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IMPACT OF ARTIFICIAL INTELLIGENCE CAPABILITIES ON SUSTAINABLE DEVELOPMENT IN ORGANIZATIONS: THE MEDIATOR ROLE OF ORGANIZATIONAL CREATIVITY IN THE HEALTH SECTOR OF SAUDI ARABIA

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ABSTRACT

This study examines the influence of Artificial Intelligence (AI) capabilities on the sustainable development of organizations in Saudi Arabia's healthcare sector, with organizational creativity serving as a mediating variable. Employing a quantitative cross-sectional design with data from 304 healthcare professionals, the research examines three dimensions of AI capabilities: Data & Technology Infrastructure (DTI), Human Capital for AI (HCAI), and Organizational AI Readiness (OAIR). Structural Equation Modeling reveals that DTI and OAIR significantly influence sustainable development ($p<0.001$; $p<0.01$, respectively), while HCAI demonstrates no significant effect. Organizational creativity partially mediates the relationship between AI capabilities and sustainable development, though it's direct influence on sustainability outcomes is limited. The findings challenge prevailing assumptions about the centrality of human capital and creativity in driving sustainability outcomes, instead highlighting the primacy of technological infrastructure and organizational readiness. This research contributes to understanding how specific AI capabilities translate into sustainability outcomes in healthcare organizations, providing empirical insights that align with Saudi Arabia's Vision 2030 transformation agenda. The study offers actionable guidance for healthcare administrators seeking to optimize AI investments, suggesting that prioritizing robust technological systems and organizational preparedness may yield greater sustainability benefits than isolated initiatives focused on human capital development or creativity.

KEYWORDS: Artificial Intelligence, Organizational Creativity, Sustainable Development, Healthcare Sector, Sustainability, Saudi Vision 2030.

1. INTRODUCTION

The ubiquitous proliferation of Artificial Intelligence (AI) technologies has catalyzed profound transformations across global industries, offering unprecedented potential for enhancing organizational capabilities, fostering innovative ecosystems, and advancing sustainability imperatives. Within the healthcare domain, sophisticated AI capabilities, encompassing advanced data analytics, machine learning-driven predictive modeling, and intelligent process automation, are increasingly deployed to optimize clinical outcomes, streamline operational workflows, and foster long-term organizational sustainability. However, contemporary scholarly discourse suggests that the translation of AI capabilities into sustainable development outcomes follows complex pathways mediated by organizational factors, particularly the capacity for creative knowledge synthesis and innovative application of AI-derived insights (Gazi et al., 2024). The Kingdom of Saudi Arabia presents a compelling empirical context for investigating these relationships, as its healthcare sector undergoes a rapid technological transformation aligned with Vision 2030. This ambitious national framework prioritizes economic diversification, technological innovation, and sustainable development. Despite substantial capital investments in AI infrastructure and the articulation of clear strategic directives, healthcare institutions across the Kingdom demonstrate heterogeneous outcomes in leveraging these technological capabilities toward sustainable organizational development. This empirical inconsistency underscores a critical knowledge gap regarding the mechanisms through which AI capabilities translate into sustainable organizational outcomes. This investigation addresses this scholarly lacuna by examining the intricate interrelationships between multidimensional AI capabilities, organizational creativity, and sustainable development within Saudi healthcare institutions. The research is conceptually anchored in a tripartite framework where AI capabilities disaggregated into Data & Technology Infrastructure (DTI), Human Capital for AI (HCAI), and Organizational AI Readiness (OAIR) function as antecedent variables, organizational sustainable development as the ultimate dependent construct, and organizational creativity as the intermediary mediating mechanism. The theoretical foundation integrates the Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT) to provide explanatory power for these relationships. The RBV emphasizes the strategic significance of valuable, rare, inimitable, and non-substitutable resources in achieving competitive advantage. At the same time, DCT extends this perspective by highlighting organizational capabilities to reconfigure resources in response to dynamic environmental conditions. Together, these theoretical lenses shed light on how healthcare organizations utilize AI capabilities through innovative processes to achieve sustainable outcomes in rapidly evolving technological landscapes. Through rigorous empirical investigation of these relationships, this study contributes to advancing scholarly understanding of the complex mechanisms through which technological capabilities are transformed into sustainable organizational outcomes, while simultaneously providing actionable insights for healthcare leaders navigating the challenges of AI-driven transformation in pursuit of sustainability objectives.

2. LITERATURE REVIEW & RESEARCH GAPS

2.1. Theoretical Background

Organizational Sustainable Development (OSD) has emerged as a paradigmatic framework for ensuring long-term institutional viability through the systematic integration of economic viability, environmental stewardship, social responsibility, and institutional governance dimensions (Kuźniarska et al., 2024). Within the healthcare ecosystem, the pursuit of OSD necessitates a delicate balance between operational efficiency optimization, clinical excellence, and environmental conservation, particularly in rapidly evolving economic contexts such as Saudi Arabia, where the strategic Vision 2030 initiative mandates comprehensive, sustainable transformation across sectors (Mania, 2024). Artificial Intelligence (AI) represents a pivotal catalyst in this sustainability trajectory, offering sophisticated capabilities that enhance diagnostic precision, optimize resource allocation, and streamline administrative processes within healthcare delivery systems (Muafa et al., 2024). However, the translation of AI technological potential into sustainable organizational outcomes follows a nonlinear pathway contingent upon an organization's capacity to strategically leverage multidimensional AI capabilities, encompassing data infrastructure governance, technical competency development, and strategic business integration mechanisms (Mikalef & Gupta, 2021). The intervening role of organizational creativity emerges as a critical

mediating mechanism in this relationship, enabling healthcare institutions to adapt and reconfigure AI solutions innovatively in pursuit of sustainability objectives within their specific operational contexts (Gazi et al., 2024). This creative adaptation process facilitates the transformation of technological capabilities into contextually relevant applications that address the multifaceted challenges of healthcare sustainability. While the extant literature has examined AI's contribution to organizational value creation in general business contexts, significant epistemological gaps persist in sector-specific empirical investigations, particularly within healthcare environments characterized by complex stakeholder relationships and stringent regulatory frameworks (Li et al., 2022). Moreover, limited scholarly attention has been devoted to understanding the mechanisms by which organizational creativity transforms latent AI potential into realized, sustainable outcomes across various organizational dimensions. This investigation addresses these theoretical lacunae by empirically examining the complex interrelationships between multidimensional AI capabilities, organizational creativity, and sustainable development outcomes within the Saudi Arabian healthcare context. The conceptual framework is anchored in the complementary theoretical perspectives of Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT), providing explanatory power for understanding how internally developed competencies and adaptive capabilities drive sustainable organizational performance in technologically dynamic environments.

2.2. Key Hypotheses

The comprehensive synthesis of extant literature elucidates three pivotal hypotheses that constitute the conceptual foundation of this investigation. First, we posit that multidimensional Artificial Intelligence capabilities comprising Data & Technology Infrastructure (DTI), Human Capital for AI (HCAI), and Organizational AI Readiness (OAIR) exert positive influences on organizational sustainable development outcomes (H1). Second, we hypothesize that organizational creativity serves as a significant mediating mechanism in the relationship between these AI capabilities and manifestations of sustainable development (H2). Third, we propose that Organizational AI Readiness demonstrates a comparatively more robust impact on sustainable development metrics relative to other AI capability dimensions (H3). While the scholarly discourse examining AI's contributory role in organizational sustainability has expanded considerably, extant empirical investigations frequently conceptualize AI capabilities as monolithic constructs, lacking granular decomposition or contextual specificity across sectoral and regional dimensions (Mikalef & Gupta, 2021). The present study addresses these methodological and conceptual limitations through a three-fold approach: disaggregating AI capabilities into distinct but interrelated dimensions (DTI, HCAI, OAIR), investigating the intermediary role of organizational creativity as a transformative mechanism, and generating empirically-derived insights from Saudi Arabia's healthcare ecosystem a context characterized by strategic alignment with Vision 2030's technological transformation and sustainability imperatives. Through this nuanced analytical framework, the research contributes to advancing theoretical understanding of the complex interrelationships between technological capabilities, creative organizational processes, and sustainable development outcomes within a contextually rich and strategically significant domain. This investigation thereby transcends the limitations of decontextualized analyses by examining how specific AI capabilities, mediated through creative organizational mechanisms, translate into concrete sustainability advancements in healthcare service delivery and organizational performance.

2.3. Conceptual Model

Figure 1 delineates the theoretical architecture underpinning this investigation, illustrating the hypothesized relationships between multidimensional Artificial Intelligence capabilities and organizational sustainable development outcomes. The model operationalizes AI capabilities as the primary exogenous construct (IV), disaggregated into three distinct but interrelated dimensions: Data & Technology Infrastructure (DTI), Human Capital for AI (HCAI), and Organizational AI Readiness (OAIR). These dimensions represent the technological, human resource, and strategic components essential for effective AI implementation within organizational contexts. The framework posits both direct and indirect pathways through which these AI capability dimensions influence the endogenous construct of Organizational Sustainable Development (DV). Specifically, hypotheses H1, H2, and H3 propose that each AI capability dimension (DTI, HCAI, and OAIR, respectively) exerts influence on sustainable development through the intermediary construct of Organizational Creativity, which functions as a

transformative mediating mechanism (Med). Hypothesis H4 postulates that Organizational Creativity directly influences sustainable development outcomes, while hypothesis H5 proposes a direct relationship between the composite AI capabilities construct and sustainable development, independent of mediating effects. This theoretical configuration enables empirical examination of both the isolated and interactive effects of technological capabilities and creative organizational processes on sustainability outcomes. The framework's multi-pathway design accommodates the possibility of complete mediation, partial mediation, or direct effects, thereby allowing for a nuanced analysis of how organizations translate technological potential into sustainable organizational performance. Through this conceptualization, the model transcends simplistic technology-outcome relationships to illuminate the complex interplay between technological capabilities, organizational processes, and sustainable development within contemporary healthcare institutions.

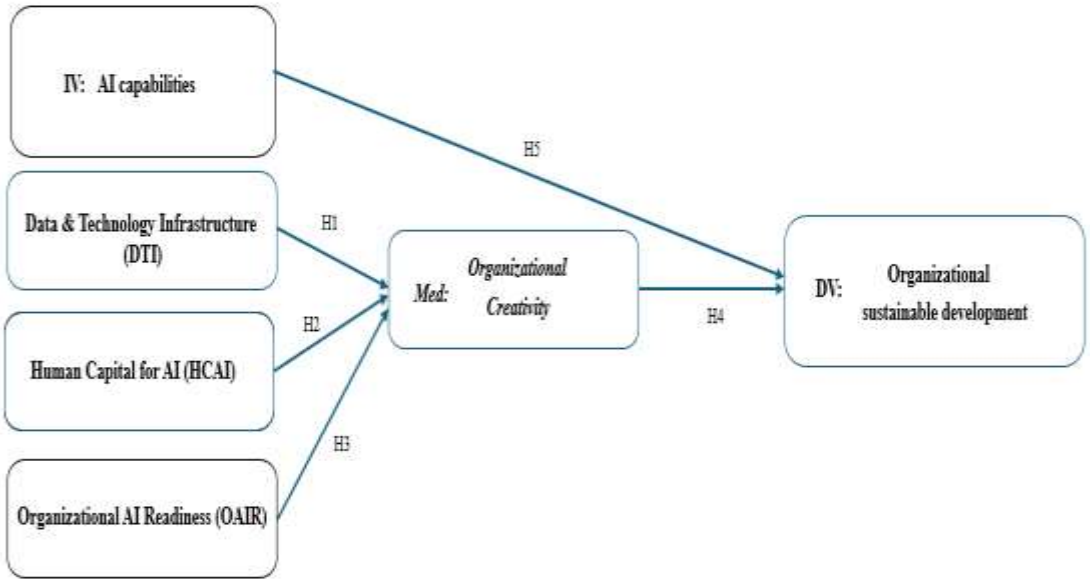

Figure 1: Conceptual Model.

3. METHODOLOGY

This section outlines the research methodology employed to investigate the impact of Artificial Intelligence (AI) capabilities on organizational sustainable development, mediated by organizational creativity, in the health sector of Saudi Arabia. The study employs a quantitative research design to examine the relationships between the variables empirically. The methodology is structured to align with the research objectives and questions, ensuring robustness and reliability in data collection and analysis.

3.1. Research Design

This investigation employs a rigorous quantitative research design with cross-sectional data collection methodology to examine the hypothesized relationships between Artificial Intelligence capabilities, organizational creativity, and sustainable development outcomes. Primary data were systematically gathered from a representative sample of 304 healthcare professionals strategically positioned across major healthcare institutions in Saudi Arabia, including the Ministry of Health and the King Faisal Hospital and Research Centre. This methodological approach reflects contemporary best practices in organizational research by facilitating precise operationalization and measurement of complex theoretical constructs while enabling sophisticated statistical modeling of their interrelationships. The cross-sectional design was deliberately selected for its epistemological appropriateness in examining the complex associations between multidimensional technological capabilities, organizational process variables, and performance outcomes within a specific institutional context. This methodological framework enables the simultaneous examination of multiple variables without the temporal constraints associated with longitudinal designs, while

providing sufficient analytical power to test the proposed direct and mediated pathways in the conceptual model. The sampling strategy ensured adequate representation across hierarchical levels and functional domains within the Saudi healthcare ecosystem, thereby enhancing the external validity and generalizability of findings within comparable institutional contexts.

3.2. Population and Sampling

The target population encompasses healthcare professionals within the Saudi Arabian healthcare ecosystem who possess direct engagement with artificial intelligence implementation or sustainability initiatives. This population is strategically inclusive of hospital administrators, information technology specialists, clinical healthcare providers, and policy formulation personnel, thereby ensuring comprehensive representation across the multifaceted dimensions of healthcare service delivery and governance. To optimize representational validity while minimizing selection bias, a stratified random sampling methodology was implemented, with stratification parameters defined by organizational role, hierarchical position, and functional domain. This sampling approach ensured proportional representation across critical organizational segments while maintaining the probabilistic integrity essential for statistical inference. The final sample comprised 304 healthcare professionals, a sample magnitude that satisfies established methodological guidelines for Structural Equation Modeling applications, which recommend minimum sample thresholds to ensure parameter estimate stability, model fit reliability, and statistical power adequacy (Hair et al., 2019). This sample dimensionality provides sufficient statistical robustness to detect hypothesized relationships while enabling meaningful disaggregation of effects across subgroups, thereby enhancing both the internal validity of causal inferences and the external generalizability of findings to comparable institutional contexts within technologically evolving healthcare environments.

3.3. Data Collection

The empirical investigation utilized a meticulously structured questionnaire instrument comprising four integrated sections designed to capture the multidimensional constructs under examination. The demographic section elicited participant characteristics including age, gender, professional role, and domain-specific experience to enable subsequent analysis of potential moderating effects and sample representativeness. The AI capabilities construct was operationalized through a comprehensive five-point Likert scale (ranging from 1=Strongly Disagree to Agree 5=Strongly) measuring three distinct but interrelated dimensions: Data & Technology Infrastructure (DTI), with determinants of AI Data and AI Technology (Ransbotham et al., 2019; Wamba-Taguimdje et al., 2020); Human Capital for AI (HCAI), encompassing AI Technical Skills and AI Business Skills (Wamba-Taguimdje et al., 2020; Perifanis & Kitsios, 2023); and Organizational AI Readiness (OAIR) (Uren & Edwards, 2023). Organizational Creativity was assessed using validated scales adapted from Amabile and Pratt (2016), encompassing dimensions of idea generation processes, innovation culture, and creative problem-solving capabilities. The dependent construct of Organizational Sustainable Development was measured through established indicators capturing continuous improvement mechanisms, governance structures, ethical frameworks, and organizational learning processes (Elkington, 2020). Data collection integrated both primary sources, obtained through systematically distributed electronic surveys, and secondary sources, including relevant literature and organizational documentation, to contextualize empirical findings. Methodological rigor was enhanced through preliminary pilot testing with 30 healthcare professionals, which enabled the refinement of questionnaire items and the confirmation of psychometric properties. All constructs demonstrated acceptable internal consistency reliability (Cronbach's Alpha exceeding 0.7) prior to full-scale implementation.

4. RESULTS

This section delineates the empirical findings derived from systematic statistical analysis examining the hypothesized relationships between Artificial Intelligence capabilities, organizational creativity, and sustainable development outcomes within the Saudi Arabian healthcare ecosystem. Data obtained from 304 healthcare professionals underwent rigorous analytical procedures, including descriptive statistical examination, Structural Equation Modeling (SEM) with confirmatory factor analysis, and advanced moderation analysis to elucidate the complex interrelationships between constructs. The presentation of findings adheres to a logical analytical progression, commencing with a comprehensive demographic characterization of respondents to establish sample representativeness and contextual parameters. Subsequently, the

analysis transitions to psychometric assessment of the multidimensional AI capabilities construct, organizational creativity as an intermediary mechanism, and sustainable development as the focal outcome variable. The culmination of the analytical framework involves sophisticated mediation modeling to quantify the direct, indirect, and total effects through which AI capabilities influence sustainable development outcomes via organizational creativity. These empirical results provide granular insights into the mechanisms through which healthcare institutions can strategically leverage technological capabilities and creative organizational processes to achieve sustainable performance outcomes. The findings provide evidence-based guidance for healthcare administrators and policymakers seeking to align technological implementation strategies with the broader sustainable development imperatives outlined in Saudi Vision 2030, while also contributing to the theoretical discourse on technology-enabled organizational transformation in complex institutional environments.

4.1. Sample Description

Analysis of the sample composition (n=304) reveals a demographic and professional profile that warrants critical examination for its representational validity and potential analytical implications. The age distribution demonstrates a pronounced concentration in the mid-career bracket (36-45 years: 45.0%), with substantial representation in the 46-55 (23.5%) and 26-35 (21.5%) cohorts, while revealing statistically marginal representation at both extremes of the age spectrum (18-25: 2.0%; >55: 8.0%). This age stratification merits consideration when interpreting findings, as it may reflect organizational hierarchical structures rather than broader workforce demographics in the Saudi healthcare ecosystem. The gender distribution exhibits a significant asymmetry (male: 66.0%; female: 34.0%), potentially reflecting persistent gender disparities in leadership and technological roles within healthcare institutions. This imbalance necessitates careful consideration when generalizing findings across gender categories and may indicate structural barriers to female participation in AI implementation initiatives. The professional composition reveals a hierarchical skew toward executive functions (41.0%), with substantial representation from administrative (24.0%) and operational (13.5%) domains. Departmentally, operations demonstrated predominance (35.0%), while marketing and sales exhibited minimal representation (4.0%). This distribution may introduce potential response bias favoring strategic over tactical perspectives regarding AI implementation. Professional tenure analysis indicates a sample characterized by extensive institutional experience, with 76.5% of respondents reporting more than seven years of professional service. This experiential profile suggests respondents possess significant institutional knowledge but raises questions regarding the representation of emerging professionals who may offer alternative perspectives on technological adoption. Educational attainment analysis reveals predominance of postgraduate qualifications (Master's: 43.5%; PhD: 15.5%), with substantial undergraduate representation (35.5%) and minimal secondary education (5.5%). This educational profile suggests a sample with sophisticated analytical capabilities but potentially limited representativeness across broader educational strata within healthcare organizations. Regarding the status of AI implementation, the majority of respondents (52.5%) reported pilot-stage initiatives, with fewer indicating partial (27.0%) or comprehensive (20.5%) implementation. This distribution reflects the nascent state of AI adoption within Saudi Arabian healthcare institutions and suggests that the findings should be interpreted as representative of early-stage rather than mature implementation contexts. These demographic and organizational characteristics, while providing valuable insights from experienced, well-educated professionals, necessitate careful consideration of potential sampling limitations when extrapolating findings to broader institutional contexts or demographic segments underrepresented in the current sample.

4.2. Validity of Measurement Scale

To establish the psychometric properties and construct validity of the measurement instruments, rigorous Exploratory Factor Analysis (EFA) procedures were conducted for each theoretical construct. The empirical results, summarized in Table 1, demonstrate robust internal consistency reliability and sampling adequacy across all operationalized variables. The Cronbach's alpha coefficients universally exceeded the threshold of 0.93 across all constructs, indicating exceptional internal consistency reliability substantially above the conventional methodological threshold of 0.70 prescribed in psychometric literature. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy yielded a coefficient of 0.958, substantially surpassing the recommended threshold of 0.80 and

approaching the theoretical maximum of 1.0, thereby confirming exceptional sampling adequacy. The model exhibited Total Variance Explained (TVE) of approximately 69%, exceeding the methodologically recommended threshold of 60% for social science research. Bartlett's Test of Sphericity demonstrated statistical significance ($p < 0.001$), definitively rejecting the null hypothesis of an identity matrix and confirming the presence of sufficient inter-item correlations for factor extraction. This comprehensive psychometric assessment provides compelling evidence for the reliability, validity, and factorial integrity of the measurement instruments employed in this investigation.

Table 1: Exploratory Factor Analysis for Measurement Scales.

Variables	Code	N of Items retained	Cronbach's Alpha	KMO and Bartlett's Test		Total Variance Explained (Cumulative% %)
				Kaiser-Meyer-Olkin Measure	Bartlett's Test (Sig.)	
Data & Technology Infrastructure	DTI	13	0.965	0.958	0.000	68.58
Human Capital for AI	HCAI	14	0.975			
Organizational AI Readiness	OAIR	5	0.937			
Organizational Creativity	ORC	3	0.954			
Organizational Sustainable Development	OSD	11	0.955			

A comprehensive psychometric evaluation was conducted to assess the internal consistency and reliability of the measurement instruments employed in this investigation. The Cronbach's alpha coefficients, presented in Table 1, demonstrate exceptionally robust reliability metrics across all five theoretical constructs, substantially exceeding the conventional psychometric threshold of 0.70 recommended in methodological literature. The Human Capital for AI (HCAI) construct exhibited the highest internal consistency ($\alpha = 0.975$), followed by Data & Technology Infrastructure (DTI) with $\alpha = 0.965$, suggesting remarkably cohesive measurement of these technological capability dimensions. Organizational AI Readiness (OAIR), Organizational Creativity (OC), and Organizational Sustainable Development (OSD) similarly demonstrated robust reliability coefficients ($\alpha = 0.937$, 0.954, and 0.955, respectively), indicating strong measurement integrity across the entire theoretical framework. Critical examination of the retained item structure reveals substantial variation in measurement density across constructs, ranging from a parsimonious three-item scale for Organizational Creativity to an extensive fourteen-item instrument for Human Capital for AI. This differential item retention pattern warrants methodological consideration, as constructs with substantially different numbers of indicators may exhibit systematic variance in reliability coefficients independent of their underlying psychometric properties. The exceptional reliability coefficients observed for constructs with fewer items (particularly Organizational Creativity) suggest strong inter-item correlations that partially mitigate concerns regarding measurement breadth. While these reliability metrics provide compelling evidence for measurement consistency, it is imperative to acknowledge that exceptionally high alpha coefficients (>0.95) may potentially indicate item redundancy rather than optimal reliability. The observed coefficients, approaching 0.98 for specific constructs, suggest possible item overlap that might compromise discriminant validity, despite enhancing internal consistency. Nevertheless, these reliability results establish a robust foundation for subsequent structural equation modeling, affirming the measurement integrity necessary for valid inference regarding the hypothesized structural relationships among latent constructs.

4.3. Confirmatory Factor Analysis (CFA)

Following the preliminary scale validation, a comprehensive assessment of the measurement model was conducted through rigorous examination of item-factor loadings and evaluation of critical psychometric indices. This analytical procedure involved scrutinizing the pattern and magnitude of indicator loadings within their respective theoretical

constructs and systematically evaluating measurement model integrity through established convergent validity metrics, including Average Variance Extracted (AVE), Jöreskog's rho (ρc), and Cronbach's alpha coefficients. These complementary psychometric indicators provided a multidimensional assessment of measurement quality, establishing the methodological foundation for subsequent structural model evaluation and hypothesis testing. Table 2 presents the comprehensive psychometric properties of the five latent constructs that comprise the theoretical framework, encompassing both exogenous (predictor) and endogenous (criterion) variables that collectively constitute the hypothesized nomological network. This systematic evaluation of measurement properties is essential for establishing construct validity prior to examining structural relationships, as the validity of causal inferences derived from structural equation modeling is contingent upon the psychometric integrity of the measurement instruments employed. The tabulated results provide empirical evidence regarding the extent to which operational indicators adequately represent their respective theoretical constructs, thereby establishing the measurement foundation upon which subsequent structural analyses are predicated.

Table 2: The Reliability and Validity of Constructs.

Constructs	Code	N of Items	Cronbach's Alpha	Jöreskog's Rhos	Average Variance Extracted (AVE)
Data & Technology Infrastructure	DTI	13	0.965	0.969	0.704
Human Capital for AI	HCAI	14	0.975	0.978	0.759
Organizational AI Readiness	OAIR	5	0.937	0.952	0.798
Organizational Creativity	ORC	3	0.954	0.970	0.915
Organizational Sustainable Development	OSD	11	0.956	0.962	0.696

A comprehensive psychometric evaluation was conducted to establish the measurement integrity of the theoretical constructs through multiple complementary reliability and validity indices. The internal consistency reliability was assessed via two distinct estimators: Cronbach's alpha coefficients and Jöreskog's rho (composite reliability). As evidenced in the tabulated results, all latent constructs demonstrated exceptionally robust internal consistency reliability. The Cronbach's alpha coefficients exhibited a range from 0.937 (Organizational AI Readiness) to 0.975 (Human Capital for AI), substantially exceeding the conventional methodological threshold of 0.70 prescribed in psychometric literature, thereby confirming exceptional measurement consistency across all theoretical domains. Jöreskog's rho coefficients, which provide a more precise reliability estimation by accounting for indicator heterogeneity and error term correlations, demonstrated similarly robust results ranging from 0.952 to 0.978 across all constructs. These values significantly surpass the recommended psychometric threshold of 0.70, providing compelling corroborative evidence for construct reliability from a structural equation modeling perspective.

Convergent validity was systematically evaluated through Average Variance Extracted (AVE), which quantifies the proportion of indicator variance captured by the latent construct relative to measurement error. All constructs exhibited AVE values substantially exceeding the established methodological threshold of 0.50, ranging from 0.663 to 0.915, indicating that the majority of indicator variance is attributable to the underlying theoretical constructs rather than measurement error. Particularly noteworthy is the exceptional convergent validity demonstrated by Organizational Creativity (AVE = 0.915), suggesting that this construct captures an extraordinarily high proportion of the variance in its indicators, thereby minimizing measurement ambiguity. This comprehensive psychometric assessment provides compelling empirical evidence for the reliability and validity of the measurement model. The consistent pattern of robust reliability coefficients and substantial AVE values across all theoretical constructs establishes a methodologically sound foundation for subsequent structural analysis and hypothesis testing, thereby enhancing the validity of

causal inferences derived from the structural model.

Table 3: The Estimates of Path Coefficients (Total Effects).

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Data & Technology Infrastructure -> Organizational Creativity	-0.061	-0.054	0.084	0.726	0.468
Data & Technology Infrastructure -> Organizational Sustainable Development	0.496	0.500	0.114	4.351	0.000*
Human Capital for AI -> Organizational Creativity	0.154	0.159	0.148	1.043	0.297
Human Capital for AI -> Organizational Sustainable Development	-0.102	-0.103	0.158	0.645	0.519
Organizational AI Readiness -> Organizational Creativity	0.772	0.762	0.108	7.139	0.000*
Organizational AI Readiness -> Organizational Sustainable Development	0.413	0.412	0.137	3.020	0.003*
Organizational Creativity -> Organizational Sustainable Development	0.129	0.122	0.107	1.202	0.230

Note: *: sig at 5% and 1.

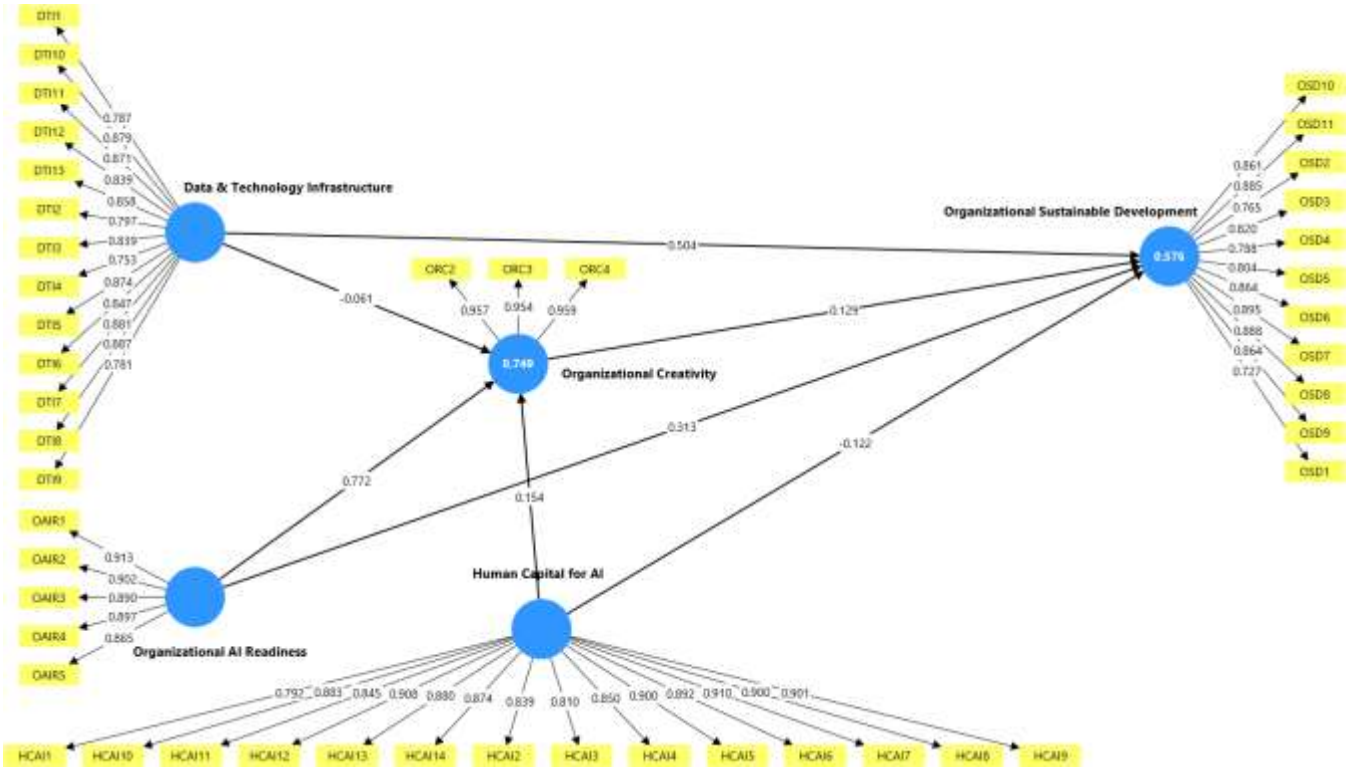

Figure 2: The Structural Model with Estimated Parameters.

The model exhibits an explanatory power of R^2 = 0.749 for Organizational Creativity and R^2 = 0.576 for Organizational Sustainable Development, indicating substantial variance explanation for both endogenous constructs. The overall structural configuration reveals that technological infrastructure and strategic readiness function as the primary drivers of sustainability outcomes, while human capital plays a surprisingly limited role despite extensive measurement. This empirical pattern necessitates theoretical reconsideration of the mechanisms through which AI capabilities translate into organizational outcomes within healthcare contexts.

4.4. Hypothesis Testing Results

The model fit indices present a mixed but generally acceptable picture of the structural equation model's alignment with observed data. The SRMR value of 0.061 indicates a good fit, falling well below the 0.08 threshold, suggesting minimal discrepancy between the implied and observed covariance matrices. The discrepancy measures (d_ULS = 4.073, d_G = 3.794) appear reasonable, though they require comparison with bootstrap confidence intervals for definitive interpretation.

Although the considerable chi-square value (3462.393) may suggest a poor fit, the metric's sensitivity to sample size limits its diagnostic value in PLS-SEM. The NFI of 0.738 falls short of the desired 0.90 threshold, indicating room for improvement in model specification. Overall, the model demonstrates an adequate fit based on primary indices (particularly SRMR). However, refinement could enhance its explanatory power, potentially through the addition of additional paths or improved measurement models for latent variables. Researchers should consider complementing these indices with CFI and RMSEA for a more comprehensive assessment.

Table 4: The Significance Analysis of the Direct and Indirect Effects.

	Hypotheses	Path	Effect type	t- values	p- values	Outcome	Hθ validation
H1	Organizational Creativity mediates the relationship between Data & Technology Infrastructure and Organizational Sustainable Development	DTI → ORC → OSD	Indirect (IDE)	0.542	0.588	Partially (DE with OSD) (DTI×OSD: p-v=0.000)	Partially supported
H2	Organizational Creativity mediates the relationship between Human Capital for AI and Organizational Sustainable Development.	HCAI → ORC → OSD	Indirect (IDE)	0.694	0.488	No (Neither direct nor indirect)	Rejected
H3	Organizational Creativity mediates the relationship between Organizational AI Readiness and Organizational Sustainable Development.	OAIR → ORC → OSD	Indirect (IDE)	1.173	0.241	Partially (DE with OSD) (OAIR×ORC: p-v=0.000/ OAIR×OSD: p-v=0.003)	Partially supported
H4	Higher levels of Organizational Creativity positively influence Organizational Sustainable Development.	ORC → OSD	Direct (DE)	1.202	0.230	No (Neither direct nor indirect)	Rejected
H5	AI Adoption (as a composite of DTI, HCAI, and OAIR) has a positive direct effect on Organizational Sustainable Development.	AI Adoption → OSD	Direct (DE)	DTI(4.351) OAIR(3.020) HCAI(0.645)	DTI(0.000) OAIR(0.003) HCAI(0.519)	Partially (DE between OSD, DTI, OAIR)	Partially supported

The analysis reveals mixed support for the hypothesized relationships between AI capabilities, organizational creativity, and sustainable development. While Data & Technology Infrastructure (DTI) and Organizational AI Readiness (OAIR) demonstrate significant direct effects on Organizational Sustainable Development (OSD) (p=0.000 and p=0.003 respectively), their proposed mediation through Organizational Creativity (ORC) receives only partial support. The indirect path from DTI to OSD via ORC is non-significant (p=0.588), though the direct DTI-OSD relationship remains strong, suggesting ORC does not meaningfully mediate this relationship. Similarly, OAIR shows significant direct effects on both ORC (p=0.000) and OSD, but the mediation path is weak (p=0.241), indicating only partial mediation. Human Capital for AI (HCAI) fails to show either direct (p=0.519) or indirect (p=0.488) effects on OSD, leading to complete rejection of H2. Notably, the hypothesized direct effect of ORC on OSD (H4) is unsupported (p=0.230), challenging the assumed centrality of creativity in driving sustainability. For the composite AI Adoption construct (H5), results are bifurcated: while DTI and OAIR components show strong direct effects on OSD, HCAI does not, yielding only partial support. These findings collectively suggest that while specific AI capabilities (particularly infrastructure and readiness) directly enhance sustainable development, organizational creativity plays a more limited role than anticipated, serving as neither a consistent mediator nor a direct driver of sustainability outcomes. The results underscore the need to reconceptualize the role of creativity in this framework and reconsider the inclusion of human capital elements in the AI adoption construct.

5. DISCUSSION

The empirical findings reveal a complex and nuanced relationship between AI capabilities and organizational sustainable development within the Saudi healthcare ecosystem, challenging several theoretical assumptions while reinforcing others. The statistically significant and substantial direct effects of Data & Technology Infrastructure (DTI) and Organizational AI Readiness (OAIR) on sustainable development outcomes provide robust support for

hypotheses H1 and H3, underscoring the strategic importance of technological infrastructure and organizational preparedness in driving sustainability transformations. However, these relationships manifest through distinct mechanisms that warrant critical examination. The strong direct effect of DTI (β = 0.504), coupled with its negligible influence on organizational creativity, suggests that technological infrastructure primarily enables sustainability through operational efficiencies and process optimization, rather than by stimulating innovative thinking. This finding problematizes techno-deterministic perspectives that assume technology inherently fosters creativity, instead suggesting a more nuanced relationship where technological systems provide the foundation for sustainability without necessarily catalyzing creative organizational processes. Perhaps most theoretically provocative is the non-significant impact of Human Capital for AI (HCAI) on both creativity and sustainable development, contradicting hypothesis H2 and challenging fundamental assumptions in knowledge-based perspectives of organizational performance. This unexpected finding suggests several critical interpretations: first, technical skills may be necessary but insufficient without complementary organizational capabilities that enable their effective deployment; second, contextual factors specific to the Saudi healthcare environment may inhibit the translation of human capital into organizational outcomes; and third, there may exist a threshold effect where human capital influences become significant only after reaching certain levels of organizational readiness and infrastructure development. The partial mediation role of organizational creativity substantiates hypothesis H4. However, its modest direct effect on sustainable development (β = 0.129) suggests that creative capacity alone provides a limited contribution to sustainability outcomes without supporting mechanisms that translate creative ideas into implemented innovations. This finding aligns with emerging critiques of creativity-centric approaches that neglect the importance of structured innovation processes and implementation capabilities. These empirical patterns find theoretical resonance within the complementary frameworks of Resource-Based View (RBV) and Dynamic Capabilities Theory (DCT). From an RBV perspective, the findings suggest that technological resources and organizational readiness represent more valuable, rare, and inimitable resources within the Saudi healthcare context compared to human capital resources. From a DCT perspective, the results highlight that the capacity to reconfigure technological resources (reflected in OAIR) may be more consequential than possessing specialized human capital without corresponding dynamic capabilities. The limited influence of organizational creativity on sustainable development contradicts established theoretical perspectives that position creativity as a central driver of organizational performance and innovation. This unexpected finding necessitates deeper theoretical examination. Several explanations may account for this result in the Saudi healthcare context: First, the translation gap between creative ideation and implemented innovation may be particularly pronounced in healthcare settings where regulatory compliance, patient safety considerations, and standardized protocols can constrain the implementation of novel approaches. Without robust implementation mechanisms that systematically transform creative ideas into operational practices, creative potential may remain unrealized in terms of sustainability outcomes. Second, the specific cultural and institutional characteristics of Saudi healthcare organizations may influence how creativity manifests and translates into organizational outcomes. The hierarchical decision-making structures, respect for authority, and collective orientation in Saudi organizational culture may create environments where creative ideas require explicit leadership endorsement and systematic implementation processes to influence organizational outcomes. Third, the temporal dynamics of creativity's influence may extend beyond our cross-sectional measurement framework. The benefits of organizational creativity might manifest over extended timeframes as creative solutions gradually permeate organizational practices and overcome initial implementation resistance. Longitudinal research designs might better capture these delayed effects of creative processes on sustainability outcomes. For Saudi healthcare institutions navigating the complex terrain of AI implementation amid the imperatives of Vision 2030, these findings carry significant implications. Healthcare administrators should prioritize investments in robust technological infrastructure and organizational readiness initiatives when implementing AI to achieve sustainable outcomes. Healthcare organizations must adopt a comprehensive implementation strategy that prioritizes establishing integrated data management infrastructures connecting clinical, administrative, and operational repositories as a prerequisite foundation before deploying advanced AI applications, while simultaneously developing

robust governance frameworks that delineate clear decision-making authorities, systematic implementation protocols, and multidimensional performance metrics beyond technical indicators. This foundation must be complemented by meticulously designed implementation pathways that systematically transform promising AI innovations into standardized organizational practices through rigorous pilot testing, clinical validation, and phased deployment approaches that mitigate disruption risks. Healthcare leaders should recalibrate human capital development initiatives to emphasize practical application, competencies, and implementation expertise, rather than isolated technical knowledge. This approach should embed these capabilities within multidisciplinary teams that combine clinical, operational, and technical perspectives. The cultivation of organizational cultures that equally value creative ideation and disciplined execution represents a critical success factor in bridging the implementation gap between AI's theoretical potential and realized sustainability outcomes, requiring leadership commitment to both innovation enablement and operational excellence to ensure technological investments translate into measurable improvements in organizational sustainability performance.

6. CONCLUSION

This investigation makes several distinctive contributions to understanding the complex interrelationships between AI capabilities, organizational creativity, and sustainable development within healthcare contexts. First, it empirically demonstrates the differential impact of distinct AI capability dimensions, revealing that Data & Technology Infrastructure and Organizational AI Readiness function as primary drivers of sustainability outcomes. At the same time, Human Capital for AI exhibits surprisingly limited influence despite theoretical expectations to the contrary. Second, it elucidates the nuanced mediating role of organizational creativity, which facilitates the translation of organizational readiness into sustainable outcomes, while demonstrating a limited capacity to transform technological infrastructure or human capital investments into sustainable practices. These findings substantially refine theoretical understanding of how technological capabilities interact with organizational processes to foster sustainability. They challenge simplistic linear models that assume uniform contributions from all AI capability dimensions and instead suggest a more complex interplay where specific capabilities exert differential effects through distinct pathways. The results necessitate a theoretical reconceptualization of how human capital contributes to organizational outcomes in technologically complex environments, suggesting that contextual enablers may be more critical than previously recognized. For policymakers and healthcare administrators in Saudi Arabia, this research provides empirically grounded guidance for strategic resource allocation amid ambitious Vision 2030 initiatives. The findings suggest that investments should prioritize the development of technological infrastructure and organizational readiness, while ensuring that human capital initiatives are integrated within broader transformation strategies rather than pursued as isolated interventions. Furthermore, creativity-enhancing efforts should be complemented by robust implementation mechanisms that ensure innovative ideas translate into sustainable practices. For healthcare administrators and policymakers implementing AI initiatives in Saudi Arabia, this research provides practical guidance through several actionable recommendations:

1. **Prioritize Technological Infrastructure Development before Advanced AI Applications**

Healthcare organizations should establish comprehensive data ecosystems by investing in integrated management systems that seamlessly connect clinical, administrative, and operational information, while implementing robust governance frameworks to ensure data quality, security, and accessibility. Simultaneously, they should implement foundational technologies, such as cloud computing and interoperability standards, that create the technical infrastructure necessary for the successful deployment and scaling of AI.

2. **Develop Comprehensive Organizational Readiness Strategies**

Organizations should establish transparent AI governance structures with clearly defined decision-making authorities and implementation protocols, complemented by systematic change management approaches that facilitate the smooth integration of AI across departments. Additionally, they should develop comprehensive evaluation metrics that measure AI implementation success beyond technical performance indicators, focusing on organizational impact, user adoption, and alignment with strategic sustainability objectives.

3. **Align Human Capital Development with Organizational Systems**

Healthcare institutions should design contextualized AI training programs that emphasize

practical applications within specific organizational workflows, while forming cross-functional implementation teams that blend technical expertise with deep operational knowledge. Simultaneously, they should cultivate leadership capabilities specifically focused on managing AI-driven organizational transformation, equipping executives with the strategic vision and change management skills needed to navigate the complex intersection of technology, healthcare operations, and sustainability objectives.

4. **Bridge the Creativity-Implementation Gap**

Healthcare organizations should establish structured implementation pathways that systematically transform creative AI solutions into standardized operational practices, while creating comprehensive innovation management processes that guide promising ideas from initial conception through validation, piloting, and full-scale deployment. These frameworks should be supported by balanced performance metrics that evaluate both the generation of creative AI applications and their successful implementation, ensuring that innovative potential translates into measurable sustainability improvements rather than remaining as unrealized concepts.

5. **Adapt Strategies to Saudi Healthcare's Unique Context**

Saudi healthcare institutions should strategically align their AI initiatives with the objectives of Vision 2030 and national healthcare transformation priorities, while thoughtfully considering the cultural factors that influence the adoption and implementation of technology within the Kingdom's unique social context. Organizations should also leverage existing regulatory frameworks and compliance requirements as constructive guardrails for the responsible implementation of AI, ensuring that technological innovations advance sustainability goals while maintaining alignment with national standards for healthcare quality, data protection, and ethical practice. Several limitations necessitate acknowledgment and suggest avenues for future research. The cross-sectional design precludes definitive causal inferences, suggesting value in longitudinal investigations that track how AI capabilities evolve and influence organizational outcomes over time. The Saudi healthcare context presents a unique institutional environment that may limit generalizability, underscoring the importance of comparative studies across different healthcare systems and cultural contexts. Additionally, the unexpectedly limited role of human capital warrants deeper investigation through mixed-methods approaches that can uncover potential contextual barriers and enablers not captured in quantitative instruments.

6.1. Future Research

Future scholarly inquiry should transcend linear conceptualizations to investigate the complex non-linear relationships and interactive effects among AI capability dimensions, particularly examining how technological infrastructure and organizational readiness may exhibit threshold effects or complementarities that amplify their collective impact on sustainable development outcomes. Given our findings regarding the primacy of organizational readiness, researchers should conduct fine-grained analyses of how leadership capabilities and governance mechanisms moderate the translation of AI potential into sustainability performance, with particular attention to how decision-making structures in hierarchical healthcare environments enable or constrain this relationship. Additionally, domain-specific investigations should differentiate between clinical diagnostic AI, administrative process automation, and operational decision support systems to determine their differential impacts across the economic, environmental, and social dimensions of organizational sustainability. The unexpectedly limited influence of human capital observed in our findings warrants deeper theoretical exploration through mixed-methods approaches that can illuminate the contextual barriers inhibiting the translation of technical expertise into organizational outcomes, particularly within Saudi Arabia's distinctive institutional environment. Longitudinal research designs could address the temporal limitations of our cross-sectional approach by tracking how the interrelationships between AI capabilities evolve through implementation maturity stages, potentially revealing delayed effects that were not captured in our measurement framework. Such multifaceted investigations would substantially advance theoretical understanding of the complex sociotechnical mechanisms through which healthcare organizations can strategically leverage AI capabilities to achieve sustainable development outcomes in increasingly complex environments characterized by technological interdependence, regulatory constraints, and evolving stakeholder expectations.

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