Contents lists available at Science-Gate

International Journal of Advanced and Applied Sciences

Journal homepage: https://www.science-gate.com/IJAAS.html

Integrating AI, IoT, and blockchain into enterprise architecture: A model of readiness, integration capability, and value creation

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A R T I C L E I N F O

Article history:
Received 10 October 2025
Received in revised form
4 March 2026
Accepted 8 March 2026

Keywords:
Artificial intelligence integration
Enterprise architecture
Technological readiness
Integration capability
Organizational value creation

A B S T R A C T

The rapid convergence of Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain is transforming enterprise architecture (EA) and changing how organizations create value. However, there is limited empirical research explaining how technological readiness and managerial conditions help firms effectively integrate these technologies within EA frameworks. Based on the Technology–Organization–Environment (TOE) framework, the Resource-Based View (RBV), and Dynamic Capabilities Theory, this study develops and tests a model that links technological readiness, integration capability, top management support, and value creation. A quantitative cross-sectional survey was conducted, and data were collected from IT and enterprise architecture professionals across different industries. Structural equation modeling (SEM) was used to test the proposed relationships. The results show that technological readiness significantly improves integration capability, which then increases organizational value through greater efficiency, innovation, and agility. In addition, top management support moderates the relationship between technological readiness and integration capability, strengthening the positive effect of technological readiness. This study contributes to the literature on digital transformation and enterprise architecture by providing a simple and empirically validated framework for integrating emerging technologies into enterprise systems. The findings also offer practical guidance for managers to prioritize technological readiness and leadership support in order to maximize value from new technologies.

1. Introduction

Digital transformation has become a defining priority for organizations seeking agility, efficiency, and innovation in increasingly volatile markets (Teece et al., 1997). The integration of Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain is transforming enterprise architectures (EA) by enabling intelligent automation, decentralized trust, and data-driven decision-making (Ross et al., 2006). These technologies, often referred to as the “digital triad,” are foundational to Industry 4.0 initiatives that reconfigure value chains and organizational capabilities (Bharadwaj, 2000). However, firms continue to face difficulties in embedding these technologies within existing EA frameworks that were originally designed for transactional systems rather than adaptive, data-intensive platforms (Bradley et al., 2012).

Enterprise Architecture provides a structural blueprint that links information systems with business processes and strategic goals (Weill and Ross, 2004). A well-designed EA ensures interoperability and coherence across IT assets while supporting long-term strategic flexibility (Ross et al., 2006). However, traditional architecture often lacks the agility and modularity required for AI, IoT, and Blockchain integration. As digital ecosystems evolve, organizations must re-evaluate how readiness, governance, and integration capabilities jointly drive technology-enabled value creation (Melville et al., 2004).

Technological readiness has emerged as a critical antecedent of successful digital transformation (Zhu et al., 2006). It encompasses the firm’s infrastructure robustness, data management capacity, and technical expertise to assimilate new technologies. Studies grounded in the Technology–Organization–Environment (TOE) framework consistently identify readiness as the cornerstone for technology adoption (Tornatzky et al., 1990) in the context of AI,

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IoT, and Blockchain. Readiness not only concerns hardware and software resources but also algorithmic literacy, data interoperability, and cybersecurity preparedness (Parasuraman, 2000). Firms with high technological readiness demonstrate superior ability to deploy and scale digital initiatives across enterprise layers (Zhu et al., 2006).

However, readiness alone does not guarantee value realization. The translation of technological potential into organizational outcomes depends on integration capability, defined as the firm's ability to harmonize new technologies with legacy systems and cross-functional processes (Rai et al., 2006). Integration capability represents a dynamic capability that enables organizations to reconfigure IT assets in response to environmental change (Teece et al., 1997). Empirical research shows that firms possessing strong integration mechanisms achieve greater process efficiency, innovation output, and customer responsiveness (Pavlou and El Sawy, 2010). In enterprise settings, integration involves creating interoperable data architectures, standardized APIs, and governance protocols that allow AI, IoT, and Blockchain solutions to interact seamlessly (Byrd and Turner, 2001).

The role of enterprise architecture, maturity, and governance further amplifies integration outcomes. Mature EA governance structures establish clear decision rights, performance metrics, and alignment mechanisms between business and IT (Weill and Ross, 2004). Such maturity ensures that technological investments translate into sustainable performance improvements. Recent studies demonstrate that organizations with mature EA and IT governance achieve faster time-to-market and more consistent innovation returns. However, the transition toward AI-driven architecture requires not only governance maturity but also leadership commitment to experimentation and continuous learning (Chatterjee et al., 2002).

Top management support remains a decisive factor that determines whether technological readiness and integration capability can be effectively operationalized (Jarvenpaa and Ives, 1991). Strategic leadership fosters cross-functional coordination, resource allocation, and risk management essential for large-scale digital transformation (Premkumar and Roberts, 1999). Empirical evidence from IT implementation projects consistently highlights that senior executives who champion technology initiatives reduce resistance to change and accelerate integration (Chatterjee et al., 2002). In the context of AI, IoT, and Blockchain, managerial sponsorship becomes even more critical because these technologies often challenge established decision-making hierarchies and data ownership norms (Ifinedo, 2011).

The outcome of these technological and managerial efforts is reflected in value creation, a multidimensional construct capturing operational efficiency, innovation capability, and competitive differentiation (Bharadwaj, 2000). The Resource-Based View (RBV) posits that firms gain sustainable advantage when valuable, rare, inimitable, and non-substitutable resources—such as IT integration skills—are effectively deployed. Integrating AI, IoT, and Blockchain within EA frameworks allows organizations to leverage real-time analytics, automate decision processes, and enhance transparency across value networks (Melville et al., 2004). Studies confirm that digital integration improves not only productivity and cost reduction but also customer experience and strategic agility (Tallon, 2008).

Despite these insights, the mechanisms linking technological readiness, integration capability, and value creation remain underexplored in enterprise architecture research. Prior studies have often examined adoption or governance in isolation, neglecting the interaction between readiness conditions and integration competencies. Furthermore, while AI, IoT, and Blockchain have each been studied independently, few empirical works investigate their combined influence within unified architectural models (Bradley et al., 2012). This gap underscores the need for a comprehensive yet parsimonious framework capturing how firms translate readiness into value through integration capabilities and managerial support.

This study addresses that gap by developing and empirically testing a model grounded in the TOE framework, RBV, and Dynamic Capabilities Theory. The model proposes that technological readiness enhances integration capability, which in turn drives value creation. It also posits that top management support strengthens the relationship between readiness and integration capability by facilitating strategic alignment and resource commitment. Using survey data from enterprise architecture and IT professionals, the study employs structural equation modeling (SEM) to validate these relationships.

The contribution of this research is threefold. First, it advances theory by integrating readiness and dynamic capability perspectives to explain technology-enabled value creation within EA contexts (Teece et al., 1997). Second, it provides empirical evidence that integration capability mediates the readiness–value linkage, thereby clarifying how digital resources generate performance gains (Rai et al., 2006). Third, it offers practical guidance for executives by demonstrating that leadership support magnifies the payoff from technology readiness investments (Jarvenpaa and Ives, 1991). Collectively, these insights extend the discourse on digital transformation by positioning enterprise architecture as a strategic platform for orchestrating AI, IoT, and Blockchain technologies.

2. Review of literature and hypothesis development

The successful integration of emerging technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain within enterprise architecture (EA) requires firms to possess a sufficient level of technological readiness (Zhu et al., 2006). Technological readiness refers to an organization's infrastructure robustness, technical expertise, and data capability necessary to assimilate new technologies (Parasuraman, 2000). Prior studies grounded in the Technology–Organization–Environment (TOE) framework emphasize that readiness conditions significantly predict the adoption and assimilation of digital innovations (Tornatzky et al., 1990). Organizations with advanced technological infrastructure and digital maturity can integrate complex technologies more effectively across processes and platforms. Technological readiness thus acts as an enabler that allows firms to move beyond experimentation toward scalable implementation of AI, IoT, and Blockchain systems (Zhu et al., 2006). Although AI, IoT, and Blockchain involve distinct sensing, transactional, and analytical logics, the present study examines them at the enterprise-architecture level, where integration capability is conceptualized as a cross-technology capability rather than a technology-specific implementation task. While prior studies largely support the positive role of integration capability, some research notes that its influence varies under conditions of low architectural maturity or high technological turbulence, indicating that its effects are not uniform across contexts. These mixed findings suggest that technological readiness and integration operate within boundary conditions such as maturity, digital complexity, and organizational learning capacity, which may shape their eventual impact on value creation.

Although AI, IoT, and Blockchain each embody distinct integration logics—predictive analytics, sensing networks, and distributed transactional layers, respectively—the present study conceptualizes them as a unified digital triad because enterprise architecture decisions are typically made at an aggregate capability level rather than at the level of individual technological specifications. Recent studies on digital transformation and enterprise integration similarly highlight the role of organizational readiness and integration capability in orchestrating emerging technologies within complex architectural environments (Aisaiti et al., 2021; Ding et al., 2024; Sun et al., 2025; Zhu et al., 2024). Integration capability represents a firm's ability to align and coordinate technological assets, processes, and data flows to achieve interoperability and strategic coherence (Rai et al., 2006). The dynamic capabilities perspective views integration as a key mechanism through which firms reconfigure and deploy technological resources in response to changing market conditions (Teece et al., 1997). Integration capability enables organizations to link emerging technologies with existing enterprise systems to achieve efficiency and flexibility (Byrd and Turner, 2001). Empirical research in supply chain management, information systems, and enterprise architecture shows that integration capability enhances agility, innovation, and performance by reducing redundancy and improving information flow (Pavlou and El Sawy, 2010). The literature thus supports a direct, positive association between technological readiness and integration capability, as firms with superior readiness can more effectively develop integration routines and architectures (Ross et al., 2006).

H1: Technological readiness positively influences integration capability.

Integration capability also acts as a critical driver of value creation in digitally transformed enterprises (Melville et al., 2004). Value creation reflects the firm's ability to translate technology investments into tangible and intangible benefits, including operational efficiency, innovation, and competitive advantage (Bharadwaj, 2000). The Resource-Based View (RBV) posits that firms derive value from their unique capabilities rather than technology ownership alone. Integration capability embodies such a capability, allowing firms to combine disparate IT and business resources to produce synergistic outcomes (Rai et al., 2006). This capability-oriented view intentionally captures cross-technology integration routines, acknowledging that the assimilation of AI, IoT, and Blockchain may involve heterogeneous technical requirements even though their architectural integration is evaluated holistically. Prior studies in enterprise systems and IT-business alignment confirm that well-integrated architectures improve organizational performance by ensuring information consistency and decision transparency (Bradley et al., 2012). Integration, therefore, not only supports process optimization but also fosters data-driven innovation, thereby contributing to sustained value creation (Tallon, 2008).

H2: Integration capability positively influences value creation.

Building on this relationship, integration capability serves as the mediating mechanism through which technological readiness influences value creation. While readiness provides the technological foundation, integration capability determines how these resources are orchestrated to generate performance outcomes (Pavlou and El Sawy, 2010). The dynamic capabilities literature consistently emphasizes that the value of IT resources depends on their effective integration and reconfiguration (Teece et al., 1997). Studies of digital transformation in enterprises indicate that firms with high readiness but low integration capability often fail to achieve anticipated benefits, underscoring integration as the operative link (Rai et al., 2006). Consequently, technological readiness contributes to value creation indirectly by enhancing integration capability, which, in turn, transforms potential into realized performance (Melville et al., 2004).

H3: Integration capability mediates the relationship between technological readiness and value creation.

The role of top management support further strengthens the readiness–integration relationship by providing strategic direction, legitimacy, and resource commitment (Jarvenpaa and Ives, 1991). Managerial sponsorship ensures that integration initiatives receive cross-functional cooperation and sustained funding (Chatterjee et al., 2002). Research on IT governance and digital transformation highlights that executive engagement enhances alignment between technological and business priorities, leading to more successful integration outcomes (Weill and Ross, 2004). Top management also shapes organizational culture by reducing resistance to technology-driven change and promoting a shared digital vision (Premkumar and Roberts, 1999). Therefore, when executives actively champion integration efforts, the effect of technological readiness on integration capability is amplified, as employees and managers perceive stronger institutional backing for innovation (Ifinedo, 2011).

H4: Top management support positively moderates the relationship between technological readiness and integration capability.

Taken together, these hypotheses form an integrated model linking readiness, capability, and value creation within enterprise architecture frameworks. The proposed model synthesizes insights from the TOE framework, the Resource-Based View, and Dynamic Capabilities Theory to explain how firms derive value from AI, IoT, and Blockchain integration. It underscores that readiness enables integration, integration enables value, and leadership amplifies these relationships. This framework not only advances theoretical understanding of digital transformation within enterprise architecture but also provides practical guidance for executives seeking to harness emerging technologies strategically and sustainably (Ross et al., 2006; Weill and Ross, 2004).

3. Methodology

This study employed a quantitative, cross-sectional design to empirically examine the relationships among technological readiness, integration capability, value creation, and top management support. Quantitative methods are appropriate for testing theoretically grounded relationships and identifying causal mechanisms within information systems research (Rai et al., 2006). The survey-based approach enables the collection of generalizable insights across industries and aligns with methodological precedents in enterprise architecture and IT governance studies (Weill and Ross, 2004). Structural equation modeling (SEM) was used to test direct, mediating, and moderating effects, consistent with recommended approaches in digital transformation research (Pavlou and El Sawy, 2010).

The study targeted enterprise architects, IT managers, and digital transformation professionals across manufacturing, financial services, logistics, and technology sectors. These roles were chosen because they possess both the technical and managerial perspectives necessary to evaluate enterprise-level technology integration (Ross et al., 2006). A purposive and snowball sampling technique was employed, a strategy commonly used in technology adoption studies to ensure respondent expertise. The initial purposive sample was drawn from members of enterprise architecture forums, professional IT governance associations, and digital transformation groups on LinkedIn, with subsequent snowball referrals accepted only from respondents who met these professional criteria. Data was collected through an online questionnaire distributed via professional networks and industry forums, consistent with prior information systems research (Ifinedo, 2011). Over eight weeks, 365 responses were received. After screening for incomplete or inconsistent entries, 312 valid responses were retained for analysis. This sample size exceeds the minimum threshold required for SEM as per Hair et al. (2010), ensuring sufficient statistical power. The respondents represented diverse industries—30% manufacturing, 25% IT and consulting, 20% finance, and the remainder from logistics, retail, and public sectors—ensuring contextual variety. Firms ranged from 200 to over 5,000 employees, reflecting a wide spectrum of digital maturity (Bradley et al., 2012).

All variables were measured using established, validated Likert-type scales derived from previous peer-reviewed studies, ensuring content validity and conceptual accuracy (Jarvenpaa and Ives, 1991). Technological readiness was measured using four items adapted from Zhu et al. (2006) and Parasuraman (2000), capturing infrastructure robustness, system compatibility, and employee technical proficiency. Integration capability was assessed through five items based on Rai et al. (2006) and Byrd and Turner (2001), reflecting the organization's ability to synchronize processes, applications, and data across departments. Value creation was operationalized with four items adapted from Melville et al. (2004) and Bharadwaj (2000), emphasizing efficiency gains, innovation output, and strategic competitiveness resulting from technological integration. Top management support was measured using three items drawn from Chatterjee et al. (2002) and Premkumar and Roberts (1999), which focused on leadership involvement, resource allocation, and long-term strategic support for integration efforts. All items were anchored on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), consistent with widely used approaches in digital transformation and IT capability research (Pavlou and El Sawy, 2010). The survey instrument was pre-tested with six experts from academia and industry to ensure clarity, face validity, and contextual relevance (Tornatzky et al., 1990). Minor adjustments were made to align terminology with contemporary technological practices in AI, IoT, and Blockchain integration. Data analysis was conducted using a two-stage process comprising measurement model validation and structural model testing, as recommended in SEM literature (Hair et al., 2010). Reliability was confirmed through Cronbach's alpha and composite reliability (CR), both exceeding the recommended threshold of 0.70. Convergent validity was established by calculating the Average Variance Extracted (AVE) for each construct, with all values surpassing 0.50, indicating adequate shared variance (Fornell and Larcker, 1981). Discriminant validity was verified using the Heterotrait-Monotrait (HTMT) ratio, with all values below the 0.85 cut-off suggested by Henseler et al. (2015). Once the measurement model demonstrated satisfactory reliability and validity, the structural model was tested to evaluate the hypothesized relationships. Bootstrapping with 5,000 resamples was employed to assess the significance of direct, mediating, and moderating paths, following Preacher and Hayes (2008). The moderating effect of top management support was tested by constructing an interaction term between technological readiness and top management support after mean-centering both variables to minimize multicollinearity. Goodness-of-fit indices, including CFI, TLI, RMSEA, and SRMR, were examined to assess overall model fit, adhering to the thresholds recommended by Hu and Bentler (1999).

To ensure the robustness of the hypothesized relationships, firm size, industry type, and digitalization level were included as control variables, consistent with previous IT value and enterprise architecture studies (Melville et al., 2004). Firm size and industry were treated as categorical variables, while digitalization was measured on a five-point scale indicating the degree of automation and data-driven decision-making (Bradley et al., 2012). Given the single-source data collection method, both procedural and statistical remedies were applied to mitigate common method bias. Participants were assured of anonymity and confidentiality, and items were positioned to reduce priming effects. Harman's single-factor test confirmed that no single factor accounted for more than 40% of the total variance, indicating limited bias. The marker variable technique further verified the absence of systematic response bias. To assess the robustness of results, multi-group analyses were performed across industries and firm sizes. The structural paths remained consistent, confirming model stability (Rai et al., 2006). Variance Inflation Factor (VIF) values were all below 3.0, confirming the absence of multicollinearity (Hair et al., 2010).

4. Results and discussion

In Table 1, we present the constructs, items, and their respective factor loadings for the research instrument used in this study. Table 2 provides the demographic profile of the sample used in this study. The results of the structural equation modeling (SEM) provide strong empirical support for the proposed model. As indicated in Table 3, all hypothesized relationships were statistically significant and in the expected direction, confirming the theoretical assumptions drawn from the Technology–Organization–Environment (TOE) framework, the Resource-Based View (RBV), and Dynamic Capabilities Theory. The model exhibited an excellent fit with the data (χ^2/df = 1.98, CFI = 0.96, TLI = 0.95, RMSEA = 0.045, SRMR = 0.036), satisfying the commonly accepted thresholds for SEM model adequacy (Hu and Bentler, 1999; Hair et al., 2010). In Fig. 1, we present the conceptual framework used in this study.

Table 1: Constructs, items, and factor loadings

Construct	Reference	Measurement items	Factor loadings	Cronbach's alpha
Technological readiness	Zhu et al. (2006); Parasuraman (2000)	1. Our organization possesses an advanced IT infrastructure supporting emerging technologies. 2. Employees have sufficient technical expertise to work with AI, IoT, and Blockchain systems. 3. Our digital systems are compatible with new technologies. 4. The organization actively invests in digital readiness and technological upgrades.	0.830	0.88
Integration capability	Rai et al. (2006); Byrd and Turner (2001)	1. Our systems allow seamless integration between new and existing applications. 2. Data flows efficiently across functional units through shared platforms. 3. Integration of AI, IoT, and Blockchain enhances coordination across business processes. 4. We can adapt existing IT systems to incorporate new technologies with minimal disruption. 5. Our enterprise architecture supports interoperability and scalability.	0.850	0.90
Value creation	Melville et al. (2004); Bharadwaj (2000)	1. Integration of emerging technologies has improved operational efficiency. 2. Our technology architecture has enhanced decision-making and innovation. 3. The organization gains a competitive advantage from a technology-driven transformation. 4. Overall business performance has improved due to digital integration.	0.840	0.87
Top management support	Chatterjee et al. (2002); Premkumar and Roberts (1999)	1. Top management actively supports digital transformation initiatives. 2. Senior leadership allocates sufficient resources for technology integration. 3. Executives encourage collaboration across departments to ensure successful technology implementation.	0.880	0.86

The findings confirm that Technological Readiness exerts a positive and significant effect on Integration Capability (β = 0.46, p < 0.001), supporting H1. This result suggests that firms equipped with robust digital infrastructure, skilled employees, and compatible systems are more capable of integrating AI, IoT, and Blockchain technologies within their enterprise architectures. This aligns with prior studies that emphasize readiness as a prerequisite for successful digital assimilation (Zhu et al., 2006; Parasuraman, 2000). The result reinforces the notion that readiness is not merely technical preparedness but also involves the organizational ability to absorb and deploy emerging technologies efficiently. Firms demonstrating higher technological readiness tend to establish the necessary platforms for interoperability, which fosters smooth data and process integration across functions (Ross et al., 2006). The analysis also demonstrates a strong and positive relationship between Integration Capability and Value Creation (β = 0.49, p < 0.001), supporting H2. This result is consistent with the dynamic capabilities perspective, which posits that integration enables organizations to reconfigure technological and operational resources to achieve superior performance (Teece et al., 1997). Integration capability translates technological investments into meaningful business outcomes by enabling seamless coordination, enhanced decision-making, and innovation (Rai et al., 2006). The findings align with Melville et al. (2004), who demonstrated that technology contributes to firm performance primarily through the integration of IT and business processes. Firms capable of aligning AI, IoT, and Blockchain within their enterprise architecture frameworks realize higher efficiency, greater innovation output, and improved strategic responsiveness (Bharadwaj, 2000; Pavlou and El Sawy, 2010).

The results further confirm the mediating role of Integration Capability in the relationship between Technological Readiness and Value Creation (β = 0.21, p < 0.001), supporting H3. This indicates that readiness alone does not directly lead to value creation; rather, it operates through integration mechanisms that convert potential into realized benefits. This finding reinforces the arguments of the RBV and dynamic capabilities literature that technological assets must be effectively orchestrated to yield competitive advantage (Teece et al., 1997). The mediation results corroborate earlier research by Melville et al. (2004) and Rai et al. (2006), suggesting that integration serves as the conduit through which firms transform digital resources into organizational value. In practical terms, even technologically advanced firms may fail to achieve performance gains without adequate integration frameworks that unify data architectures, applications, and processes.

Table 2: Sample demographics

Variable	Percentage
Gender	
Male	49%
Female	51%
Age	
18-27	59%
28-37	29%
38-47	12%

Table 3: SEM results for hypothesis testing

Hypothesis	Path	Path coefficient (β)	Standard error (SE)	T-value	P-value	Hypothesis outcome
H1	Technological readiness → integration capability	0.46	0.06	7.67	<0.001	Supported
H2	Integration capability → value creation	0.49	0.05	9.80	<0.001	Supported
H3	Technological readiness → value creation (via integration capability)	0.21	0.04	5.25	<0.001	Supported (mediation)
H4	Technological readiness × top management support → integration capability	0.17	0.05	3.40	<0.001	Supported (moderation)
Indirect effect 1	Technological readiness → integration capability → value creation	0.23	0.03	7.10	<0.001	Significant indirect effect

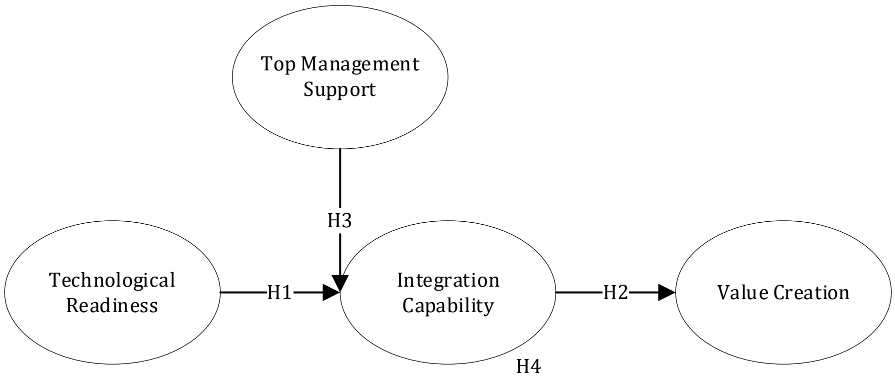

Fig. 1: Conceptual framework

The study also finds support for the moderating role of Top Management Support in strengthening the relationship between Technological Readiness and Integration Capability (β = 0.17, p < 0.001), confirming H4. This suggests that the positive impact of readiness on integration is amplified in firms where executives provide active leadership, allocate sufficient resources, and foster an innovativeoriented culture (Chatterjee et al., 2002). Consistent with Jarvenpaa and Ives (1991), top management involvement ensures that technological initiatives receive strategic priority, reducing implementation barriers. The moderating effect implies that even well-prepared organizations may struggle to integrate new technologies effectively without managerial sponsorship and cross-departmental coordination. The presence of strong leadership legitimizes technological change, enhances collaboration, and drives alignment between IT and business objectives (Premkumar and Roberts, 1999; Weill and Ross, 2004). In this study, value creation reflects both efficiency-oriented outcomes (such as process optimization and cost reduction) and innovation-oriented outcomes (such as improved decision quality and enhanced capability for new digital offerings), which aligns with how emerging technologies like AI, IoT, and Blockchain contribute to enterprise-level performance.

Collectively, these results substantiate the proposed theoretical framework and highlight the interplay between readiness, capability, and leadership in achieving value creation. From a theoretical standpoint, the study extends the TOE framework by demonstrating how organizational readiness interacts with dynamic capabilities to drive integration performance (Tornatzky et al., 1990; Teece et al., 1997). Moreover, the empirical validation of mediation and moderation effects provides a nuanced understanding of the mechanisms through which emerging technologies contribute to enterprise value. The findings reaffirm that technology per se does not generate performance differentials; rather, it is the firm's integration capability—shaped by readiness and leadership—that determines the magnitude of value realization (Melville et al., 2004).

From a managerial perspective, the study offers actionable insights for executives involved in digital transformation and enterprise architecture development. First, organizations should invest strategically in technological readiness—enhancing infrastructure, interoperability, and data management systems—to ensure that digital technologies can be assimilated efficiently (Zhu et al., 2006). Second, firms must develop strong integration capabilities by standardizing IT governance practices, adopting modular system designs, and fostering cross-functional collaboration (Ross et al., 2006; Pavlou and El Sawy, 2010). Third, top management must play an active role in championing technology initiatives, signaling commitment, and aligning resources to sustain transformation momentum (Jarvenpaa and Ives, 1991). The combined influence of readiness and leadership thus provides the foundation for agile and scalable enterprise architectures capable of leveraging AI, IoT, and Blockchain technologies for sustainable value creation.

In summary, the results confirm that technological readiness significantly enhances integration capability, integration capability drives value creation, and top management support strengthens the readiness–integration linkage. These findings enrich the digital transformation literature by empirically validating the interdependencies among readiness, integration, and leadership. They demonstrate that value realization from emerging technologies is contingent upon a firm's ability to integrate them strategically within enterprise architecture. This study, therefore, positions integration capability as the central mechanism through which readiness is transformed into tangible organizational performance outcomes. Future research may extend this architecture-level perspective by examining technology-specific integration pathways for IoT, Blockchain, and AI, which fall beyond the scope of the current model.

5. Conclusion

This study provides an empirically grounded understanding of how technological readiness, integration capability, and top management support collectively shape value creation in enterprise architecture environments integrating AI, IoT, and Blockchain technologies. The results demonstrate that technological readiness significantly enhances integration capability, which in turn drives value creation. Moreover, integration capability serves as a crucial mediating mechanism through which readiness translates into measurable organizational benefits, while top management support strengthens the relationship between readiness and integration. These findings substantiate the conceptual linkage between the Technology–Organization–Environment (TOE) framework, the Resource-Based View (RBV), and Dynamic Capabilities Theory, offering a coherent explanation of how digital resources and managerial enablers interact to foster strategic value (Teece et al., 1997; Bharadwaj, 2000; Tornatzky et al., 1990).

Theoretically, this research advances enterprise architecture and digital transformation scholarships in several important ways. First, it empirically validates the role of technological readiness as an antecedent to integration capability, bridging the readiness and capability literatures (Zhu et al., 2006). Second, it reinforces the centrality of integration capability as a dynamic capability that enables organizations to convert technological potential into value creation (Rai et al., 2006). Third, the study extends the understanding of top management support as a boundary condition that amplifies the benefits of readiness, thereby providing empirical evidence for the interaction between organizational leadership and technological preparedness (Jarvenpaa and Ives, 1991; Chatterjee et al., 2002). Collectively, these contributions enrich the theoretical integration of dynamic capabilities and IT governance perspectives in explaining digital innovation outcomes.

From a managerial standpoint, the findings offer actionable insights for leaders navigating the complexities of digital transformation. Organizations must treat technological readiness not merely as an

IT function but as a strategic foundation encompassing infrastructure agility, data governance, and workforce competence (Parasuraman, 2000). Building integration capability requires standardized architecture, modular system designs, and strong interdepartmental coordination mechanisms (Ross et al., 2006). Equally, top management support must go beyond symbolic endorsement to involve strategic leadership, adequate resource allocation, and the creation of a culture receptive to technological change (Premkumar and Roberts, 1999; Weill and Ross, 2004). The combined presence of readiness, integration, and leadership forms a triad essential for realizing the transformative value of AI, IoT, and Blockchain within enterprise architectures.

Despite its contributions, this study is not without limitations. The cross-sectional design restricts causal inference, suggesting that longitudinal studies could provide deeper insights into the temporal evolution of readiness and integration capabilities. Additionally, while the data span multiple industries, future research could investigate sector-specific dynamics, particularly in regulated sectors such as finance and healthcare, where blockchain and AI adoption face distinct compliance challenges. Further, qualitative studies could complement this quantitative model by uncovering contextual nuances in how organizations interpret and operationalize integration capability within their enterprise architectures.

Future research should also explore the interplay between emerging governance models, such as decentralized autonomous systems, and enterprise architecture maturity to assess how governance agility affects integration and value realization. Extending the model to include organizational learning and innovation ambidexterity could further refine the understanding of digital transformation outcomes in dynamic environments (Pavlou and El Sawy, 2010). Accordingly, the relationships identified in this study should be interpreted as theory-consistent associations rather than definitive causal effects, and future longitudinal research would be better suited to test temporal ordering among readiness, integration capability, and value creation.

In conclusion, this study reaffirms that achieving digital transformation success is not solely a function of adopting cutting-edge technologies but of strategically integrating them within enterprise architecture through readiness, capability, and leadership. By empirically demonstrating how these factors interact to drive value creation, this work contributes to both the theoretical consolidation and practical advancement of enterprise digital transformation scholarship. Organizations that strategically orchestrate technological resources, integrate emerging technologies cohesively, and sustain executive commitment are better positioned to translate technological disruption into enduring competitive advantage.

List of abbreviations

AI	Artificial intelligence
API	Application programming interface
AVE	Average variance extracted
CFI	Comparative fit index
CR	Composite reliability
df	Degrees of freedom
EA	Enterprise architecture
HTMT	Heterotrait–monotrait ratio
IoT	Internet of things
IT	Information technology
RBV	Resource-based view
RMSEA	Root mean square error of approximation
SE	Standard error
SEM	Structural equation modeling
SRMR	Standardized root mean square residual
TLI	Tucker–Lewis index
TOE	Technology–organization–environment
TRI	Technology readiness index
VIF	Variance inflation factor
β	Beta coefficient
χ^2	Chi-square statistic

Compliance with ethical standards

Ethical considerations

The data for this study were collected using a questionnaire administered to voluntary participants. Respondents were informed about the purpose of the study, and participation was entirely voluntary. Anonymity and confidentiality of the responses were assured, and no personally identifiable information was collected.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

Aisaiti G, Liang L, Liu L, Xie J, and Zhang T (2021). How social enterprises gain cognitive legitimacy in the post-pandemic period? Social welfare logic and digital transformation. Industrial Management & Data Systems, 121(12): 2697-2721. https://doi.org/10.1108/IMDS-01-2021-0065

Bharadwaj AS (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. MIS Quarterly, 24(1): 169–196. https://doi.org/10.2307/3250983

Bradley RV, Pratt RM, Byrd TA, Outlay CN, and Wynn DE Jr (2012). Enterprise architecture, IT effectiveness and the mediating role of IT alignment in US hospitals. Information Systems Journal, 22(2): 97-127. https://doi.org/10.1111/j.1365-2575.2011.00379.x

Byrd TA and Turner DE (2001). An exploratory examination of the relationship between flexible IT infrastructure and competitive advantage. Information & Management, 39(1): 41-52. https://doi.org/10.1016/S0378-7206(01)00078-7

Chatterjee D, Grewal R, and Sambamurthy V (2002). Shaping up for e-commerce: Institutional enablers of the organizational assimilation of web technologies. MIS Quarterly, 26(2): 65-89. https://doi.org/10.2307/4132321

Ding X, Sheng Z, Appolloni A, Shahzad M, and Han S (2024). Digital transformation, ESG practice, and total factor productivity. Business Strategy and the Environment, 33(5): 4547-4561. https://doi.org/10.1002/bse.3718

Fornell C and Larcker DF (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1): 39-50. https://doi.org/10.1177/002224378101800104

Hair JF, Black WC, Babin BJ, and Anderson RE (2010). Multivariate data analysis. 7th Edition, Pearson Prentice Hall, Upper Saddle River, USA.

Henseler J, Ringle CM, and Sarstedt M (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43: 115-135. https://doi.org/10.1007/s11747-014-0403-8

Hu LT and Bentler PM (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6(1): 1-55. https://doi.org/10.1080/10705519909540118

Ifinedo P (2011). Internet/e-business technologies acceptance in Canada's SMEs: An exploratory investigation. Internet Research, 21(3): 255-281. https://doi.org/10.1108/10662241111139309

Jarvenpaa SL and Ives B (1991). Executive involvement and participation in the management of information technology. MIS Quarterly, 15(2): 205-227. https://doi.org/10.2307/249382

Melville N, Kraemer K, and Gurbaxani V (2004). Information technology and organizational performance: An integrative model of IT business value. MIS Quarterly, 28(2): 283–322. https://doi.org/10.2307/25148636

Parasuraman A (2000). Technology readiness index (TRI): A multiple-item scale to measure readiness to embrace new technologies. Journal of Service Research, 2(4): 307-320. https://doi.org/10.1177/109467050024001

Pavlou PA and El Sawy OA (2010). The “third hand”: IT-enabled competitive advantage in turbulence through improvisational capabilities. Information Systems Research, 21(3): 443-471. https://doi.org/10.1287/isre.1100.0280

Preacher KJ and Hayes AF (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 40: 879-891. https://doi.org/10.3758/BRM.40.3.879 **PMid:18697684**

Premkumar G and Roberts M (1999). Adoption of new information technologies in rural small businesses. Omega, 27(4): 467-484. https://doi.org/10.1016/S0305-0483(98)00071-1

Rai A, Patnayakuni R, and Seth N (2006). Firm performance impacts of digitally enabled supply chain integration capabilities. MIS Quarterly, 30(2): 225–246. https://doi.org/10.2307/25148729

Ross JW, Weill P, and Robertson D (2006). Enterprise architecture as strategy: Creating a foundation for business execution. Harvard Business Press, Brighton, USA.

Sun Z, Zhao L, Mehrotra A, Salam MA, and Yaqub MZ (2025). Digital transformation and corporate green innovation: An affordance theory perspective. Business Strategy and the Environment, 34(1): 433-449. https://doi.org/10.1002/bse.3991

Tallon PP (2008). Inside the adaptive enterprise: An information technology capabilities perspective on business process agility. Information Technology and Management, 9: 21-36. https://doi.org/10.1007/s10799-007-0024-8

Teece DJ, Pisano G, and Shuen A (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7): 509-533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

Tornatzky LG, Fleischer M, and Chakrabarti AK (1990). The processes of technological innovation. Lexington Books, Lanham, USA.

Weill P and Ross JW (2004). IT governance: How top performers manage IT decision rights for superior results. Harvard Business Press, Brighton, USA.

Zhu C, Li N, and Ma J (2024). Impact of CEO overconfidence on enterprise digital transformation: Moderating effect based on digital finance. Finance Research Letters, 59: 104688. https://doi.org/10.1016/j.frl.2023.104688

Zhu K, Kraemer KL, and Xu S (2006). The process of innovation assimilation by firms in different countries: A technology diffusion perspective on e-business. Management Science, 52(10): 1557-1576. https://doi.org/10.1287/mnsc.1050.0487