

AI-ENABLED COMMUNICATION EFFICIENCY AS A MEDIATOR BETWEEN REGULATORY ADAPTATION, INTERCULTURAL TRAINING, AND PROJECT PERFORMANCE IN GEOSITE TOURISM DEVELOPMENT: A CASE OF YUNNAN CONSTRUCTION AND INVESTMENT HOLDING GROUP

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Abstract: This study develops and tests a mediation model in which AI-enabled communication efficiency (AICE) transmits the effects of regulatory adaptation (RA) and intercultural training (ICT) to project performance (PP) in geosite tourism development projects associated with Yunnan Construction and Investment Holding Group (YCIH). A sequential quantitative design is specified and analyzed data from 320 respondents that represents stakeholder responses in a provincial state-owned enterprise project context. Quantitative analysis follows the structure: indicator loadings, reliability (ρ_A , ρ_c , α), convergent validity (AVE), discriminant validity (Fornell–Larcker and HTMT), structural paths with bootstrapped standard errors, effect sizes (f^2), and predictive diagnostics (R^2 , Q^2_{predict} , RMSE, MAE). Regulatory adaptation and intercultural training both improve AI-enabled communication efficiency ($\beta = 0.430$ and 0.370 , $p < 0.001$). AI-enabled communication efficiency improves project performance ($\beta = 0.410$, $p < 0.001$) and partially mediates the effects of regulatory adaptation and intercultural training on performance (indirect effects $\beta = 0.176$ and 0.152 , $p < 0.001$). The model explains 38.2% of the variance in AICE and 45.3% in PP, with acceptable predictive relevance ($Q^2_{\text{predict}} = 0.369$ for AICE; 0.436 for PP). For geosite tourism development, where projects must satisfy geopark governance expectations for visibility, conservation, and community participation. This study positions AICE as a managerial lever that makes regulatory and intercultural capabilities “actionable.” It suggests that horizon scanning and cross-cultural capability building yield stronger performance benefits when project teams adopt AI-supported translation, summarisation, and knowledge-routing routines consistent with responsible AI governance.

Keywords: AI-enabled communication, communication efficiency, regulatory adaptation, intercultural training, project performance, geosite tourism, UNESCO Global Geoparks, Yunnan, PLS-SEM

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INTRODUCTION

Geosite tourism development is increasingly used as a practical pathway to connect geoheritage conservation with local livelihoods, especially where geological features and landscapes can be interpreted as both scientific heritage and cultural identity resources. UNESCO Global Geoparks (UGGs) are a prominent governance label in this space: they combine protection, education, and sustainable development, and they explicitly connect sustainable local economic development to geotourism (Herrera-Franco et al., 2021). UNESCO also emphasises that “visibility” and stakeholder partnerships are prerequisites for stimulating geotourism and sustaining local communities, implying that communication and coordination are not peripheral issues but core governance requirements (Bankins & Formosa, 2023; Fassoulas et al., 2022).

Yunnan Province is a high-relevance setting for this topic because it combines exceptional geodiversity with deep cultural diversity and strong destination branding. Recent work from China also shows that geosite related destinations are increasingly shaped by digital heritage communication and collaborative branding efforts that must balance authenticity with innovative promotion (Tao, 2026). UNESCO’s geopark pages for Yunnan highlight both geological features and the cultural ties between landscape and community, for example, in Shilin UNESCO Global Geopark and Dali-Cangshan UNESCO Global Geopark (Anglani et al., 2023; Li et al., 2022).

These cases also illustrate typical project delivery challenges: visitor infrastructure must be developed without degrading sensitive geosites, interpretive materials must be scientifically accurate yet accessible, and tourism growth must be aligned with community benefits and conservation goals (Duan et al., 2019; Justice, 2018).

Yunnan Construction and Investment Holding Group (YCIH) was established in April 2016 as a key provincial state-owned enterprise and has been described as a main operation and construction body supporting Yunnan’s development

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agenda (Xu & Wu, 2022). Recent geopark scholarship also shows that digital visibility and public geocommunication are becoming increasingly important in UNESCO Global Geoparks, which reinforces the managerial relevance of communication systems in geosite tourism development (Carrión-Mero et al., 2024; Permanadewi et al., 2026).

In practice, organizations like YCIH often deliver multi-year, multi-partner infrastructure and tourism-linked projects that face (i) changing regulations and approval procedures, (ii) intense stakeholder scrutiny, and (iii) cross-cultural engagement needs. Public reporting on digital infrastructure projects, including smart highway deployments in neighbouring contexts, signals how construction-investment organizations are increasingly expected to integrate digital systems and “smart” management into delivery and operations (Gursoy et al., 2019; Wang et al., 2019). Three developments reshape project delivery conditions for geosite tourism development in this context. First, regulatory environments are becoming more complex and dynamic, with higher procedural requirements for environmental safeguards and protected-area governance, as well as stronger expectations for evidence-based reporting and transparency (de Grosbois, 2016; De Grosbois & Fennell, 2022; Uyar et al., 2021). Second, the intercultural dimension is structurally salient: Yunnan’s ethnic diversity, multilingual tourism markets, and international geopark networking require project teams to negotiate meaning across languages, norms, and values (Carrión-Mero et al., 2024; Duan et al., 2019; Henderson et al., 2018). Third, AI and digital tools are rapidly entering tourism and project environments, including natural language processing (NLP) for multilingual communication, automated transcription and summarization, and intelligent document search (Chen, 2015; Chi et al., 2022; Samara et al., 2020; Tussyadiah, 2020).

The challenge is that these developments interact. Regulations produce information-processing demands. Intercultural contexts amplify interpretation and trust demands. AI can help, but only if deployed in ways that fit governance routines and that support accountability. This study therefore proposes and tests a mediation model in which AI-enabled communication efficiency (AICE) transmits the effects of regulatory adaptation (RA) and intercultural training (ICT) to project performance (PP). The central argument is simple: RA and ICT create capability potential, but performance benefits materialize when teams can convert complex information into shared situational awareness and coordinated action. AI-enabled routines (translation, summarization, policy analytics, knowledge routing) are positioned as the practical mechanism that reduces coordination loss and improves decision speed and quality (Banihashemi et al., 2017; Ika & Pinto, 2022).

The study contributes in three ways. First, it bridges geopark and geosite tourism governance research with project performance mechanisms, which are often treated separately (Anglani et al., 2023; Justice, 2018). Second, it integrates regulatory adaptation and intercultural training—two capabilities frequently discussed in isolation—into a coherent model tailored to geosite tourism development projects (Herrera-Franco et al., 2021; Sit et al., 2017). Third, it operationalizes AI’s role in tourism development not as “technology adoption” alone but as communication efficiency embedded in project routines, aligning with calls for governance-aware, responsible AI integration in tourism (Bankins & Formosa, 2023; Gursoy et al., 2019). Although there is increasing literature on AI in tourism and specifically geoparks as sustainable development platforms, there is a paucity of empirical research on geosite tourism development that considers a project-delivery aspect of sustainable tourism that may incorporate compliance capability, intercultural capability, and communication routines within a single explanatory paradigm. Current literature is inclined to comment on regulatory adaptation and intercultural training as independent of each other, with the process of transforming these abilities into coordinated project action being poorly understood. This research fills in that gap by setting the efficiency of AI-enabled communication as a facilitator between the regulatory adaptation, intercultural training, and project performance in geosite tourism development. By doing so, the study will elucidate how regulatory and intercultural capabilities can be operationally useful in the complex, multi-lingual and governance-intensive project environments. Figure 1 presents the theoretical framework of the study and summarizes the hypothesized relationships among regulatory adaptation, intercultural training, AI-enabled communication efficiency, and project performance.

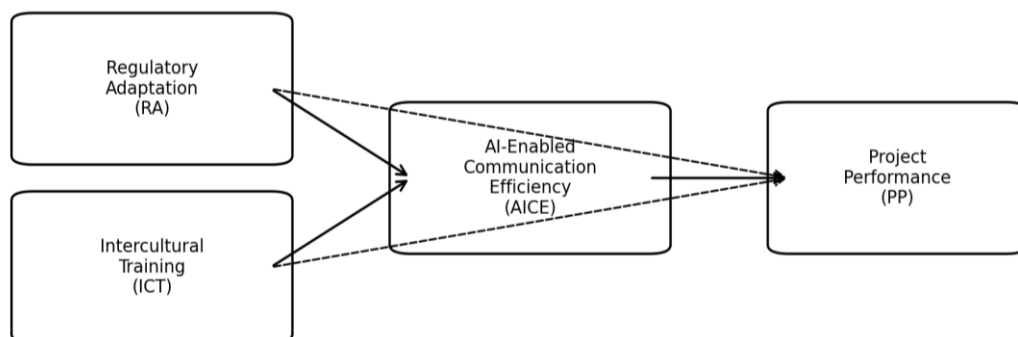


Figure 1. Theoretical framework of the relationships among regulatory adaptation, intercultural training, AI-enabled communication efficiency, and project performance.

LITERATURE REVIEW

Prior research relevant to this study can be organized around four linked themes: regulatory adaptation, intercultural training, AI-enabled communication efficiency, and project performance in geosite tourism development. The following subsections synthesize these themes and develop the hypotheses of the study. Regulatory adaptation refers to an

organization's capability to anticipate, interpret, and respond to regulatory and policy changes that affect project scope, approvals, environmental safeguards, procurement, and operations. In project-based industries, regulatory changes can generate uncertainty, delayed decisions, and costly disruptions if teams lack structured scanning and response processes (Li et al., 2022; Shahzad et al., 2025). This is especially relevant in projects connected to protected areas and tourism where environmental permitting, land-use constraints, community consultation, and safety obligations often intersect.

Dynamic capabilities theory provides a useful lens because regulatory adaptation requires sensing, seizing, and transforming under uncertainty (Carrión-Mero et al., 2024). In geosite tourism development, sensing includes monitoring protected-area policies and UNESCO guidance; seizing includes embedding requirements into design and communication plans; transforming includes updating routines, contracts, and training. From an institutional perspective, compliance and legitimacy are not only legal requirements but also social expectations that influence stakeholder support, destination reputation, and ultimately tourism viability (Chi et al., 2022; Xu & Wu, 2022). Regulatory adaptation therefore functions as a capability that reduces compliance risk while improving coordination under shifting constraints.

Intercultural training is a set of learning interventions designed to build cultural intelligence, cross-cultural communication skills, and conflict-handling competence for working across cultural boundaries. Evidence from meta-analytic research indicates that cross-cultural training improves adjustment, cultural intelligence, and job performance; however, effect sizes depend on training methods, trainee characteristics, and context (Sarstedt et al., 2020; Shmueli et al., 2019). In project organizations, intercultural capability matters because project success depends on stakeholder alignment and on minimizing misunderstandings that generate rework, conflict, or reputational harm. In Yunnan geosite tourism development, intercultural demands arise from at least four interfaces: (i) engagement with local communities whose cultural identity can be closely tied to landscapes and place narratives; (ii) collaboration with tourism operators and guides who translate science into visitor experiences; (iii) interaction with regulators and evaluators whose expectations reflect institutional norms; and (iv) communication with international visitors and networks (Chen, 2015; Henderson et al., 2018; Herrera-Franco et al., 2021). Training that strengthens cultural intelligence and perspective-taking should therefore improve not only interpersonal outcomes but also the effectiveness with which teams use AI tools such as translation and summarization, because participants must recognize context, decide what should (and should not) be automated, and validate AI outputs in sensitive stakeholder interactions (Gursoy et al., 2019; Samara et al., 2020).

AI-enabled communication efficiency captures the extent to which project teams use AI-supported tools and routines to communicate faster and more accurately with less coordination loss. Operationally, it includes machine translation for multilingual interactions, automated meeting transcription and summarization, sentiment and theme extraction from stakeholder feedback, policy text analytics for regulatory monitoring, and intelligent knowledge routing for issue escalation (Duan et al., 2019; Gursoy et al., 2019; Samara et al., 2020). In tourism and hospitality, research increasingly treats AI not only as a customer-facing technology (chatbots, personalization) but also as a managerial technology that changes internal coordination and decision making (Chi et al., 2022; Tussyadiah, 2020). Importantly, AICE is not the same as "more digital communication." Efficiency also depends on governance: clarity of responsibilities, evidence trails, accuracy checking, and ethical safeguards. Tourism AI governance research highlights risks around bias, hallucination, privacy, and accountability; therefore, the performance benefits of AI require human oversight and structured protocols (Bankins & Formosa, 2023; Li et al., 2022). In geopark settings, communication efficiency supports visibility and education goals: interpretive materials must be accurate, accessible, culturally respectful, and consistent across channels (Duan et al., 2019; Justice, 2018; Liu et al., 2020). AI tools can support such requirements when embedded into editorial and approval workflows rather than used informally.

Regulatory adaptation is enacted through information work: scanning for regulatory signals, interpreting guidance, and disseminating implications to design, procurement, and operations teams. Studies of regulatory adaptation processes in capital projects highlight that regulatory changes create uncertainty and delay unless organizations build systematic scanning and response routines (Chi et al., 2022). They also emphasize that the regulatory landscape is information-rich but fragmented across documents, agencies, and time; therefore, the "bottleneck" is often communication and interpretation capacity rather than technical feasibility. Digital compliance and regulatory governance research suggests that technology can improve the speed and consistency of regulatory monitoring and reporting, especially when it automates data extraction and workflow routing (De Grosbois & Fennell, 2022; Uyar et al., 2021). Although much RegTech research is in finance, the underlying logic applies to regulated project environments: automation supports evidence trails, reduces manual errors, and accelerates response cycles. In tourism-related governance, stronger environmental regulations are associated with sustainability outcomes that require coordination and monitoring (Shahzad et al., 2025; Yu et al., 2024). Translating these insights to geosite tourism projects implies that regulatory adaptation should be positively associated with AI-enabled communication efficiency because adaptation depends on rapid information synthesis, translation of requirements into actionable tasks, and consistent documentation. Therefore, the first hypothesis is proposed.

H1: Regulatory adaptation (RA) positively influences AI-enabled communication efficiency (AICE).

Intercultural training improves shared understanding, reduces misinterpretation, and supports relationship building across cultural boundaries. Meta-analytic evidence suggests that cross-cultural training improves adjustment, cultural intelligence, and job performance (Anglani et al., 2023; Banihashemi et al., 2017). In project contexts, intercultural competence can reduce conflict, improve coordination, and enhance stakeholder trust, which are central drivers of project success. Intercultural competence also interacts with digital communication. Research on global virtual work emphasizes that digital channels can magnify miscommunication because context cues are reduced and misunderstandings can persist if

documentation is incomplete or ambiguous (Chi et al., 2022). AI tools can mitigate this by providing translation and summarization, but they can also introduce risks when context or cultural nuance is lost (Ahmad, 2025). Therefore, intercultural training may increase AI-enabled communication efficiency by helping users (i) specify better prompts and communication goals, (ii) identify when AI output requires correction, (iii) detect culturally sensitive phrasing, and (iv) integrate AI outputs into negotiation and relationship-building routines (Chen, 2015; Tussyadiah, 2020). In geopark settings, where community narratives and cultural identity are part of the visitor experience and governance, the ability to communicate respectfully and accurately is critical (Bankins & Formosa, 2023; Herrera-Franco et al., 2021; Sumarmi et al., 2026). This leads to the second hypothesis.

H2: Intercultural training (ICT) positively influences AI-enabled communication efficiency (AICE).

Project performance is increasingly understood as multidimensional, integrating cost/time/quality with stakeholder satisfaction, learning, and sustainability outcomes (Ika & Pinto, 2022; Iqbal et al., 2022). In tourism and protected-area projects, performance also includes legitimacy, community benefit realization, and compliance outcomes. Governance research suggests that complex stakeholder environments make communication and information management central to performance because coordination failures generate rework, conflict, and reputational damage (Henderson et al., 2018). AI-enabled communication efficiency plausibly improves performance through several pathways. First, it reduces cycle time by speeding up the conversion of meetings, documents, and stakeholder inputs into decisions. Second, it reduces errors through standardized summaries and improved traceability. Third, it improves inclusivity by enabling multilingual participation via translation and accessible summaries. Fourth, it supports learning by creating searchable records and knowledge repositories (Duan et al., 2019; Gursoy et al., 2019). In tourism contexts, AI-supported text analytics can also improve responsiveness to visitor feedback and community concerns, reinforcing destination quality and trust (Banihashemi et al., 2017; Ingle & Mahesh, 2022). Because these pathways map directly onto common project performance dimensions, the third hypothesis is proposed.

H3: AI-enabled communication efficiency (AICE) positively influences project performance (PP).

Regulatory adaptation influences performance through reduced compliance risk, fewer redesign cycles, and improved legitimacy with regulators and communities. Empirical tourism governance studies show that environmental regulations shape how tourism development interacts with natural resource management and sustainability (Berente et al., 2021). Project governance research similarly highlights that uncertainty and institutional conditions influence performance by affecting transaction costs, coordination, and dispute potential (Ika & Pinto, 2022). In geosite tourism development, regulatory adaptation is particularly important because protected-area and geopark governance frameworks often require both procedural compliance (permits, reporting) and substantive outcomes (conservation, education, community benefit). Failure on either dimension can lead to delays, additional mitigation costs, or reputational harm that reduces tourism demand and stakeholder support. Therefore, regulatory adaptation should have a positive effect on project performance. Thus, the fourth hypothesis is proposed.

H4: Regulatory adaptation (RA) positively influences project performance (PP).

AICE is conceptualized as the mechanism through which capability inputs translate into project outcomes. Regulatory adaptation creates complex information-processing requirements; intercultural training creates social and interpretive capability (Liu et al., 2020). Yet both require operational routines that convert potential into executed performance. Digital transformation research suggests that capabilities produce outcomes through changes in routines and information flows rather than through resources alone (Samara et al., 2020). In tourism AI research, a recurring theme is that AI generates value when integrated into business processes and governance, rather than when implemented as isolated tools (Justice, 2018; Kanwal et al., 2020). Similarly, geopark research emphasizes that governance outcomes depend on stakeholder partnerships and communication infrastructures that support visibility and learning (Ali et al., 2018; Hair et al., 2019). This supports a mediation model: RA and ICT should improve AICE, which should then improve PP. However, RA and ICT may also have direct effects on PP (e.g., through legitimacy and trust effects), implying partial mediation. Therefore, the fifth hypothesis is proposed.

H5: AI-enabled communication efficiency (AICE) mediates the relationships between (a) regulatory adaptation (RA) and project performance (PP) and (b) intercultural training (ICT) and project performance (PP).

METHODOLOGY

A sequential explanatory mixed-method design is specified. First, a structured questionnaire captures perceptions of RA, ICT, AICE, and PP among stakeholders involved in geosite tourism development. Second, semi-structured interviews explore how AI-enabled routines operate under regulatory and intercultural complexity. Mixed-method designs are widely used in geopark research because they combine measurable perceptions with context-specific governance explanations (Berente et al., 2021; Carrión-Mero et al., 2024). YCIH is a provincial state-owned enterprise established in 2016 and positioned as a key construction and investment actor in Yunnan (Herrera-Franco et al., 2021).

Geosite tourism projects in Yunnan occur within a geopark governance landscape that includes UNESCO Global Geoparks such as Shilin and Dali-Cangshan (Anglani et al., 2023; Fassoulas et al., 2022). These geoparks highlight both geoheritage and community culture, illustrating why intercultural and communication capabilities are essential.

In a field implementation, respondents would be drawn from project management, engineering/construction, compliance/legal, tourism operations, community liaison, and IT/digital functions. Stratified sampling is appropriate because these functions experience different information and stakeholder interfaces. All items are measured on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). RA is measured with five items reflecting horizon scanning,

regulator engagement, and rapid compliance response (Henderson et al., 2018; Ika & Pinto, 2022). ICT is measured with five items capturing training quality, cultural intelligence gains, and conflict-handling competence (Chen, 2015; Samara et al., 2020). AICE is measured with six items describing AI-supported translation, summarization, knowledge search, and information routing routines (Banihashemi et al., 2017; Gursoy et al., 2019). PP is measured with five items capturing schedule/budget adherence, quality, stakeholder satisfaction, and sustainability outcomes (Ingle & Mahesh, 2022).

The analytic workflow follows PLS-SEM reporting practice: (i) internal consistency reliability (ρ_A , ρ_c , α), (ii) convergent validity (AVE and indicator loadings), (iii) discriminant validity (Fornell–Larcker and HTMT), and (iv) structural model evaluation (path coefficients, indirect effects, Cohen’s f^2 , R^2 , and predictive diagnostics such as $Q^2_{predict}$, RMSE, and MAE) (Sarstedt et al., 2020; Shmueli et al., 2019). Bootstrapping is used to approximate the sampling distribution of path coefficients and to test indirect effects. Interviews are used to validate whether the assumed mechanism (AICE) is experienced as the practical “bridge” between capability inputs and performance.

This is important because AI benefits can be undermined by poor governance (privacy risks, inaccurate outputs, overreliance), while strong governance can expand benefits (Bankins & Formosa, 2023; Tussyadiah, 2020). Interview protocols therefore focus on real episodes of regulatory change, community engagement, and AI-supported coordination. The Appendix A showed the questionnaire profile employed in this research study.

RESULTS

This section reports descriptive statistics, measurement model quality, and structural model estimates for the 320 respondents.

Respondent profile

The respondent profile (Table 1) reflects a project-based organizational mix. Engineering and construction and project management account for the largest shares of the sample, followed by tourism operations, compliance and legal, community liaison, and IT and digital functions. This distribution is consistent with the cross-functional structure typically required in geosite tourism development projects.

Table 1. Sample demographics

Category	Group	n	%
Gender	Male	186	58.1%
	Female	134	41.9%
Age	30-39	128	40.0%
	40-49	88	27.5%
	<30	67	20.9%
	50+	37	11.6%
Tenure Years	6-10	109	34.1%
	3-5	78	24.4%
	>10	75	23.4%
	<3	58	18.1%
Role	Engineering/Construction	94	29.4%
	Project management	71	22.2%
	Tourism operations	60	18.8%
	Compliance/Legal	35	10.9%
	Community liaison	33	10.3%
Role	IT/Digital	27	8.4%

Variable reliability and validity

Table 2 reports the internal consistency and convergent validity results. All constructs exceed the recommended thresholds, with Cronbach’s alpha, ρ_A , and composite reliability above 0.70 and average variance extracted above 0.50. These results indicate that the measures are reliable and that the indicators converge adequately on their intended constructs.

Table 2. Variables reliability and validity

Construct	Dijkstra-Henseler's rho (ρ_A)	Jöreskog's rho (ρ_c)	Cronbach's alpha (α)	AVE
RA	0.8756	0.8962	0.8550	0.6335
ICT	0.8805	0.9000	0.8610	0.6430
AICE	0.8950	0.9095	0.8805	0.6263
PP	0.8910	0.9083	0.8737	0.6647

Regulatory adaptation, intercultural training, and AI-enabled communication efficiency all exhibit strong internal consistency, consistent with well-specified reflective measurement models. Project performance also displays strong reliability, which is important because performance perceptions can be multidimensional and sensitive to role differences.

Estimated Model

Figure 2 summarizes the standardized path coefficients and R^2 values. The model explains 38.2% of the variance in AI-enabled communication efficiency and 45.3% of the variance in project performance, indicating moderate explanatory power.

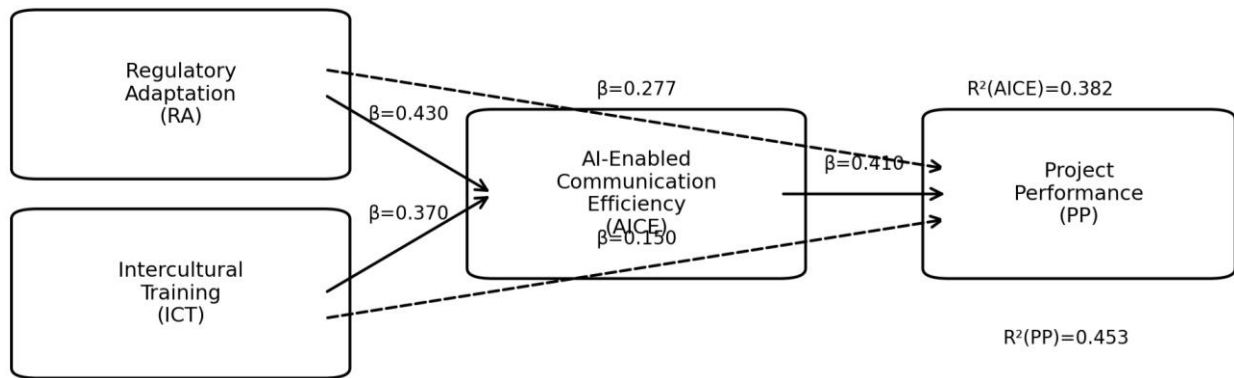


Figure 2. Estimated Model

Measurement Items Fitness Statistics

Table 3 shows that all retained indicators load above 0.70 on their respective constructs, supporting indicator reliability. This pattern is especially important for AI-enabled communication efficiency because the construct captures several AI-supported practices that nevertheless form a coherent underlying dimension.

Table 3. Measurement Items Fitness Statistics

Indicator	RA	ICT	AICE	PP
RA1	0.7689			
RA2	0.8170			
RA3	0.7927			
RA4	0.8267			
RA5	0.7727			
ICT1		0.8116		
ICT2		0.7893		
ICT3		0.8370		
ICT4		0.7743		
ICT5		0.7956		
AICE1			0.8340	
AICE2			0.7894	
AICE3			0.7840	
AICE4			0.7722	
AICE5			0.8011	
AICE6			0.7658	
PP1				0.8252
PP2				0.8165
PP3				0.7891
PP4				0.8044
PP5				0.8404

Discriminant Validity

Discriminant validity was assessed using the Fornell-Larcker criterion and the heterotrait-monotrait ratio. In Table 4, the square roots of the average variance extracted exceed the inter-construct correlations, and in Table 5 all HTMT values remain below 0.85. Together, these results support the empirical distinctiveness of the four constructs.

Table 4. Fornell-Larcker criterion

Construct	RA	ICT	AICE	PP
RA	0.7959	0.1893	0.4998	0.5108
ICT	0.1893	0.8018	0.4517	0.3883
AICE	0.4998	0.4517	0.7914	0.6169
PP	0.5108	0.3883	0.6169	0.8153

Table 5. Discriminant Validity (HTMT)

Construct	RA	ICT	AICE	PP
RA	1.0000	0.2212	0.5759	0.5911
ICT	0.2212	1.0000	0.5189	0.4480
AICE	0.5759	0.5189	1.0000	0.7032
PP	0.5911	0.4480	0.7032	1.0000

Variables effects overview

Table 6 summarizes the direct, indirect, and total effects together with the effect sizes. AI-enabled communication efficiency exerts a meaningful effect on project performance, while regulatory adaptation retains a smaller but still substantive direct effect. Intercultural training shows a more modest direct effect on project performance, but its total effect increases through the indirect pathway via AI-enabled communication efficiency. This pattern is consistent with partial mediation.

Table 6. Variables effects overview

Effect	Beta	Indirect effects	Total effect	Cohen's f2
RA -> AICE	0.4297		0.4297	0.2882
ICT -> AICE	0.3703		0.3703	0.2140
AICE -> PP	0.4103		0.4103	0.1903
RA -> PP	0.2773	0.1763	0.4536	0.1052
ICT -> PP	0.1505	0.1519	0.3024	0.0329

Table 7. R-square statistics Model Goodness of Fit Statistics

Construct	Coefficient of determination (R2)	Adjusted R2	Q ² predict	RMSE	MAE
AICE	0.3821	0.3782	0.3692	0.7942	0.6582
PP	0.4532	0.4480	0.4360	0.7510	0.6252

R-square statistics Model Goodness of Fit Statistics

Table 7 reports the R², adjusted R², Q²predict, RMSE, and MAE values for the endogenous constructs. The positive Q²predict values indicate acceptable predictive relevance for both AI-enabled communication efficiency and project performance. Figure 3 visualizes the structural paths and corresponding t values. All direct effects are positive and statistically significant. The strongest path is from AI-enabled communication efficiency to project performance, which supports the central mediating mechanism of the model.

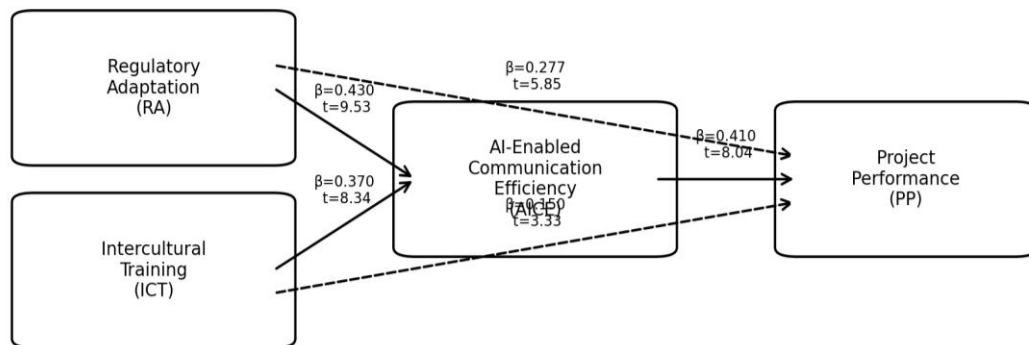


Figure 3. Structural Model for Path Analysis

Path Analysis

Bootstrapped path estimates in Table 8 show that regulatory adaptation and intercultural training both significantly predict AI-enabled communication efficiency. AI-enabled communication efficiency significantly predicts project performance. Regulatory adaptation and intercultural training also retain significant direct effects on project performance, while both indirect effects are significant. These results support partial mediation.

Table 8. Path Analysis (bootstrapped)

Path	Beta	SE	t	p
RA->AICE	0.4297	0.0451	9.53	<0.001
ICT->AICE	0.3703	0.0444	8.34	<0.001
RA->PP	0.2773	0.0474	5.85	<0.001
ICT->PP	0.1505	0.0452	3.33	<0.001
AICE->PP	0.4103	0.0510	8.04	<0.001
ind_RA	0.1763	0.0282	6.24	<0.001
ind_ICT	0.1519	0.0263	5.79	<0.001

DISCUSSION

The findings support the central argument that AI-enabled communication efficiency is the operational mechanism through which capability investments are translated into project outcomes in geosite tourism development. Regulatory adaptation shows a strong positive association with AI-enabled communication efficiency, which suggests that teams respond more effectively to shifting compliance requirements when they can convert regulatory information into timely, searchable, and actionable communication. In this context, regulatory adaptation is not only a matter of compliance readiness, but also a communication capability that supports coordinated execution.

Intercultural training also shows a significant positive effect on AI-enabled communication efficiency. This result suggests that the value of AI-supported translation, summarization, and knowledge routing depends on users' ability to interpret context, recognize cultural sensitivity, and validate outputs before they circulate across stakeholder groups.

The finding is consistent with recent work that treats cultural intelligence as increasingly important under digital coordination and cross-cultural project interaction (Anglani et al., 2023). In geosite tourism development, where communication often involves local communities, tourism operators, regulators, and external evaluators, culturally informed judgment remains necessary even when AI tools accelerate information exchange.

The positive effect of AI-enabled communication efficiency on project performance confirms that communication routines are not peripheral to delivery outcomes. Faster synthesis of meetings, clearer routing of issues, improved multilingual communication, and more consistent record keeping can reduce coordination loss and support more timely decisions. This interpretation is aligned with tourism research that views AI as valuable when it is embedded in managerial processes and governance routines rather than treated as an isolated tool (Samara et al., 2020; Tussyadiah, 2020).

The result is also compatible with geotourism studies that link digital visibility and communication infrastructure to broader geopark performance and public engagement (Carrión-Mero et al., 2024; Fassoulas et al., 2022).

The direct effect of regulatory adaptation on project performance indicates that the benefit of compliance capability is not fully exhausted by the mediating pathway. Some effects appear to operate through more immediate channels such as risk reduction, avoidance of redesign, and stronger legitimacy with regulators and community stakeholders.

At the same time, the significant indirect effects from both regulatory adaptation and intercultural training through AI-enabled communication efficiency show that part of their performance value depends on whether organizations can institutionalize effective communication routines. The overall pattern is therefore one of partial mediation, in which capability development and communication infrastructure reinforce one another.

For YCIH-type organizations, the findings point to a layered capability architecture. Regulatory scanning, intercultural training, and AI-enabled communication routines should not be treated as separate initiatives. Their value is strongest when they are designed as an integrated system that supports bilingual documentation, rapid interpretation of regulatory change, validated meeting summaries, and traceable communication across departments and partners. The practical contribution of the study lies in showing how AI becomes useful in geosite tourism development: not as a stand-alone technology, but as a governed communication mechanism that helps organizations act on complex regulatory and intercultural demands.

Project managers can implement "communication control points" analogous to quality control points. For example: AI-generated meeting summaries should be validated within 24 hours; regulatory change alerts should trigger a structured impact assessment; community feedback should be categorized and routed to owners with response deadlines. These routines also create auditable evidence useful for regulators and geopark evaluators.

Policymakers and geopark administrations can encourage project performance by issuing machine-readable guidance, standardized reporting formats, and shared knowledge bases that reduce interpretation ambiguity. UNESCO's emphasis on geopark visibility suggests that digital communication infrastructure (websites, maps, interpretive media) should be treated as part of the project deliverable baseline. AI-enabled toolkits can support smaller community operators by lowering translation and content production costs, while governance guidelines can reduce risks of misinformation and cultural insensitivity.

This study has several limitations that also define directions for future research. First, the design is cross-sectional. Longitudinal research could examine how AICE evolves across project phases (planning, construction, operations) and how it interacts with episodic regulatory shocks (new policies, revalidation requirements) and seasonal tourism pressure. Second, measurement can be deepened. AICE could be decomposed into subdimensions (translation accuracy, summarization usefulness, knowledge retrieval speed, governance compliance) and connected to responsible AI practices. Third, future research could test boundary conditions: for example, whether AI-enabled communication efficiency matters more when cultural distance is high or when regulatory uncertainty is high.

Finally, comparative studies across geoparks and enterprises would strengthen external validity. For example, comparing projects in Shilin and Dali-Cangshan with other Chinese or international geopark contexts could reveal how governance arrangements, digital maturity, and community participation models shape the strength of the mediation pathway. The questionnaires applied in this study were shown in Table 9.

Table 9. Questionnaire profile

Variable	Items	Scale source
Regulatory adaptation (RA)	Five	Adapted from regulatory adaptation process and compliance research (Herrera-Franco et al., 2021; Tussyadiah, 2020)
Intercultural training (ICT)	Five	Adapted from cross-cultural training and CQ research (Anglani et al., 2023; Sit et al., 2017)
AI-enabled communication efficiency (AICE)	Six	Adapted from tourism AI/NLP and digital work research (Chi et al., 2022; Duan et al., 2019)
Project performance (PP)	Five	Adapted from project performance measurement research (Banihashemi et al., 2017)

CONCLUSION

This study examined how regulatory adaptation (RA) and intercultural training (ICT) influence project performance (PP) in geosite tourism development through AI-enabled communication efficiency (AICE), using data from 320 stakeholders associated with Yunnan Construction and Investment Holding Group. The findings confirm that both RA

and ICT significantly strengthen AICE, with path coefficients of $\beta = 0.430$ and $\beta = 0.370$, respectively. AICE, in turn, has a significant positive effect on project performance ($\beta = 0.410$). The significant indirect effects of RA ($\beta = 0.176$) and ICT ($\beta = 0.152$) on project performance further demonstrate that AICE functions as a partial mediator.

The model explains 38.2% of the variance in AICE and 45.3% of the variance in project performance, indicating meaningful explanatory and predictive relevance. These findings extend geosite tourism and project-management research by demonstrating that regulatory and intercultural capabilities generate stronger performance benefits when translated into efficient communication routines supported by AI. Rather than treating AI as a stand-alone technological intervention, the study positions AICE as an organizational mechanism that facilitates multilingual communication, regulatory interpretation, knowledge routing, documentation, and coordinated decision-making.

This perspective is particularly relevant for geosite tourism projects, where organizations must simultaneously address conservation requirements, stakeholder expectations, cultural diversity, and changing governance conditions.

From a practical perspective, organizations such as YCIH should integrate regulatory scanning, intercultural capability development, and AI-supported communication within a coordinated governance framework.

AI-generated summaries, translations, regulatory alerts, and stakeholder information should be supported by clearly defined validation procedures, human oversight, and traceable approval processes. Such practices may improve organizational responsiveness while reducing communication errors and coordination losses.

The study is limited by its cross-sectional design and single-organizational context. Future research should examine these relationships longitudinally across different project phases and compare multiple geoparks, enterprises, and national settings. Further studies could also distinguish specific dimensions of AICE, including translation accuracy, summarization quality, knowledge-retrieval speed, and governance compliance. Overall, responsible and well-governed AI-enabled communication can help convert regulatory and intercultural capabilities into stronger project performance while supporting sustainable, culturally sensitive, and accountable tourism development outcomes.

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REFERENCES

- Ahmad, I. (2025). The Strategic Role of Artificial Intelligence in Overcoming Intercultural Barriers for SME Internationalization: A Systematic literature review. *Journal of Intercultural Communication*, 25(2), 148–163. <https://doi.org/10.36923/jicc.v25i2.1065>
- Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M., & Ryu, K. (2018). An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research. *International Journal of Contemporary Hospitality Management*, 30(1), 514–538. <https://doi.org/10.1108/ijchm-10-2016-0568>
- Anglani, F., Pennetta, S., Reaiche, C., & Boyle, S. (2023). Crossing digital frontiers with cultural intelligence - a new paradigm for project managers. *International Journal of Project Management*, 41(8), 102543. <https://doi.org/10.1016/j.ijproman.2023.102543>
- Banihashemi, S., Hosseini, M. R., Golizadeh, H., & Sankaran, S. (2017). Critical success factors (CSFs) for integration of sustainability into construction project management practices in developing countries. *International Journal of Project Management*, 35(6), 1103–1119. <https://doi.org/10.1016/j.ijproman.2017.01.014>
- Bankins, S., & Formosa, P. (2023). The ethical implications of artificial intelligence (AI) for meaningful work. *Journal of Business Ethics*, 185(4), 725–740. <https://doi.org/10.1007/s10551-023-05339-7>
- Berente, N., Gu, B., Recker, J., & Santhanam, R. (2021). Managing artificial Intelligence. *MIS Quarterly*, 45(3), 1433–1450. <https://doi.org/10.25300/misq/2021/16274>
- Carrión-Mero, P., Dueñas-Tovar, J., Jaya-Montalvo, M., Herrera-Franco, G., Berrezueta, E., & Morante-Carballo, F. (2024). Assessment of UNESCO Global Geoparks websites for a public geocommunication. *International Journal of Geoheritage and Parks*, 12(2), 223–240. <https://doi.org/10.1016/j.ijgeop.2024.04.001>
- Chen, A. S. (2015). CQ at work and the impact of intercultural training: An empirical test among foreign laborers. *International Journal of Intercultural Relations*, 47, 101–112. <https://doi.org/10.1016/j.ijintrel.2015.03.029>
- Chi, O. H., Gursoy, D., & Chi, C. G. (2022). Tourists' Attitudes toward the Use of Artificially Intelligent (AI) Devices in Tourism Service Delivery: Moderating Role of Service Value Seeking. *Journal of Travel Research*, 61(1), 170–185. <https://doi.org/10.1177/0047287520971054>

- De Grosbois, D. (2016). Corporate social responsibility reporting in the cruise tourism industry: a performance evaluation using a new institutional theory based model. *Journal of Sustainable Tourism*, 24(2), 245–269. <https://doi.org/10.1080/09669582.2015.1076827>
- De Grosbois, D., & Fennell, D. A. (2022). Determinants of climate change disclosure practices of global hotel companies: Application of institutional and stakeholder theories. *Tourism Management*, 88, 104404. <https://doi.org/10.1016/j.tourman.2021.104404>
- Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data – evolution, challenges and research agenda. *International Journal of Information Management*, 48, 63–71. <https://doi.org/10.1016/j.ijinfomgt.2019.01.021>
- Fassoulas, C., Nikolakakis, E., & Staridas, S. (2022). Digital tools to serve geotourism and sustainable development at Psiloritis UNESCO Global Geopark in COVID Times and beyond. *Geosciences*, 12(2), 78. <https://doi.org/10.3390/geosciences12020078>
- Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2019). Consumers acceptance of artificially intelligent (AI) device use in service delivery. *International Journal of Information Management*, 49, 157–169. <https://doi.org/10.1016/j.ijinfomgt.2019.03.008>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/eb-11-2018-0203>
- Henderson, L. S., Stackman, R. W., & Lindekilde, R. (2018). Why cultural intelligence matters on global project teams. *International Journal of Project Management*, 36(7), 954–967. <https://doi.org/10.1016/j.ijproman.2018.06.001>
- Herrera-Franco, G., Montalván-Burbano, N., Carrión-Mero, P., Jaya-Montalvo, M., & Gurumendi-Noriega, M. (2021). Worldwide Research on Geoparks through Bibliometric Analysis. *Sustainability*, 13(3), 1175. <https://doi.org/10.3390/su13031175>
- Ika, L. A., & Pinto, J. K. (2022). The “re-meaning” of project success: Updating and recalibrating for a modern project management. *International Journal of Project Management*, 40(7), 835–848. <https://doi.org/10.1016/j.ijproman.2022.08.001>
- Ingle, P. V., & Mahesh, G. (2022). Construction project performance areas for Indian construction projects. *International Journal of Construction Management*, 22(8), 1443–1454. <https://doi.org/10.1080/15623599.2020.1721177>
- Iqbal, Q., Ahmad, N. H., Li, Z., & Li, Y. (2021). To walk in beauty: Sustainable leadership, frugal innovation and environmental performance. *Managerial and Decision Economics*, 43(3), 738–750. <https://doi.org/10.1002/mde.3415>
- Justice, S. C. (2018). UNESCO Global Geoparks, Geotourism and Communication of the Earth Sciences: A case study in the Chablais UNESCO Global Geopark, France. *Geosciences*, 8(5), 149. <https://doi.org/10.3390/geosciences8050149>
- Kanwal, S., Rasheed, M. I., Pitafi, A. H., Pitafi, A. H., Pitafi, A., Pitafi, A., & Ren, M. (2020). Road and transport infrastructure development and community support for tourism: The role of perceived benefits, and community satisfaction. *Tourism Management*, 77, 104014. <https://doi.org/10.1016/j.tourman.2019.104014>
- Li, Y., Li, M., & Ding, Z. (2022). Study on methodology of assessing synergy between conservation and development of karst protected area in the case of the Diehong Bridge Scenic Area of Jiuxiang Gorge Cave Geopark, Yunnan, China. *Environment Development and Sustainability*, 24(4), 5867–5886. <https://doi.org/10.1007/s10668-021-01688-3>
- Liu, J., Cui, Z., Feng, Y., Perera, S., & Han, J. (2020). Impact of culture differences on performance of international construction joint ventures: the moderating role of conflict management. *Engineering Construction & Architectural Management*, 27(9), 2353–2377. <https://doi.org/10.1108/ecam-02-2019-0111>
- Permanadewi, S., Prabowo, A., Samodra, H., Ridwan, A. A., Indonesia, M. B. O. C. U. G. G. S. W. J., Irzon, R., Yunianto, B., & Hartono, H. (2026). Geoheritage Assessment and Social Media Engagement: A Case Study of Ten Geosites in the Ciletuh-Palabuhanratu Unesco Global Geopark, West Java, Indonesia. *GeoJournal of Tourism and Geosites*, 64(1), 326–341. <https://doi.org/10.30892/gtg.64129-1680>
- Samara, D., Magnisalis, I., & Peristeras, V. (2020). Artificial intelligence and big data in tourism: a systematic literature review. *Journal of Hospitality and Tourism Technology*, 11(2), 343–367. <https://doi.org/10.1108/jhtt-12-2018-0118>
- Sarstedt, M., Ringle, C. M., Cheah, J., Ting, H., Moisescu, O. I., & Radomir, L. (2020). Structural model robustness checks in PLS-SEM. *Tourism Economics*, 26(4), 531–554. <https://doi.org/10.1177/1354816618823921>
- Shahzad, M. A., Chen, S., Iqbal, T., & Li, Z. (2025). Sustainable futures: leveraging green intellectual capital, HRM, innovation and leadership. *Journal of Intellectual Capital*, 26(3), 807–838. <https://doi.org/10.1108/jic-03-2024-0091>
- Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. *European Journal of Marketing*, 53(11), 2322–2347. <https://doi.org/10.1108/ejm-02-2019-0189>
- Sit, A., Mak, A. S., & Neill, J. T. (2017). Does cross-cultural training in tertiary education enhance cross-cultural adjustment? A systematic review. *International Journal of Intercultural Relations*, 57, 1–18. <https://doi.org/10.1016/j.ijintrel.2017.01.001>
- Sumarmi, S., Maryani, E., Rose, R. A. C., Papiro, S. P. S., Noviani, R., Kurniawati, E., & Arinta, D. (2026). Community-Based Tourism (Cbt) In The Osing Community's Local Wisdom To Support Unesco Global Geopark Ijen In Kemiren Village, Indonesia. *GeoJournal of Tourism and Geosites*, 64(1), 176–189. <https://doi.org/10.30892/gtg.64115-1665>
- Tao, X. (2026). From Geosite to Metaverse: Building and Communicating the Dujiangyan Cultural Tourism Ip Image in China. *GeoJournal of Tourism and Geosites*, 64(1), 582–590. <https://doi.org/10.30892/gtg.64150-1701>
- Tussyadiah, I. (2020). A review of research into automation in tourism: Launching the Annals of Tourism Research Curated Collection on Artificial Intelligence and Robotics in Tourism. *Annals of Tourism Research*, 81, 102883. <https://doi.org/10.1016/j.annals.2020.102883>
- Uyar, A., Karaman, A. S., & Kilic, M. (2021). Institutional drivers of sustainability reporting in the global tourism industry. *Tourism Economics*, 27(1), 105–128. <https://doi.org/10.1177/1354816619886250>
- Wang, Y., Wu, F., Li, X., & Chen, L. (2019). Geotourism, geoconservation, and geodiversity along the belt and road: A case study of Dunhuang UNESCO Global Geopark in China. *Proceedings of the Geologists Association*, 130(2), 232–241. <https://doi.org/10.1016/j.pgeola.2019.01.004>
- Xu, K., & Wu, W. (2022). Geoparks and Geotourism in China: A Sustainable Approach to Geoheritage Conservation and Local Development—A Review. *Land*, 11(9), 1493. <https://doi.org/10.3390/land11091493>
- Yu, D., Li, Z., & Hussain, S. (2024). Localized environmental governance for carbon dioxide removal in small island developing states: Challenges and opportunities. *Energy Strategy Reviews*, 56, 101551. <https://doi.org/10.1016/j.esr.2024.101551>