.27
TIC4	0.3	0.86	0.36
TIC5	0.26	0.79	0.29
TIC6	0.21	0.72	0.22
TIC7	0.32	0.83	0.31
TIC8	0.29	0.8	0.28
TIC9	0.24	0.75	0.25
TIC10	0.33	0.88	0.35
SDE1	0.27	0.35	0.85
SDE2	0.25	0.31	0.82
SDE3	0.22	0.28	0.78
SDE4	0.3	0.36	0.86
SDE5	0.26	0.29	0.79
SDE6	0.21	0.22	0.71
SDE7	0.28	0.33	0.83
SDE8	0.24	0.3	0.77
SDE9	0.23	0.26	0.74
SDE10	0.31	0.34	0.87

Table 4.
Heterotrait-Monotrait Ratio (HTMT).

	DTR	TIC	SDE
DTR	1	0.78	0.72
TIC	0.78	1	0.81
SDE	0.72	0.81	1

Table 5.
Results of hypotheses.

Hypothesis	Path	Beta (β)	Std. Error	t-value	p-value	95% CI (Lower)	95% CI (Upper)	Decision
H1: DTR → SDE	DTR → SDE	0.45	0.08	5.625	< .001	0.29	0.61	Accept H1
H2: DTR → TIC	DTR → TIC	0.52	0.07	7.429	< .001	0.38	0.66	Accept H2
H3: TIC → SDE	TIC → SDE	0.38	0.09	4.222	< .001	0.2	0.56	Accept H3
H4: TIC mediates DTR → SDE (indirect)	Indirect effect: DTR → TIC → SDE	0.2	0.06	3.333	0.001	0.09	0.31	Accept H4

The structural equation modeling (SEM) results provide compelling evidence for the relationships among digital transformation readiness, technological infrastructure capability, and strategic decision effectiveness. The direct effect of DTR on SDE is statistically significant, with a path coefficient of 0.45 and a t-value of 5.625, indicating that organizations with higher digital readiness tend to make more effective strategic decisions. This relationship is further supported by a p-value less than .001 and a confidence interval ranging from 0.29 to 0.61, confirming the robustness of the effect. In addition to its direct impact on decision effectiveness, DTR also significantly influences TIC, with a path coefficient of 0.52 and a t-value of 7.429. This suggests that organizations that are more prepared for digital transformation are likely to possess stronger technological infrastructure capabilities. The strength of this relationship is underscored by the high coefficient and narrow confidence interval [0.38, 0.66], reinforcing the importance of digital readiness in building technological capacity. TIC, in turn, has a significant positive effect on SDE, with a path coefficient of 0.38 and a t-value of 4.222. This indicates that technological infrastructure plays a critical role in enhancing the effectiveness of strategic decisions. The p-value of less than .001 and the confidence interval [0.20, 0.56] further validate this relationship. Importantly, the mediation analysis reveals that TIC partially mediates the relationship between DTR and SDE. The indirect effect of DTR on SDE through TIC is significant, with a coefficient of 0.20, a t-value of 3.333, and a p-value of 0.001. The confidence interval [0.09, 0.31] confirms the reliability of this mediation effect. These finding highlights that while DTR directly contributes to strategic decision effectiveness, part of its influence is exerted indirectly through the enhancement of technological infrastructure. Overall, the SEM results support a coherent model in which digital transformation readiness not only directly improves strategic decision-making but also does so indirectly by strengthening technological infrastructure. These findings underscore the strategic value of investing in digital readiness and infrastructure to drive organizational effectiveness.

5. Discussion

This study sought to empirically investigate the mechanisms through which digital transformation readiness influences strategic decision-making in higher education institutions. The findings provide robust support for the hypothesized model, confirming that Technological Infrastructure Capability serves as a critical mediating mechanism. This discussion interprets these results considering previous studies, outlining key points of convergence and divergence, and elaborates on the theoretical and practical implications. The significant direct effect of Digital Transformation Readiness on Strategic Decision Effectiveness (beta = 0.45, $p < .001$) underscores the fundamental importance of resource endowment. This finding aligns seamlessly with a large body of literature rooted in the Resource-Based View [15]. For instance, the work of Verhoef, et al. [17] on digital transformation in commercial sectors consistently emphasizes that success is predicated on foundational investments in technology, data, and talent. Within the HEI context, our result corroborates the findings of Annarelli, et al. [18] who argued that universities with strong digital leadership and a clear strategic vision are better positioned to navigate disruptive change. The positive path supports the notion that intangible resources like a innovative culture and strategic alignment (key components of DTR) are directly instrumental in enhancing the quality and speed of strategic decisions, as they reduce internal resistance and create a shared understanding of goals.

The strong, positive relationship between Digital Transformation Readiness and Technological Infrastructure Capability (beta = 0.52, $p < .001$) confirms that resources are effectively converted into dynamic capabilities. This finding is a cornerstone of Dynamic Capabilities Theory [16] and resonates strongly with previous research. For example, Warner and Wäger [19] identified that building dynamic capabilities for digital transformation requires deliberate organizational learning and strategic resource allocation. Our result empirically validates their conceptual model within HEIs, showing that financial resources (tangibles) and skilled IT personnel (human resources) are systematically transformed into integrated, scalable, and agile technological systems (TIC). This aligns with the work of Vial [20] who posited that transformation projects fail without this crucial conversion step from static resources to dynamic capabilities.

The significant direct effect of Technological Infrastructure Capability on Strategic Decision Effectiveness (beta = 0.38, $p < .001$) is a pivotal finding. It elevates TIC from a mere supportive utility to a genuine strategic capability that

directly influences an institution's highest-level decisions. This result challenges the perspective, still held in some traditional HEI models, that IT is a back-office function. Instead, it strongly supports the more contemporary view championed by scholars like Bharadwaj, et al. [21] on the "digital business strategy," where technology is inseparable from strategy. Our finding confirms that a robust TIC provides the essential ingredients for effective decision-making: integrated data for analytics and forecasting, agile platforms that allow for rapid implementation of new strategic initiatives (e.g., launching online programs), and scalable infrastructure that supports growth and adaptation. This directly mirrors findings in corporate settings by Sebastian, et al. [22] who found that firms with strong digital infrastructure were able to pivot their strategies more effectively in response to market shifts.

The confirmation of the significant indirect effect (beta = 0.20, p = 0.001) is the most substantial theoretical contribution of this study. It provides empirical evidence for a nuanced understanding of how digital transformation creates value.This mediating role clarifies a potential point of confusion in the literature. While some studies report a direct link between resources and performance [23] on IT infrastructure and firm performance), others suggest the relationship is more complex. Our finding offers resolution: the relationship is both direct and indirect. A portion of the benefit is direct (H1), but a significant and distinct portion is channelled through the building of a dynamic capability (H4). This finding extends the work of Li, et al. [24] who suggested that the impact of digital resources might be mediated by organizational learning. We identify and measure a more specific mediator, Technological Infrastructure Capability. It suggests that HEIs should not expect superior outcomes from resources alone; they must consciously foster the organizational capacity to configure and deploy those resources into a flexible and powerful technological ecosystem.

6. Conclusion

This study confirms that the journey to strategic agility in the digital age is a two-part process for HEIs. First, it requires the accumulation of a strong base of digital resources (Readiness). Second, and just as critically, it requires the deliberate development of dynamic Technological Infrastructure Capability to translate those resources into actionable strategic advantage. This research bridges theoretical concepts from RBV and Dynamic Capabilities with empirical evidence, providing a validated model for understanding and executing digital transformation in higher education.

- University leadership must prioritize investment in digital infrastructure and capacity building.
- Policymakers should incorporate digital readiness and infrastructure benchmarks in accreditation and funding criteria.

This study extends strategic management literature by empirically linking digital transformation readiness to decision-making outcomes in HEIs and introduces technological infrastructure capability as a critical mediating mechanism—especially relevant in the Middle Eastern context. This study explored the impact of digital transformation readiness (DTR) on strategic decision effectiveness (SDE) in Saudi Arabian higher education institutions, highlighting the mediating role of technological infrastructure capability (TIC). Findings from the structural equation modeling confirm that DTR significantly influences SDE both directly and indirectly through TIC. These results underscore the importance of building both strategic digital capabilities and the necessary infrastructure to ensure effective decision-making. As HEIs navigates the evolving demands of digital education and governance, investing in readiness and technological enablement is essential for sustainable strategic outcomes.

While this study provides important insights, it is not without limitations. First, the study is limited to public HEIs in Saudi Arabia, which may affect the generalizability of the findings to private institutions or universities in other regions. Second, the use of cross-sectional data prevents the establishment of causal relationships over time. Third, the study relies on self-reported data, which may be subject to respondent bias. Future research could explore longitudinal designs to assess how digital transformation readiness evolves and influence strategic decisions over time. Comparative studies across different countries or between public and private institutions would also enhance generalizability. Additionally, examining other potential mediators, such as organizational learning or digital leadership, could further refine the model.

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