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ARTIFICIAL INTELLIGENCE ADOPTION IN ENTERPRISES: A LAYERED CAPABILITY FRAMEWORK FOR EMERGING ECONOMIES

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ABSTRACT

Artificial Intelligence (AI) is increasingly recognized as a foundational technology for enterprise competitiveness in the digital economy. However, limited research explains how AI capabilities create enterprise value in emerging economies with uneven digital readiness. This study synthesizes the mechanisms of AI-driven value creation and examines structural barriers to enterprise AI adoption in Vietnam. Using a qualitative conceptual research design based on secondary data, the study integrates the Resource-Based View (RBV) with a four-layer AI framework covering data, algorithms, infrastructure, and applications. The findings suggest that AI creates enterprise value through cognitive automation, decision intelligence, and business model innovation, but their effectiveness depends on data governance, digital leadership, human capital, financial readiness, and regulatory support. In Vietnam, adoption is constrained by fragmented data systems, shortages of skilled AI professionals, limited SME investment capacity, and evolving governance frameworks. This study contributes a conceptual synthesis linking AI capability layers to enterprise value creation and provides implications for managers and policymakers seeking to accelerate responsible AI adoption.

Keywords: Artificial intelligence, AI capability, digital transformation, Resource-Based View, enterprise AI.

1. INTRODUCTION

Artificial Intelligence (AI) has evolved from narrow automation tools into general-purpose technologies capable of transforming entire business ecosystems. The rapid emergence of generative AI systems, such as ChatGPT developed by OpenAI, has significantly accelerated enterprise-level experimentation and large-scale adoption across industries. As a result, AI is increasingly recognized as a foundational driver of digital transformation and competitive restructuring.

Compared with prior studies on AI capability and digital transformation, this study does not attempt to introduce a completely new technological taxonomy. Instead, its contribution lies in synthesizing dispersed AI capability dimensions into an integrated four-layer analytical framework tailored to the conditions of emerging economies. The framework specifically emphasizes the interaction between technological components and organizational readiness factors, which remain underexplored in the context of Vietnam.

Furthermore, this research should be understood as a conceptual synthesis study grounded in secondary evidence rather than an empirical validation model. The proposed framework is therefore intended to provide analytical structure and contextual interpretation for future empirical research on enterprise AI adoption.

AI is projected to contribute up to USD 15.7 trillion to the global economy by 2030 [1]. At the firm level, At the firm level, the most recent McKinsey Global Survey on AI reveals that 65% of respondents indicate their organizations are now regularly utilizing generative AI [2], indicating a transition from experimental adoption to strategic deployment. These developments suggest that AI is no longer merely a technological innovation but a strategic production factor comparable to capital and labor.

In Vietnam, Decision No. 127/QĐ-TTg, which approved the National Strategy on AI Development to 2030, reflects the government's ambition to position the country among ASEAN leaders in AI research and application. Despite this favorable policy direction, enterprise readiness remains uneven. Many organizations—particularly small and medium-sized enterprises (SMEs)—continue to face constraints related to data infrastructure, human capital, financial resources, and organizational capabilities.

This gap between AI's projected economic potential and its actual implementation highlights a critical research problem. While prior studies have extensively examined AI technologies and their applications, limited attention has been given to the mechanisms through which AI creates enterprise value and the structural conditions that determine its effectiveness in emerging economies such as Vietnam.

To address this gap, this study aims to analyze how AI generates value at the enterprise level and to identify the key structural factors influencing its implementation outcomes. The study adopts the Resource-Based View (RBV) as a theoretical foundation and proposes a four-layer enterprise AI framework to explain how data, algorithms, infrastructure, and applications interact to create measurable economic value.

By integrating technological and organizational perspectives, this research contributes to the literature by providing a structured explanation of AI-driven value creation in emerging markets, while offering practical insights for policymakers and business leaders seeking to accelerate AI adoption.

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

2.1. Resource-based view (RBV)

The Resource-Based View (RBV) posits that sustainable competitive advantage arises from resources that are valuable, rare, inimitable, and non-substitutable (VRIN) [3]. In the digital economy, data assets, algorithmic models, and analytical capabilities increasingly constitute such strategic resources.

Artificial intelligence enhances the value of these resources by transforming raw data into predictive and prescriptive insights, thereby improving decision quality and operational efficiency. In this sense, AI capability extends beyond a standalone technological asset and can be conceptualized as a higher-order dynamic capability that enables firms to integrate, build, and reconfigure internal and external resources in response to rapidly changing environments [4].

Recent studies have extended RBV and dynamic capability perspectives to AI adoption and digital transformation contexts. AI capability has been conceptualized as an integration of data resources, digital technologies, organizational talent, and managerial capabilities that supports organizational agility and strategic adaptation under digital uncertainty [5]–[7].

Building on these perspectives, the present study does not claim theoretical novelty in treating AI as a strategic capability. Rather, it contributes by organizing AI capability dimensions into a layered analytical structure that explicitly links technological architecture with enterprise value creation mechanisms and structural constraints in emerging economies.

From an RBV perspective, firms that effectively combine proprietary data, advanced algorithms, and organizational capabilities are more likely to achieve sustained competitive advantage, as these resource configurations are difficult to imitate and replicate.

2.2. AI value creation mechanisms

Based on the literature reviewed, artificial intelligence generates enterprise value through three primary mechanisms.

First, cognitive automation, which replaces repetitive and rule-based cognitive tasks such as contract review, fraud detection, and customer support, thereby reducing operational costs and improving efficiency.

Second, decision intelligence, which leverages AI-driven insights to improve the quality, speed, and accuracy of managerial decision-making, enabling firms to respond more effectively to changing market dynamics.

Third, business model innovation, whereby AI enables firms to develop new ways of creating, delivering, and capturing value through data-driven products, services, and ecosystems, thereby generating new revenue streams and strengthening competitive advantages.

Collectively, these mechanisms illustrate how AI functions not only as an operational tool but also as a strategic capability that reshapes firm-level value creation processes.

These three value creation mechanisms are consistently supported in recent AI management literature. While cognitive automation primarily improves operational efficiency, decision intelligence enhances managerial decision quality through predictive analytics, whereas business model innovation enables firms to develop new value propositions and digital ecosystems based on data-driven services [7].

2.3. Four-Layer enterprise AI framework

This study proposes a four-layer enterprise AI architecture to explain how technological components interact to generate economic value.

Although previous AI architectures generally distinguish data, algorithms, infrastructure, and application components, most existing studies focus primarily on technological design rather than enterprise capability development. The framework proposed in this study extends these perspectives by explicitly linking each technological layer to organizational resources and value creation mechanisms under the Resource-Based View [7], [12].

The data layer focuses on data collection, integration, and governance, forming the foundational resource base for AI systems. The quality, volume, and accessibility of data determine the potential effectiveness of downstream analytics.

The algorithm layer comprises machine learning and deep learning models that transform structured and unstructured data into predictive and prescriptive insights. This layer represents the core analytical capability of the system.

The infrastructure layer provides the computational backbone, including cloud computing, storage, and processing systems, ensuring scalability, reliability, and real-time performance of AI applications.

The application layer involves the deployment of AI solutions in operational and strategic contexts, such as process automation, decision support, and customer engagement. This is the layer where business value is directly realized.

Collectively, the framework illustrates a value transformation process in which raw data are progressively converted into actionable insights and measurable economic outcomes. From a theoretical perspective, the integration of these layers reflects a dynamic capability that enables firms to reconfigure resources and sustain competitive advantage.

2.4. Distinguishing Features of the Proposed Framework

Existing AI capability studies primarily focus on technological readiness, organizational resources, or dynamic capability development separately. Standard AI-stack models generally describe technical architectures consisting of data pipelines, algorithms, cloud infrastructure, and applications. However, these approaches often provide limited explanation of how technological layers interact with organizational constraints in emerging economies.

Recent studies also identify organizational AI readiness as a prerequisite for successful AI implementation. Beyond technological capability, organizations require digital leadership, governance capability, employee readiness, and organizational learning to successfully integrate AI into business operations [12].

The framework proposed in this study differs in three respects.

First, it integrates technological architecture with RBV logic by linking each AI layer to enterprise capability development and value creation processes rather than treating AI as a standalone technical system.

Second, the framework explicitly connects the four AI layers with three enterprise value mechanisms—cognitive automation, decision intelligence, and business model innovation—thereby providing a structured explanation of how technological resources are transformed into business outcomes.

Third, the framework incorporates structural constraints specific to emerging economies, including fragmented data governance, talent shortages, financial limitations among SMEs, and evolving institutional environments. This contextual orientation distinguishes the framework from generic AI capability models developed primarily for advanced economies.

Accordingly, the framework should be interpreted as a contextual analytical synthesis rather than a universal or empirically validated theory of AI adoption.

3. METHODOLOGY

This study adopts a qualitative research approach based on secondary data to examine the value creation mechanisms of artificial intelligence in enterprises. The data sources include global consulting reports, Vietnamese policy documents, and industry publications, providing both international perspectives and local contextual insights.

The data source selection process is carried out from late 2025 to early 2026, guided by two criteria: relevance to AI adoption and value creation, and credibility in terms of institutional authority and publication quality. The search covered academic databases, global consulting reports (PwC, McKinsey, Deloitte), Vietnamese policy documents (such as Decision No. 127/QĐ-TTg and the Google Asia Pacific AI Opportunity Agenda), and industry publications. This ensures that the analysis is grounded in reliable and widely recognized evidence, integrating both international perspectives and local contextual insights.

A comparative analysis is employed to evaluate the differences between global best practices and the current state of AI adoption in Vietnam, with a particular focus on technological capabilities, data governance, and organizational readiness. In addition, thematic

analysis is used to identify key patterns of AI-driven value creation, including cognitive automation, predictive analytics, and business model transformation.

The analytical framework integrates the Resource-Based View (RBV) with the proposed four-layer AI model, enabling a structured interpretation of how technological components and organizational capabilities jointly contribute to firm-level performance. This combined framework provides both theoretical grounding and practical relevance for the study.

This conceptual synthesis follows the approach commonly adopted in recent AI capability studies that integrate theoretical perspectives with secondary evidence to explain organizational AI adoption and capability development [7], [12].

4. RESULTS AND DISCUSSION

4.1. Global empirical evidence

Empirical evidence from global enterprises demonstrates the substantial economic impact of artificial intelligence (AI) across multiple industries. According to Deloitte (2023), enterprises adopting generative AI report measurable improvements in productivity, operational efficiency, and decision-support capabilities [8]. These performance gains are primarily driven by the automation of routine cognitive tasks, enhanced forecasting accuracy, and improved decision-making processes.

From the perspective of the Resource-Based View (RBV), these outcomes indicate that AI functions as a strategic capability rather than merely a technological tool. By transforming raw data into actionable insights, AI enhances the value, rarity, and inimitability of firm-specific resources, thereby strengthening sustainable competitive advantage.

Firm-level evidence further illustrates these mechanisms. Recommendation systems play a substantial role in personalized digital commerce ecosystems [9]. By leveraging large-scale consumer data, these systems enable highly personalized product recommendations, increasing both conversion rates and customer retention.

Numerous organizations have successfully applied AI to automate document-intensive and knowledge-intensive business processes. Typical applications include contract analysis, customer service, fraud detection, and compliance management, demonstrating substantial improvements in operational efficiency and decision quality [10].

At the macroeconomic level, PwC estimates that AI could contribute up to USD 15.7 trillion to the global economy by 2030 [1]. This projection reinforces the characterization of AI as a general-purpose technology with broad economic implications across industries and regions.

Synthesizing these findings, AI-driven value creation can be conceptualized through three interrelated mechanisms:

− Cognitive automation, which enhances cost efficiency by replacing repetitive analytical tasks

− Decision intelligence, which improves strategic and operational decision-making through predictive analytics

− Business model innovation, which enables new revenue streams through data-driven services and platform-based ecosystems

Collectively, these mechanisms reshape both internal operational processes and external competitive strategies, positioning AI as a central driver of enterprise transformation in the digital economy.

4.2. Vietnam context

In Vietnam, the adoption of artificial intelligence remains uneven and is primarily concentrated among large enterprises, financial institutions, and technology firms with relatively advanced digital infrastructure and financial resources.

AI is projected to contribute approximately USD 79.3 billion to Vietnam's GDP by 2030, equivalent to nearly 12% of total economic output [11]. This projection reflects strong macroeconomic potential driven by rapid digital transformation and increasing demand for data-driven business models.

The banking and financial services sector provides a particularly relevant context for examining AI adoption. AI can support a range of activities, including fraud detection, credit assessment, customer analytics, and intelligent virtual assistants, potentially improving operational efficiency and customer services.

Technology firms also play an important role in accelerating AI adoption by providing AI-enabled solutions, digital transformation services, and technological infrastructure. Their capabilities can help organizations integrate AI into business processes and expand the practical use of AI across different industries.

However, despite these promising developments, the effective adoption and integration of AI remain important challenges for Vietnamese enterprises. Moving beyond pilot-scale applications requires firms to develop the organizational resources and capabilities needed to integrate AI into business processes and translate technological investments into business value. Therefore, access to AI technologies alone may not be sufficient to generate sustained organizational value, highlighting the importance of developing AI capabilities as strategic organizational resources.

From the perspective of the proposed four-layer AI framework, this gap can be explained by uneven development across system layers. While progress has been made in the application and infrastructure layers, significant weaknesses persist in the data layer and governance mechanisms. As a result, many organizations are unable to fully leverage AI for value creation.

4.3. Structural barriers

Previous studies consistently identify fragmented data governance, talent shortages, financial constraints, digital leadership limitations, and regulatory uncertainty as major barriers to enterprise AI adoption [2], [5], [6], [7].

First, fragmented data governance systems restrict the effective utilization of enterprise data. Data are often stored across disconnected platforms and legacy systems, reducing accessibility and integration for machine learning applications. This weakens the foundational data layer necessary for AI development.

Second, limited digital leadership and strategic alignment hinder the integration of AI into core business strategies. Many organizations still treat AI as an experimental technology rather than a transformative capability. Empirical evidence suggests that firms with strong digital leadership are significantly more likely to achieve measurable financial returns from AI investments.

Third, the measurement of return on investment (ROI) in AI projects remains complex. Unlike traditional investments, AI generates both tangible and intangible benefits, including improved decision-making quality, innovation capacity, and risk mitigation. The difficulty in quantifying these outcomes often discourages large-scale investment.

Fourth, talent shortages represent a critical constraint. Vietnam faces a significant gap in highly skilled professionals in areas such as data science, machine learning, and cloud computing. This limits the development and scalability of AI capabilities within enterprises.

Fifth, high initial investment costs pose a major barrier, particularly for small and medium-sized enterprises (SMEs). Financial constraints limit their ability to allocate resources for AI adoption, thereby slowing the overall diffusion of AI technologies across the business sector.

Finally, evolving regulatory frameworks create uncertainty for enterprises. While policies related to cybersecurity and data protection have been introduced, comprehensive regulations addressing AI governance, transparency, and ethical standards remain underdeveloped.

From an integrated perspective, these barriers reflect systemic misalignment across the four layers of the AI framework. Weaknesses in data governance, human capital, financial resources, and institutional support limit the ability of firms to convert technological capabilities into measurable economic value.

4.4. Integrated discussion

Overall, the findings indicate that AI adoption is not solely a technological issue but a multidimensional transformation process involving resources, capabilities, and institutional conditions. The integration of the Resource-Based View (RBV) with the four-layer AI framework provides a comprehensive explanation of how value is created, sustained, and constrained in different contexts.

At the global level, enterprises that successfully leverage AI demonstrate strong alignment between data resources, algorithmic capabilities, and strategic objectives. In contrast, the Vietnamese context reveals significant gaps in this alignment, particularly in foundational capabilities such as data governance and talent development.

Therefore, bridging the gap between AI potential and realized value in Vietnam requires a systemic approach that integrates technological investment with organizational transformation and institutional development. This includes strengthening data infrastructure, enhancing digital leadership, developing AI talent, and establishing clear regulatory frameworks.

Such an integrated approach will be essential for enabling Vietnam to fully harness the economic potential of artificial intelligence and enhance its position in the global digital economy.

5. POLICY AND MANAGERIAL IMPLICATIONS

Based on the structural constraints identified in the previous analysis, this study proposes several policy and managerial implications to accelerate artificial intelligence (AI) adoption and enhance enterprise competitiveness in Vietnam. These implications are aligned with the four-layer AI framework, emphasizing the need for coordinated development across data, technology, infrastructure, and application dimensions.

From a policy perspective, strengthening national data governance systems is a critical priority. Establishing standardized data frameworks and promoting cross-sector data-sharing mechanisms would improve data quality, interoperability, and accessibility. This would significantly reinforce the data layer, enabling more effective development and deployment of AI models. In parallel, governments should continue to refine regulatory frameworks by introducing regulatory sandboxes and enhancing legal provisions related to data protection,

algorithmic transparency, and ethical AI governance. Such measures can create a balanced environment that supports both innovation and responsible AI deployment.

Another key policy implication relates to human capital development. Expanding AI-related education programs, fostering collaboration between universities and industry, and promoting public–private partnerships are essential to address the shortage of skilled professionals in areas such as data science, machine learning, and cloud computing. These initiatives will strengthen the algorithm and application layers by ensuring the availability of high-quality technical and managerial talent.

From a managerial perspective, enterprises must recognize AI as a strategic capability rather than merely a technological tool. Developing digital leadership capabilities and implementing structured change management processes are essential to foster a data-driven organizational culture and reduce resistance to AI adoption. This transformation is particularly important for aligning AI initiatives with long-term business strategies.

In addition, organizations should improve their investment evaluation mechanisms for AI projects. Establishing standardized frameworks to measure AI return on investment (ROI), including both financial and non-financial indicators such as productivity, innovation, and risk mitigation, can support more effective resource allocation and strategic decision-making.

Furthermore, improving financial accessibility is essential to enable broader AI adoption, particularly among small and medium-sized enterprises (SMEs). The development of AI-as-a-Service (AIaaS) platforms, along with preferential financing mechanisms and innovation support funds, can significantly reduce entry barriers and promote more inclusive technological diffusion.

Overall, these policy and managerial measures highlight that successful AI adoption requires systemic alignment across institutional frameworks, organizational capabilities, and technological infrastructures. A coordinated and integrated approach will be essential for enabling Vietnamese enterprises to fully leverage the economic potential of AI and enhance their competitiveness in the global digital economy.

6. LIMITATIONS AND FUTURE RESEARCH

This study has several limitations.

First, the analysis relies primarily on secondary data sources, including consulting reports, policy documents, and institutional publications. Although these sources provide broad industry-level insights, they do not offer direct firm-level evidence regarding AI implementation practices in Vietnam.

Second, the proposed four-layer framework is conceptual and interpretive rather than empirically validated. The study therefore cannot establish causal relationships between AI capability development and enterprise performance outcomes.

Third, the Vietnamese evidence presented in the study remains aggregated at the sectoral level, limiting the ability to capture variations across industries, firm sizes, and organizational maturity levels.

Future research could empirically validate the proposed framework using mixed-method research designs that combine qualitative case studies with large-scale enterprise surveys. Comparative studies across industries and emerging economies would also provide deeper insights into contextual variations in AI capability development.

7. CONCLUSION

This study examined how artificial intelligence contributes to enterprise value creation and explored the structural conditions influencing AI adoption in Vietnam. Rather than empirically testing causal relationships, the research synthesized secondary evidence to develop an integrated analytical framework linking AI capability layers with organizational value creation mechanisms.

The findings suggest that AI creates enterprise value through three interconnected mechanisms: cognitive automation, decision intelligence, and business model innovation. However, the realization of these benefits depends heavily on organizational readiness, data governance quality, digital leadership, and institutional support mechanisms.

From a theoretical perspective, the study contributes by integrating the Resource-Based View (RBV) with a four-layer enterprise AI framework that contextualizes AI capability development in emerging economies. Rather than proposing a universal AI adoption theory, the framework offers a structured analytical synthesis linking technological layers, organizational capabilities, and structural constraints.

From a practical perspective, the findings indicate that effective AI adoption requires coordinated efforts among governments, enterprises, universities, and technology providers. Strengthening data infrastructure, improving AI-related talent development, expanding financial accessibility for SMEs, and establishing transparent governance frameworks are essential to accelerate sustainable AI adoption in Vietnam.

Ultimately, the study argues that AI implementation should be viewed not merely as a technological investment but as a multidimensional organizational transformation process. The extent to which Vietnam can translate AI potential into sustainable economic growth will depend on its ability to align technological capability development with institutional and managerial readiness.

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