

A Structural Equation Model of Artificial Intelligence Capability and Institutional Sustainability Performance under the ESG Framework in Private Higher Education Institutions in Thailand

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Abstract

The rapid digital transformation of higher education has elevated the strategic role of artificial intelligence (AI) in institutional governance and sustainability management. Concurrently, Environmental, Social, and Governance (ESG) principles have become key benchmarks for evaluating institutional responsibility and long-term performance. However, prior research in higher education has largely focused on sustainability reporting, with limited attention to the structural mechanisms through which AI capability drives ESG-related sustainability outcomes. Grounded in the Resource-Based View (RBV) and sustainable governance theory, this study aims to examine the level of artificial intelligence capability in private higher education institutions in Thailand, to examine the level of institutional sustainability performance under the ESG framework, to develop and empirically validate a structural equation model explaining the effect of artificial intelligence capability on institutional sustainability performance under the ESG framework in private higher education institutions in Thailand, and to conduct a multi-group analysis by comparing institutions located in Bangkok and those in provincial regions. This study employed a quantitative cross-sectional survey design. Data were collected from 412 administrators and senior academic staff across eight private higher education institutions in Thailand using a multi-stage stratified sampling technique to ensure institutional representation. Covariance-based Structural Equation Modeling was applied to test both measurement and structural models. Reliability and validity were assessed using Confirmatory Factor Analysis (CFA), Composite Reliability (CR), Average Variance Extracted (AVE), and standard model fit indices.

The institutional sustainability performance is at a high level (3.92). The next most important factor is artificial intelligence capability, which is also at a high level (3.87). The structural model revealed that artificial intelligence capability has a significant positive effect on institutional sustainability performance ($\beta=0.64$, $p<0.001$), indicating a large effect size. The model explained 52% of the variance in sustainability performance ($R^2=0.52$), reflecting substantial explanatory power. Additional robust analysis confirmed the stability of the model across institutional contexts. The findings indicate that the relationship between artificial intelligence capability and institutional sustainability performance is positive and significant in both groups. The findings indicate that



artificial intelligence capability functions as a strategic organizational resource that enhances environmental efficiency, social inclusiveness, and governance transparency. By shifting the focus from ESG reporting to AI-enabled ESG integration, this study contributes to the advancement of sustainable digital governance theory in higher education. The results highlight the importance of aligning AI investment strategies with ESG-oriented institutional transformation to achieve long-term sustainability outcomes.

Keywords: Artificial Intelligence Capability, Institutional Sustainability Performance, ESG Framework, Resource-Based View, Structural Equation Modeling

Introduction

The rapid acceleration of digital transformation has fundamentally reshaped the governance, management, and strategic positioning of higher education institutions (HEIs) worldwide. (Fosso Wamba, et. al., 2024). Artificial intelligence (AI), in particular, has emerged as a critical technological capability influencing administrative efficiency, data-driven decision-making, and institutional competitiveness. Universities increasingly adopt AI-enabled systems for predictive analytics, resource optimization, and performance monitoring, reflecting a shift from traditional administrative processes toward digitally supported governance structures.

At the same time, environmental, social, and governance (ESG) principles have become central to the sustainability agenda in higher education. (Ziyia.J, et. al., 2024). Universities are no longer evaluated solely on academic performance but also on their environmental responsibility, social inclusiveness, and governance transparency. Global frameworks such as the Sustainable Development Goals (SDGs) and international ranking systems have intensified institutional pressure to demonstrate measurable sustainability outcomes. As a result, many HEIs have implemented ESG-related policies, sustainability initiatives, and reporting mechanisms to enhance institutional legitimacy and stakeholder trust.

However, despite the increasing emphasis on ESG in higher education, existing research has largely focused on sustainability reporting, disclosure practices, and accountability mechanisms. (Li, et. al., 2025). Such approaches tend to conceptualize ESG as an outcome of institutional transparency rather than as an integrated managerial process embedded within organizational systems. Consequently, limited attention has been given to understanding how internal organizational capabilities enable the effective implementation of ESG principles in higher education institutions. In parallel, the literature on AI in higher education has predominantly examined its pedagogical applications, including personalized learning, student engagement, and assessment efficiency. (Worapongpat, et. al., 2026). Comparatively fewer studies have investigated AI as a strategic organizational capability that contributes to institutional performance and sustainability outcomes. This gap suggests a need to explore AI not merely as a technological tool but as an organizational resource that supports long-term institutional transformation.

This issue is particularly relevant in the context of private higher education institutions (PHEIs) in emerging economies. (Padhy, et. al., 2026). In Thailand, private HEIs operate under increasing competitive pressure due to declining student enrollment, market competition, and

rising expectations for sustainable performance. Unlike public institutions, private universities must balance financial sustainability with social responsibility and governance transparency. In this context, ESG integration becomes a strategic imperative rather than a symbolic practice. However, empirical evidence explaining how AI capability contributes to sustainability performance in private higher education institutions remains limited. From a theoretical perspective, this study is grounded in the Resource-Based View (RBV), which conceptualizes organizational capabilities as strategic resources that generate competitive advantage (Worapongpat, 2025f). AI capability can be viewed as a valuable, rare, and difficult-to-imitate resource that enhances institutional decision-making, operational efficiency, and governance effectiveness. By leveraging AI-driven data systems, institutions can improve environmental management, social inclusiveness, and governance transparency, thereby strengthening sustainability performance. Addressing these gaps, this study aims to develop and empirically validate a structural equation model explaining the effect of artificial intelligence capability on institutional sustainability performance under the ESG framework in private higher education institutions in Thailand. (Rahman, & Shaon, 2026). By focusing on the direct relationship between AI capability and sustainability outcomes, this research provides a more precise and empirically grounded understanding of how digital capabilities contribute to ESG-oriented institutional transformation.

This study contributes to the literature in three key ways. First, it extends theoretical understanding by positioning AI capability as a strategic organizational resource that directly influences sustainability performance. (Worapongpat, 2025c). Second, it contributes methodologically by applying structural equation modeling (SEM) to examine causal relationships within a higher education context. Third, it provides empirical evidence from private higher education institutions in Thailand, offering insights into how digital transformation supports sustainability strategies in emerging educational markets. Overall, this study shifts the analytical focus from ESG reporting toward ESG performance driven by internal digital capabilities. The findings are expected to inform both academic discussions on sustainable governance and practical decision-making in private higher education institutions seeking to enhance long-term competitiveness through AI-enabled transformation.

Research Objectives

1. To examine the level of artificial intelligence capability in private higher education institutions in Thailand.
2. To examine the level of institutional sustainability performance under the ESG framework.
3. To analyze the effect of artificial intelligence capability on institutional sustainability performance.
4. To conduct a multi-group analysis by comparing institutions located in Bangkok and those in provincial regions.

Concept, Theory and Literature Review

1. Artificial Intelligence as a Strategic Organizational Capability



Artificial intelligence (AI) has evolved from a technological tool for instructional enhancement into a strategic organizational capability that shapes institutional performance. (Worapongpat, 2025e). In higher education, AI applications extend beyond adaptive learning and student analytics to include predictive modeling, resource optimization, institutional monitoring, and data-driven decision-making systems. This transformation reflects a shift from operational technology toward digitally enabled governance structures.

From the perspective of the Resource-Based View (RBV), differences in organizational performance arise from heterogeneous resources that are valuable, rare, inimitable, and non-substitutable. AI capability comprising data infrastructure, analytical systems, digital platforms, and skilled human resources can be conceptualized as such a strategic asset. When effectively integrated into institutional processes, AI enhances decision quality, operational efficiency, and organizational adaptability. Importantly, AI capability is not merely a technical resource but an organizational competence that enables institutions to respond to complex environmental and strategic challenges.

2. ESG Framework and Institutional Sustainability in Higher Education

Environmental, Social, and Governance (ESG) principles have become central to evaluating sustainability performance in higher education institutions. (Alkaraan, et. al., 2024). Universities are increasingly expected to demonstrate environmental responsibility, social inclusiveness, and governance transparency alongside academic excellence. Global frameworks such as the Sustainable Development Goals (SDGs) and international sustainability rankings have intensified institutional pressure to achieve measurable ESG outcomes.

However, much of the existing literature conceptualizes ESG primarily as a reporting and disclosure mechanism. Studies often focus on sustainability reports, transparency indices, and accountability practices rather than examining ESG as an integrated component of institutional management. This reporting-oriented perspective limits understanding of how ESG principles are operationalized within organizational systems and linked to performance outcomes. Reconceptualizing ESG as an embedded managerial framework allows for a more comprehensive understanding of sustainability in higher education. ESG performance can be viewed as the outcome of internal organizational capabilities that support environmental management, social engagement, and governance effectiveness. In this context, digital technologies such as AI play a critical role in enabling data-driven monitoring, performance evaluation, and strategic alignment with sustainability goals.

3. Institutional Sustainability Performance

Institutional sustainability performance refers to the ability of higher education institutions to achieve long-term effectiveness across environmental, social, and governance dimensions while maintaining operational and strategic stability. (Wang, & Zhang, 2025). Unlike traditional performance measures that emphasize academic or financial outcomes, sustainability performance reflects a broader integration of responsible management practices and long-term institutional resilience.

In higher education research, empirical studies examining sustainability performance remain limited, particularly those that model its relationship with internal organizational

capabilities. While corporate sustainability literature frequently links ESG practices to firm performance, similar structural models are less developed in the educational context. This gap highlights the need to examine how internal capabilities contribute directly to sustainability outcomes in higher education institutions.

4. Linking AI Capability to Sustainability Performance

Despite the growing importance of both AI and ESG in higher education, limited research has examined the direct relationship between AI capability and institutional sustainability performance. (Worapongpat, 2025d). From an RBV perspective, AI capability can enhance sustainability outcomes by improving data accuracy, enabling real-time monitoring, and supporting evidence-based decision-making across environmental, social, and governance domains. AI-enabled systems can support energy efficiency management, optimize resource allocation, enhance stakeholder engagement through data transparency, and improve governance processes through automated monitoring and reporting. These functions collectively contribute to improved sustainability performance by aligning institutional operations with ESG objectives.

However, empirical evidence supporting this relationship in higher education particularly in private institutions within emerging economies remains scarce. This gap is especially relevant in Thailand, where private higher education institutions face increasing pressure to enhance competitiveness while demonstrating sustainability performance.

5. Conceptual Gap and Research Direction

A synthesis of the literature reveals a key gap in understanding how digital organizational capabilities contribute directly to sustainability performance in higher education. (Wang, et. al., 2025). Existing studies tend to separate AI research, which focuses on technological applications, from ESG research, which emphasizes reporting and accountability. Few studies integrate these perspectives to examine how AI capability functions as a strategic resource that drives sustainability outcomes. (Worapongpat, 2025c). To address this gap, this study adopts the Resource-Based View as its primary theoretical foundation and proposes a structural relationship in which artificial intelligence capability directly influences institutional sustainability performance under the ESG framework. By focusing on this relationship, the study provides a more precise and empirically grounded explanation of how digital capabilities support sustainable transformation in private higher education institutions.

Conceptual Framework

This study proposes a conceptual framework grounded in the Resource-Based View (RBV), which posits that organizational capabilities function as strategic resources that drive performance outcomes. In this study, artificial intelligence capability is conceptualized as a critical organizational resource that enhances institutional effectiveness through data-driven decision-making, operational efficiency, and governance support.

Accordingly, artificial intelligence capability is specified as the independent variable, while institutional sustainability performance under the ESG framework is treated as the dependent variable. The framework assumes a direct causal relationship in which AI capability positively

influences sustainability performance by supporting environmental management, social inclusiveness, and governance transparency. As follow figure 1

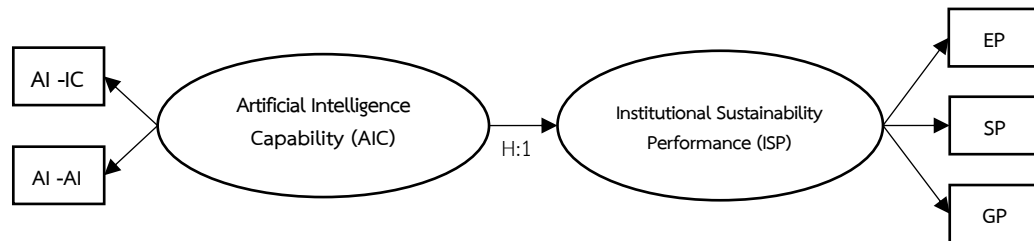


Figure 1 Conceptual Framework

Methodology

This study was conducted among selected private higher education institutions in Thailand, including institutions located in Bangkok and other provinces. The participating institutions comprised Dusit Thani College, Saint Louis College, Southeast Bangkok College, Siam Technology College, Chiang Rai College, Nakhon Ratchasima College, Asia Graduate College, and Saengtham College. These institutions represent diverse academic orientations, including hospitality management, health sciences, technology, business administration, and social sciences, thereby enhancing the generalizability of the findings.

Sampling Design

Target population, the target population consisted of administrators, Deans, Program directors, and senior academic staff employed in private higher education institutions in Thailand. These individuals were selected as key informants due to their involvement in institutional management and strategic decision-making.

Sampling technique, A multi-stage stratified sampling design was employed. First, eight institutions were purposively selected to ensure variation in geographic location, institutional size, and academic specialization. Second, proportionate stratified sampling was applied within each institution to select respondents across managerial levels. The required sample size was determined based on Structural Equation Modeling (SEM) guidelines. A minimum of 200 cases is recommended for covariance-based SEM, with larger samples preferred for increased statistical power. (Hair et al., 2010). The final sample consisted of 412 respondents, exceeding the recommended threshold and ensuring adequate statistical power.

Measurement Instrument

Data were collected using a structured questionnaire adapted from validated scales. All items were measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The independent variable is Artificial Intelligence Capability (AIC). This construction was modeled as a second-order construct consisting of AI Infrastructure Capability (AI-IC; Data architecture readiness, AI platforms and analytics systems, and Technical expertise and digital skills), AI Adoption Intensity (AI-AI; Extent of AI use in academic management, AI-supported decision-making, and Integration of AI into administrative processes), Sample items included, our institution possesses adequate AI-based data analytics systems. AI tools are widely integrated into administrative processes. AI

supports strategic decision-making in our institution. The dependent variable is Institutional Sustainability Performance (ISP; Environmental Performance, Social Performance, and Governance Performance). This construction was conceptualized under the ESG framework and measured as a second-order construct consisting of environmental performance (EP), social performance (SP), and governance performance (GP). Sample items included, the institution effectively manages environmental resources and energy use, the institution promotes inclusiveness and equal access to educational opportunities, The institution ensures transparency and accountability in governance processes.

Validity and Reliability

Content validity was assessed using the Index of Item-Objective Congruence (IOC), with all values exceeding 0.67. Construct validity was evaluated through Confirmatory Factor Analysis (CFA), with factor loadings above 0.60, Average Variance Extracted (AVE) above 0.50, and Composite Reliability (CR) above 0.70. Discriminant validity was confirmed using the Fornell–Larcker criterion and the HTMT ratio. (Fornell & Larcker, 1981). Data analysis was conducted using AMOS (covariance-based SEM) following a two-step approach. *First*, the measurement model was evaluated using CFA to assess reliability and validity. *Second*, the structural model was tested to examine the relationship between artificial intelligence capability and

Research Results

The results of the analysis of artificial intelligence capability in private higher education institutions in Thailand and institutional sustainability performance under the ESG framework, using descriptive statistics and correlation analysis, are shown in Table 1.

Table 1 the descriptive statistics and correlation matrix of the study variables. Artificial intelligence capability shows a relatively high mean score (Mean = 3.87, S.D = 0.64), indicating that private higher education institutions in Thailand generally perceive their AI capability at a moderate to high level. Institutional sustainability performance also demonstrates a high mean value (Mean = 3.92, S.D = 0.58), suggesting that ESG-related performance is relatively well developed across institutions.

Table 1. Descriptive Statistics and Correlations

Construct	Mean	S.D	1	2
1. AI Capability	3.87	0.64	0.81	
2. Institutional Sustainability Performance	3.92	0.58	0.62***	0.84

Remark: Diagonal elements (bold) represent the square root of AVE.

***p < 0.001

The correlation analysis reveals a significant positive relationship between artificial intelligence capability and institutional sustainability performance ($r = 0.62$, $p < 0.001$), indicating a strong association between the two constructs. The square root of the AVE values (0.81 and 0.84) exceeds the inter-construct correlation, confirming adequate discriminant validity, are shown in Table 2.

Measurement Model

Table 2. The results of the measurement model assessment. All factor loadings exceed the recommended threshold of 0.60, indicating satisfactory indicator reliability. Composite reliability (CR) values range from 0.86 to 0.92, exceeding the acceptable threshold of 0.70, while Average Variance Extracted (AVE) values range from 0.63 to 0.76, exceeding the minimum requirement of 0.50. These results confirm strong internal consistency and convergent validity of the constructions.

Table 2. Measurement Model (First-order Constructs): Reliability and Validity

Construct	Items	Factor Loadings	Cronbach's α	CR	AVE
1. AI Infrastructure Capability (AI-IC)	4	0.68–0.84	0.88	0.90	0.69
2. AI Adoption Intensity (AI-AI)	4	0.70–0.87	0.86	0.89	0.67
3. Environmental Performance (EP)	3	0.71–0.88	0.84	0.88	0.71
4. Social Performance (SP)	3	0.66–0.83	0.82	0.86	0.63
5. Governance Performance (GP)	3	0.72–0.90	0.89	0.92	0.76

Remark: Acceptance Criteria: Factor loading > 0.60, CR > 0.70, AVE > 0.50

In addition, artificial intelligence capability and institutional sustainability performance were modeled as second-order constructs, supported by the satisfactory validity of their underlying dimensions.

The structural model results in Table 3. The findings indicate that artificial intelligence capability has a significant and positive effect on institutional sustainability performance ($\beta = 0.64$, $t = 10.27$, $p < 0.001$), supporting Hypothesis 1. This result suggests that higher levels of AI capability are associated with substantially improved sustainability performance in private higher education institutions.

The model demonstrates good fit with the data, as indicated by $\chi^2/df = 2.14$, CFI = 0.95, TLI = 0.94, RMSEA=0.052, and SRMR=0.041, all of which meet recommended thresholds. The coefficient of determination ($R^2=0.52$) indicates that artificial intelligence capability explains 52% of the variance in institutional sustainability performance, reflecting substantial explanatory power in an organizational research context.

Furthermore, the effect size ($f^2 = 0.42$) indicates a large effect according to established benchmarks, while the predictive relevance ($Q^2 = 0.34$) confirms that the model has strong predictive capability, are shown in Table 3.

Table 3. Structural Model Results

Hypothesis	Path	β	t-value	p-value	Result
H1	AI Capability $\rightarrow$ Institutional Sustainability Performance	0.64	10.27	<0.001	Supported

Model Fit Indices

Index	Value	Threshold
χ^2/df	2.14	< 3
CFI	0.95	> 0.90
TLI	0.94	> 0.90
RMSEA	0.052	< 0.08
SRMR	0.041	< 0.08

Remark: R^2 (Institutional Sustainability Performance) = 0.52, f^2 = 0.42 (Large effect)
 Q^2 = 0.34 (Predictive relevance)

The result of the multi-group analysis by comparing institutions located in Bangkok and those in provincial regions. The findings indicate that the relationship between artificial intelligence capability and institutional sustainability performance is positive and significant in both groups ($\beta=0.66$ and $\beta=0.61$, respectively). The difference between the two groups is not statistically significant ($\Delta\chi^2$ = n.s.), suggesting that the structural relationship is stable across geographic contexts.

This result implies that the impact of AI capability on sustainability performance is consistent across different institutional environments in Thailand, enhancing the generalizability of the findings, are shown in Table 4.

Table 4 Multi-group Comparison

Path	Bangkok	Provincial	$\Delta\chi^2$	Difference
AI $\rightarrow$ Sustainability	0.66***	0.61***	n.s.	No significant difference

Discussion

1. Interpretation of key findings

The institutional sustainability performance is of high because, in the current context, higher education institutions are no longer evaluated solely based on academic achievements. They are also expected to demonstrate responsibility toward environmental, social, and governance (ESG) dimensions, which have become global standards for sustainable organizational development. Aligning operations with ESG principles not only enhances institutional image and credibility but also serves as a key mechanism for building competitive advantage and long-term stability (Liu & Curtin, 2024). Furthermore, the Resource-Based View (RBV) explains that sustainability management capability can be considered a strategic resource that differentiates organizations (Bhandari et al., 2022). At the same time, Artificial Intelligence Capability is also highly important at a comparable level. This is because AI has evolved beyond being merely a technological tool to becoming an organizational capability that enhances administrative efficiency, decision-making, and institutional operations—particularly in areas such as data analytics, forecasting, and resource optimization. This is consistent with research indicating that AI can improve organizational



performance and support sustainable development through increased efficiency and innovation (Fosso Wamba et al., 2024). Moreover, AI plays a crucial role in directly driving sustainability performance. For example, it supports environmental data analysis, enhances transparency in governance, and facilitates policy decision-making aligned with ESG principles. As a result, AI becomes a key mechanism for translating sustainability policies into practical implementation (Li et al., 2025).

The findings of this study provide strong empirical evidence that artificial intelligence capability significantly enhances institutional sustainability performance in private higher education institutions. The positive and substantial standardized effect ($\beta = 0.64$, $p < 0.001$) indicates that AI capability plays a critical role in shaping environmental, social, and governance outcomes. Furthermore, the model's explanatory power ($R^2=0.52$) suggests that AI capability accounts for a substantial proportion of the variance in sustainability performance, highlighting its importance as a key organizational driver. (Bhandari, et. al., 2022). These findings support the Resource-Based View, which posits that organizations achieve superior performance through valuable, rare, and difficult-to-imitate resources. In this context, AI capability functions as a strategic organizational resource that enhances decision-making quality, operational efficiency, and governance effectiveness. The results are consistent with prior studies emphasizing the role of digital capabilities in improving organizational performance, while extending this perspective to sustainability outcomes in higher education.

2. From ESG Reporting to ESG Performance

A key contribution of this study lies in shifting the focus from ESG reporting to ESG performance. Existing research in higher education has predominantly emphasized sustainability disclosure and reporting practices, often treating ESG as an outcome of institutional transparency. While such approaches are important for accountability, they provide limited insight into how sustainability outcomes are achieved in practice. (Chen, & Lee, 2024). The findings of this study suggest that AI capability contributes directly to improved sustainability performance, indicating that ESG outcomes are supported by internal organizational capabilities rather than external reporting mechanisms alone. This perspective highlights the importance of embedding ESG principles within institutional processes and decision-making systems. In this sense, ESG performance can be understood as an outcome of digitally supported governance and management practices.

3. Implications for Private Higher Education Institutions

Private higher education institutions operate in highly competitive environments characterized by financial constraints, declining student enrollment, and increasing expectations for sustainability performance. The results of this study indicate that AI capability can significantly enhance institutional sustainability performance across environmental, social, and governance dimensions. (Worapongpat, 2025a). From an environmental perspective, AI systems can support more efficient resource management and energy utilization through data-driven monitoring. In terms of social performance, AI-enabled analytics can facilitate more inclusive and equitable access to educational services. Regarding governance, AI can improve transparency and accountability by supporting evidence-based decision-making and monitoring processes. These findings suggest that

AI adoption should be strategically aligned with sustainability objectives rather than treated solely as a technological upgrade.

4. Theoretical Contributions

This study makes several important theoretical contributions. First, it extends the Resource-Based View by demonstrating that AI capability functions as a strategic resource influencing sustainability performance in higher education institutions. Second, it bridges the gap between digital transformation and sustainability governance literature by integrating these perspectives within a single empirical framework. Third, it shifts the focus from ESG reporting toward ESG performance, providing a more outcome-oriented understanding of sustainability in higher education. (Worapongpat, 2025b). Finally, the study contributes empirical evidence from private higher education institutions in an emerging economy, addressing the geographical limitations of prior research predominantly conducted in developed contexts.

5. Robustness and Contextual Insights

The multi-group analysis indicates that the relationship between AI capability and institutional sustainability performance is consistent across institutions located in Bangkok and provincial regions. This finding suggests that the effect of AI capability is robust across different geographic contexts. Additionally, the inclusion of control variables such as institutional size and years of establishment does not alter the significance of the relationship, further supporting the stability of the model.

6. Practical Implications

The findings provide several practical implications for institutional leaders and policymakers. Private higher education institutions should prioritize investment in AI infrastructure that aligns with sustainability objectives. Integrating ESG metrics into AI-supported management systems can enhance decision-making and performance monitoring. Furthermore, institutions should establish governance frameworks that ensure ethical AI use, data transparency, and accountability. At the policy level, regulators may consider promoting AI-driven sustainability initiatives to strengthen the competitiveness of private higher education institutions. Supporting digital transformation in alignment with ESG principles can contribute to long-term institutional resilience and sustainable development.

Knowledge Contribution

From the study of artificial intelligence capability and institutional sustainability performance in private higher education institutions in Thailand, a new body of knowledge can be synthesized into a conceptual model. As follows figure 2

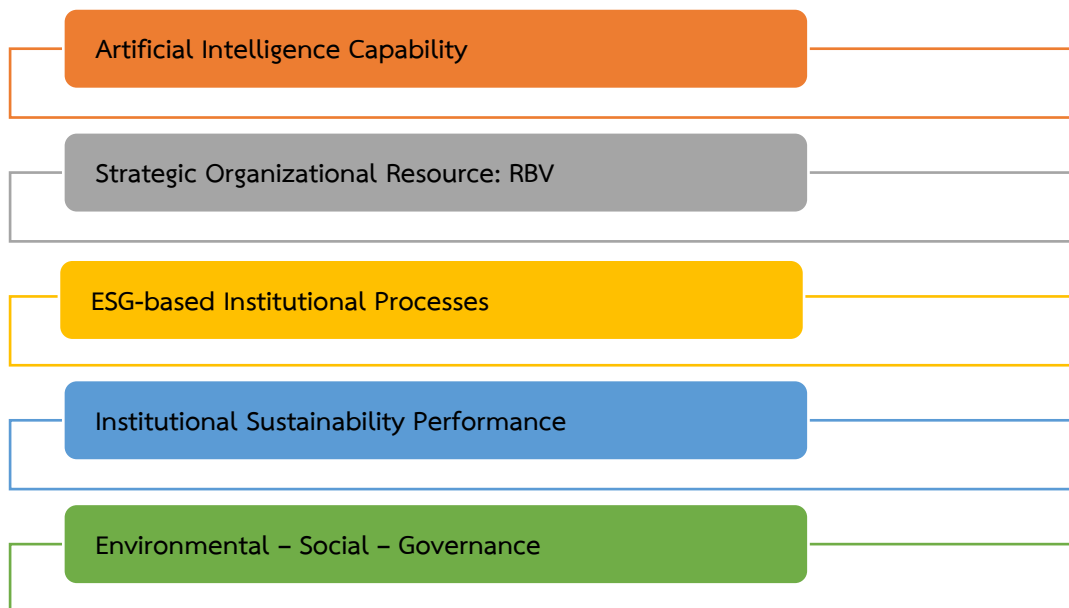


Figure 2 New Knowledge Model: AI-Enabled Sustainability Performance Framework

The model demonstrates that artificial intelligence capability functions as a strategic organizational resource, consistent with the Resource-Based View (RBV). This capability enhances ESG-based institutional processes, including environmental management, social inclusiveness, and governance transparency. As a result, institutions achieve improved sustainability performance. The framework highlights that sustainability outcomes are not solely driven by reporting practices but are fundamentally enabled by internal digital capabilities. Therefore, AI capability serves as a foundational mechanism that supports ESG-oriented institutional transformation and long-term sustainability performance.

1. **Theoretical Contribution** this study makes several significant theoretical contributions to the fields of higher education management, digital transformation, and sustainability governance. *First*, it reconceptualizes artificial intelligence (AI) as a strategic organizational capability rather than merely a technological or pedagogical tool. Grounded in the Resource-Based View (RBV), the findings demonstrate that AI capability functions as a value-creating institutional resource that significantly enhances sustainability performance ($\beta = 0.64$). *Second*, The study advances ESG scholarship in higher education by shifting the analytical focus from sustainability reporting toward ESG performance as an outcome of internal organizational capabilities. While prior research has emphasized disclosure and accountability, this study provides an empirically supported explanation linking AI capability directly to sustainability outcomes. *Third*, the research bridges digital transformation and sustainability governance literature by empirically validating their relationship within a unified framework. This integrative perspective contributes to the emerging concept of sustainable digital governance in higher education.

2. **Methodological Contribution** Methodologically, this study employs covariance-based Structural Equation Modeling (SEM) to validate a higher-order construct model of AI capability and

institutional sustainability performance. The use of second-order constructs captures the multidimensional nature of both variables, enhancing construct validity and theoretical precision. In addition, the multi-stage stratified sampling design improves external validity by incorporating multiple institutions with diverse characteristics, addressing a common limitation in higher education research that often relies on single-institution samples.

3. Empirical and Contextual Contribution Empirically, this study provides evidence from private higher education institutions in Thailand, an emerging economy context that remains underrepresented in ESG and digital transformation research. The findings demonstrate that AI capability serves as a key driver of sustainability performance in competitive and resource-constrained institutional environments.

4. Conceptual Advancement At a broader conceptual level, this study advances the discourse from ESG as a reporting practice to AI-enabled ESG performance as a result of strategic organizational capability. This conceptual shift highlights the role of digital capability as a foundational driver of sustainability outcomes in higher education institutions.

Recommendations

1. Strategic Recommendations for Institutional Leaders

The findings of this study, which demonstrate a strong and significant effect of artificial intelligence capability on institutional sustainability performance ($\beta=0.64$), suggest that AI should be positioned as a core strategic driver rather than a standalone technological initiative. Private higher education leaders are encouraged to align AI investment strategies with ESG objectives to ensure coherence between digital transformation and sustainability goals.

Institutions should develop AI-enabled management systems, such as sustainability dashboards, to monitor environmental, social, and governance performance in real time. In addition, strengthening internal digital competencies through continuous professional development is essential to ensure effective AI utilization in managerial processes. Establishing governance structures, such as cross-functional AI committees, can further enhance transparency, accountability, and ethical data management within institutions.

2. Policy Recommendations for Regulators

At the policy level, the significant explanatory power of the model ($R^2=0.52$) highlights the importance of digital capability in shaping sustainability outcomes. Regulatory bodies may consider developing ESG-aligned digital transformation frameworks specifically tailored to private higher education institutions.

Policymakers could also promote AI-supported sustainability performance systems that go beyond traditional reporting by incorporating measurable integration indicators. Incentive mechanisms, such as funding support and recognition programs, may encourage institutions to adopt AI-driven sustainability practices. Furthermore, establishing national guidelines for ethical AI use in education would help ensure responsible data governance and institutional accountability.

3. Recommendations for ESG Governance Development

To strengthen ESG integration, institutions should move beyond compliance-based reporting toward performance-oriented management systems supported by AI technologies. This



includes integrating ESG key performance indicators into strategic planning processes and utilizing AI-based analytics to support decision-making and performance monitoring.

AI can also be used to enhance governance transparency through digital tracking systems and data-driven reporting mechanisms. By embedding ESG within operational processes, institutions can transform sustainability from a symbolic practice into a measurable and strategic outcome.

4. Recommendations for Future Research

Future research should extend this study by incorporating longitudinal designs to examine the dynamic impact of AI capability on sustainability performance over time. Expanding the model to include additional variables, such as governance quality or organizational culture, may provide a more comprehensive understanding of the mechanisms underlying digital sustainability transformation.

Comparative studies across different countries or institutional contexts would also enhance the generalizability of findings. In addition, future research may integrate objective sustainability indicators alongside perceptual measures to improve the robustness and validity of ESG performance assessment.

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