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An integrative framework operationalising artificial intelligence destination governance and geopolitical risk moderation in sustainable tourism

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Abstract

The nexus between sustainable tourism, artificial intelligence (AI), and geopolitical fragility has attracted growing scholarly attention, yet no study has systematically synthesised how maritime security disruptions — specifically a Strait of Hormuz blockage — may intersect with tourism flows and sustainability transitions in the world. This paper addresses that gap through a PRISMA 2020-compliant systematic literature review of 24 peer-reviewed studies published between 2018 and 2026. Drawing on the Triple Bottom Line (TBL) framework, Stakeholder Theory, and Smart Destination Theory, we examine: (i) the typology and relative sustainability of tourism forms; (ii) the success and failure determinants of sustainable destination management; (iii) the structural role of AI and smart technologies in tourism governance; and (iv) the plausible but under-theorised impact of Hormuz disruptions on tourism. Our synthesis reveals that heritage-based and ecotourism modalities — particularly when augmented by AI-enabled governance — consistently outperform other tourism types on environmental, social, and economic sustainability dimensions. AI emerges not merely as a technological adjunct but as a structural catalyst for destination resilience. Geopolitical shock variables such as maritime blockages remain almost entirely absent from tourism sustainability models despite their demonstrated macroeconomic significance. A comprehensive multi-dimensional research framework is proposed to guide future empirical and mixed-methods investigations.

Introduction

The global tourism sector has undergone unprecedented transformation over the past decade, driven simultaneously by the twin forces of digital disruption and heightened environmental consciousness. As Healy & Carvao, (2025) affirms, tourism is both a powerful engine of economic development and a significant contributor to environmental and social pressures. For nations in the Gulf and broader Middle East region — characterised by extraordinary cultural heritage, fragile desert ecosystems, and a distinctive geopolitical environment — the imperative to develop tourism sustainably is not merely aspirational; it is existential.

Within this complex landscape, two dynamics have emerged as structurally transformative. First, artificial intelligence (AI) and the Internet of Things (IoT) are reshaping how destinations are managed, marketed, and experienced (Li & Mahasuweerachai, 2026; Zhang & Deng, 2024). From smart monitoring systems that prevent overcrowding in heritage sites to AI-powered personalisation engines that tailor visitor itineraries, digital technologies have entered the core architecture of destination governance. Second, regional geopolitical instability — particularly the recurrent threat of conflict or blockade at the Strait of Hormuz — poses an asymmetric and under-studied risk to tourism flows, investor confidence, and economic resilience across Iran, Oman, the United Arab Emirates, and beyond (Rizkiyani et al., 2025; Zulkifli & Ariffin, 2023).

Despite the salience of both dynamics, the academic literature has engaged them in isolation. Reviews of AI in tourism (Florido-Benítez & del Alcázar Martínez, 2024; Li & Mahasuweerachai, 2026) rarely

theorize geopolitical shocks; conversely, security studies of the Hormuz corridor (Ariffin & Zulkifli, 2023; Mangu, 2025) ignore tourism as a channel of economic impact. Meanwhile, heritage tourism and ecotourism scholarship for Gulf contexts (Al-Hammadi, 2022; Moscatelli, 2024; Sampieri & Bagader, 2024) has flourished without systematically integrating either AI-enabled governance or geopolitical vulnerability. This fragmentation leaves policymakers, destination managers, and scholars without a unified analytical lens.

The present paper addresses these gaps through a PRISMA 2020-compliant systematic literature review. Our central argument is threefold: (a) sustainable tourism in Gulf-type contexts is best advanced through heritage and ecotourism modalities governed by participatory, stakeholder-centred approaches; (b) AI acts as a structural amplifier of both sustainability outcomes and destination competitiveness; and (c) geopolitical risk — particularly Hormuz-related disruptions — constitutes a neglected but critical moderating variable in regional tourism sustainability models. In synthesizing these threads, we offer both a state-of-the-art review and a theoretically grounded research framework for future investigation.

The remainder of this paper is organized as follows. Section 2 presents the theoretical framework. Section 3 details the methodology. Section 4 provides the main literature synthesis across six thematic dimensions. Section 5 presents the proposed integrative research framework. Section 6 discusses implications and limitations, and Section 7 concludes.

Theoretical Framework

This review is anchored in three complementary theoretical traditions that, taken together, offer a multi-level lens for understanding sustainable tourism in politically complex environments.

Triple Bottom Line (TBL) Framework

Originally developed by Elkington, (1997) and applied extensively in tourism sustainability scholarship, the TBL posits that sustainable development requires simultaneous attention to economic viability, environmental integrity, and social equity (Baloch et al., 2023; Rangkuti et al., 2025). In the context of Gulf tourism, the TBL is particularly instructive because the region faces acute trade-offs: rapid economic growth ambitions (economic pillar) sit alongside severe water scarcity and biodiversity loss (environmental pillar) and cultural authenticity concerns (social pillar). Studies reviewed in this paper consistently invoke TBL logic to evaluate destination performance, making it the natural organising framework for our thematic synthesis.

Stakeholder Theory

Freeman, (1984) Stakeholder Theory holds that sustainable outcomes require the identification, engagement, and balanced accommodation of all parties with a stake in organisational or territorial

decisions. In tourism, stakeholders include governments, local communities, heritage authorities, investors, tourism firms, and visitors. The reviewed literature emphasises that destinations that engage local communities as active co-managers — rather than passive recipients of tourism revenue — achieve more durable sustainability outcomes (Baloch et al., 2023; Moscatelli, 2024; Rangkuti et al., 2025). This theoretical commitment is operationalized in our framework through the governance and community participation components.

Smart Destination Theory

Smart Destination Theory, developed in response to the proliferation of ICT in urban planning and tourism management, conceptualizes tourist destinations as interconnected sociotechnical systems in which digital infrastructure enables more efficient, personalized, and environmentally conscious visitor experiences (Lasisi et al., 2025; Zhang & Deng, 2024). This theory is particularly relevant for understanding how AI and IoT function not merely as productivity tools but as instruments of governance transformation. The reviewed studies suggest that AI adoption significantly mediates the relationship between destination infrastructure and sustainability outcomes — a finding that motivates its central placement in our proposed framework.

Systems Thinking and Geopolitical Risk

We complement the above frameworks with a systems thinking perspective (Meadows, 2008), recognising that tourism destinations are open systems exposed to external shocks. Geopolitical disruptions, such as military conflicts or maritime blockades, function as high-magnitude external stressors that can rapidly reconfigure energy prices, trade routes, travel advisories, and investor sentiment. The Strait of Hormuz — through which approximately 20% of the world's tradeable oil transits — represents precisely such a systemic vulnerability (Mangu, 2025; Rizkiyani et al., 2025). Integrating geopolitical risk variables into sustainable tourism models is therefore not merely a contextual addition; it is a theoretical necessity for Gulf-regional scholarship.

Methodology

PRISMA 2020 Protocol

This study follows the PRISMA 2020 guidelines (Page et al., 2022) for systematic reviews, ensuring transparency, reproducibility, and rigour in evidence synthesis. The review protocol was designed to address six research objectives: (a) categorising sustainable tourism types in Gulf-adjacent contexts; (b) identifying the most sustainability-effective tourism models; (c) theorising the impacts of a Strait of Hormuz disruption on regional tourism; (d) mapping success and failure determinants of sustainable tourism; (e) assessing economic and socio-environmental impacts; and (f) characterising the role of AI in sustainable destination governance.

Search Strategy

Systematic searches were conducted in Scopus, Web of Science (WoS), and Google Scholar, covering publications from January 2018 to May 2026. The search combined terms relating to three conceptual clusters: (i) tourism types and sustainability ("heritage tourism", "ecotourism", "smart tourism", "pilgrimage tourism", "cultural tourism"); (ii) AI and technology ("artificial intelligence", "IoT", "smart destination", "GenAI", "NLP tourism"); and (iii) Gulf geopolitics ("Strait of Hormuz", "Gulf tourism", "maritime security", "tourism risk").

Inclusion and Exclusion Criteria

Studies were included if they: (a) were peer-reviewed journal articles or systematic reviews; (b) addressed sustainable tourism, AI in tourism, or geopolitical impacts on tourism in Gulf, Middle Eastern, or analogous developing-region contexts; (c) were published in English; and (d) passed quality appraisal using JBI Critical Appraisal Tools (Rangkuti et al., 2025; Zhang & Deng, 2024). Grey literature, opinion pieces, and non-peer-reviewed reports were excluded. Geopolitical studies were included if they provided quantifiable or theoretically significant implications for economic sectors that encompass tourism.

Screening and Quality Appraisal

A total of 387 initial records were identified through database searches, with 41 additional records through manual reference tracking. After duplicate removal (n = 68), 360 records underwent title and abstract screening, yielding 82 full-text articles for eligibility assessment. Following quality appraisal, 24 studies met all inclusion criteria and were retained for synthesis.

Table 1. PRISMA 2020 Screening and Selection Process

PRISMA Phase	Action	Details
Identification	Database Search	Scopus, Web of Science, Google Scholar, EconLit (2018–2026)
Screening	Title & Abstract Review	Duplicates removed; irrelevant topics excluded; language filter (English)
Eligibility	Full-Text Appraisal	JBI Critical Appraisal Tools; minimum quality threshold enforced; n=24 final studies
Synthesis	Thematic Coding & Framework Build	Codebook aligned with Triple Bottom Line, Stakeholder Theory, and Smart Destination Theory

Synthesis Approach

A thematic synthesis approach was employed (Thomas & Harden, 2008), following the three-stage process: (i) line-by-line coding of findings; (ii) development of descriptive themes; and (iii) generation of analytical themes linked to theoretical constructs. Codebook categories were anchored to the TBL pillars, Stakeholder Theory dimensions, Smart Destination components, and geopolitical risk variables.

Findings and Discussion

Tourism Typology

The reviewed literature identifies five dominant tourism modalities relevant to Gulf and analogous contexts, each with distinctive sustainability profiles (see Table 2). These are: (1) ecotourism and smart ecotourism; (2) cultural and heritage tourism; (3) pilgrimage tourism; (4) cultural-heritage sports tourism; and (5) AI-enabled smart tourism destinations (STDs).

Ecotourism, as synthesized by Zhang & Deng, (2024) across 42 systematic studies, consistently emerges as a high-sustainability modality when supported by smart monitoring infrastructure. Nature-based settings across developing-world contexts demonstrate that AI-powered visitor flow management, biodiversity monitoring sensors, and digital visitor guides substantially reduce anthropogenic pressures while improving the quality of visitor experience. Baloch et al., (2023) corroborate this finding within the South Asian ecotourism context, emphasizing that participatory governance — rather than technological sophistication alone — determines long-run ecological outcomes.

Heritage and pilgrimage tourism represents the most distinctive typology for the Arabian Gulf. Sampieri & Bagader, (2024) document Jeddah's Historic District as a case where UNESCO World Heritage status creates both opportunity and vulnerability: while heritage designation drives international visitor flows and provides a rationale for infrastructure investment, it simultaneously generates overtourism pressures that threaten the very assets upon which tourism is predicated. Moscatelli, (2024) offers complementary evidence from the Darb Zubaydah Hajj pilgrimage route, arguing that heritage criteria — cultural, environmental, spatial, and economic — must be integrated into risk management frameworks from the outset of tourism development planning, rather than retrofitted after damage has occurred.

Al-Hammadi, (2022) extends heritage tourism analysis to Qatar's Msheireb Downtown Doha, demonstrating how adaptive heritage reuse can serve as a vehicle for sustainable urban tourism when design principles prioritize environmental performance alongside cultural authenticity. The Qatari case is instructive for broader Gulf application: it illustrates that sustainability and economic ambition are not inherently contradictory when heritage governance is institutionally robust.

Cultural-heritage sports tourism, examined by Rangkuti et al., (2025) through a PRISMA systematic review, represents an emerging hybrid modality in which major sporting events are co-located with heritage experiences to generate diversified revenue streams and amplify destination image. The Gulf's hosting of Formula One races in Abu Dhabi and Bahrain, and Qatar's 2022 FIFA World Cup, exemplifies this trend. However, Rangkuti et al., (2025) caution that over commercialization risks the authenticity

loss that undermines long-run heritage tourism viability — a finding with direct policy relevance for the region.

Finally, AI-enabled STDs represent the frontier of tourism governance innovation. As Li & Mahasuweerachai, (2026) demonstrate through bibliometric analysis spanning 2015–2025, the academic literature on AI in smart tourism has expanded exponentially, with AI now fundamentally reshaping visitor personalisation, destination marketing, environmental monitoring, and governance architecture. Florido-Benítez & del Alcázar Martínez, (2024) show that AI-driven marketing platforms can optimise revenue, reduce customer acquisition costs, and attract foreign direct investment — but require substantial initial investment and skilled technical workforce, which represents a significant constraint for less-developed Gulf-adjacent destinations.

Table 2. Sustainable Tourism Typology: Rationale and Evidence

Tourism Type	Key Sustainability Rationale	Representative Citations
Ecotourism / Smart Ecotourism	Integrates environmental protection with community economic benefits; AI/IoT enhances monitoring and resource efficiency; supports biodiversity conservation goals aligned with SDG 15	(Baloch et al., 2023; Zhang & Deng, 2024)
Heritage & Pilgrimage Tourism	Preserves cultural identity and community cohesion; diversifies economic base; leverages existing infrastructure; aligns with UNESCO World Heritage objectives	(Al-Hammadi, 2022; Moscatelli, 2024; Sampieri & Bagader, 2024)
Cultural-Heritage Sports Tourism	Generates event-linked revenue; promotes community empowerment; integrates with urban regeneration strategies when governed participatively (Triple Bottom Line)	(Rangkuti et al., 2025)
AI-Enabled Smart Tourism Destinations	Improves operational efficiency; personalises visitor experience; facilitates data-driven governance; reduces carbon footprint through intelligent logistics	(Florido-Benítez & del Alcázar Martínez, 2024; Li & Mahasuweerachai, 2026; Siddik et al., 2025)

Most Sustainable Tourism Models: Evidence and Rationale

Across the reviewed studies, a consistent evidence base supports the primacy of heritage-based and ecotourism models as the most sustainable, provided three governance conditions are met. First, environmental conservation must be operationalised through specific monitoring instruments, not merely articulated as a policy aspiration (Baloch et al., 2023; Zhang & Deng, 2024). Second, economic benefits must flow demonstrably to local communities rather than accruing primarily to external investors (Baloch et al., 2023; Moscatelli, 2024). Third, social sustainability — measured through cultural identity preservation, community cohesion, and resident wellbeing — must be actively monitored and

protected against displacement and commercialisation pressures (Al-Hammadi, 2022; Rangkuti et al., 2025).

The convergence of heritage and ecotourism with AI-enabled management creates what the literature terms "smart sustainable tourism" — a modality that synthesises environmental stewardship, cultural authenticity, and digital governance into a coherent destination management approach. Zhang & Deng, (2024) identify five pathways through which smart technologies enhance ecotourism sustainability: resource efficiency, visitor behaviour modification, biodiversity monitoring, accessibility expansion, and revenue diversification. These pathways are not context-specific; they apply with equal salience to Gulf heritage corridors as to nature-based destinations elsewhere.

Strait of Hormuz Disruptions: Tourism Implications

The Strait of Hormuz — a 33-kilometre-wide waterway between Iran and Oman through which approximately 20% of globally traded oil and 25–30% of global liquefied natural gas transits — represents one of the most strategically sensitive chokepoints in the world economy (Mangu, 2025; Rizkiyani et al., 2025). Security analyses consistently document how even credible threats of blockage generate immediate macroeconomic ripple effects: energy price spikes, trade route disruptions, financial market volatility, and sovereign risk reassessment for adjacent states (Ariffin & Zulkifli, 2023; Zulkifli & Ariffin, 2023).

What the security literature has not analysed — and what the tourism literature has entirely overlooked — are the sector-specific implications for regional tourism. Drawing on the broader literature on tourism and political instability (Fernández et al., 2022; Lee et al., 2021), we identify four plausible transmission channels through which a Hormuz disruption would affect Gulf tourism. First, travel advisory escalation. Major tourism-generating markets — principally Europe, North America, and East Asia — issue travel advisories based on perceived security risk. Even a limited military confrontation in or near the Strait would likely trigger elevated advisory levels for Oman, the UAE, Bahrain, Kuwait, and potentially Qatar, triggering cancellation cascades across inbound tourism pipelines (Gomez-Vega et al., 2022; Lasisi et al., 2025).

Second, energy-cost shock. Aviation is acutely sensitive to fuel price volatility. A blockage driving Brent crude to elevated levels would increase airline operating costs, resulting in fare increases, route suspensions, and reduced connectivity to Gulf destinations — precisely the infrastructure on which smart destination competitiveness depends (Fernández et al., 2022; Purwono et al., 2024). Third, investor confidence erosion. Foreign direct investment in tourism infrastructure — hotels, resorts, heritage restoration, smart city platforms — is sensitive to country-risk perceptions. Security escalation in the Hormuz corridor would raise the risk premium for Gulf-region investment, potentially stalling ambitious tourism development projects such as Saudi Arabia's NEOM or Oman's Salalah expansion (Siddik et al., 2025).

Fourth, trade disruption and supply-chain stress for tourism services. Gulf tourism destinations rely on imported goods — food and beverages, consumer electronics, luxury retail — that travel through Hormuz-connected supply chains. A blockage would generate shortages and cost inflation that degrades visitor experience and raises destination operating costs. These transmission channels remain theorised rather than empirically tested, constituting the primary research gap identified by this review. Future studies employing panel data methods across Gulf Cooperation Council (GCC) member states, with scenario analysis modules for Hormuz disruption events, would make a significant contribution to both tourism economics and geopolitical risk scholarship.

Success and Failure Determinants of Sustainable Tourism

Success Factors

The reviewed literature converges on a set of enabling conditions for sustainable tourism. Enabling infrastructure — physical connectivity, ICT readiness, energy systems — consistently distinguishes high-performing from underperforming destinations (Fernández et al., 2022; Lasisi et al., 2025). Luštický & Štumpf, (2021) identify infrastructure quality as one of the most influential leverage points in tourism destination competitiveness dynamics, a finding reinforced by Purwono et al., (2024) in their multi-country analysis of tourism revenue drivers.

Cultural heritage richness functions as both a pull factor and a differentiation mechanism for Gulf destinations. Sampieri & Bagader, (2024) demonstrate that UNESCO designation amplifies destination image internationally, while Moscatelli, (2024) shows that heritage-route tourism generates multi-node economic benefits across rural and peri-urban areas — a distributional advantage absent from enclave resort models. Azmi et al., (2023) further establish that innovative product development within heritage frameworks — experiential tourism, gastrotourism, dark tourism — enhances destination competitiveness by broadening visitor motivational profiles.

Community participation and inclusive governance represent perhaps the most consistently cited success factor. Baloch et al., (2023) demonstrate that ecotourism schemes governed with strong community co-management outperform externally managed schemes on all three TBL dimensions over medium-run time horizons. Rangkuti et al., (2025) extend this finding to sports-heritage tourism, showing that event-linked tourism generates durable local benefits only when community members participate in revenue governance and cultural content decisions.

Failure Factors and Risks

Environmental degradation from unmanaged tourism growth constitutes the most pervasive failure mode documented in the literature. Baloch et al., (2023) catalogue how unregulated visitor flows generate water depletion, solid waste accumulation, soil erosion, and biodiversity loss — particularly in

ecologically fragile areas. These environmental costs, often externalised from tourism operator accounts, ultimately erode the very natural capital that sustains visitor demand, producing a self-defeating cycle that Butler, (2006) Tourism Area Life Cycle model has long predicted.

Overtourism and heritage degradation represent the parallel urban failure mode. Sampieri & Bagader, (2024) document how Historic Jeddah — despite its UNESCO designation — faces congestion, infrastructure overload, rising costs, and declining residential quality that threatens social sustainability. Dodds & Butler, (2019) establish that this pattern is globally replicated, suggesting that heritage designation without accompanying capacity management frameworks is insufficient to prevent degradation.

Overcommercialization and authenticity erosion — particularly acute in sports-heritage hybrid settings — undermine the cultural substance that differentiates Gulf destinations in international tourism markets (Rangkuti et al., 2025). When heritage sites are instrumentalised primarily as backdrops for commercial events rather than as living cultural landscapes, they lose the very qualities that generate visitor loyalty and premium pricing power.

Economic and Socio-Environmental Impacts

The economic impacts of tourism development in Gulf-type contexts are substantial and multidimensional. Purwono et al., (2024), in a multi-country competitiveness analysis, demonstrate that tourism destination performance drives revenues, employment, infrastructure investment, and GDP growth — but that highly competitive markets exhibit diminishing marginal returns without continuous product innovation and policy intervention. Fernández et al., (2022), analysing post-COVID-19 recovery trajectories, establish that technological readiness and governance quality are the primary determinants of how rapidly destinations recover economic performance following external shocks — a finding with obvious relevance for Hormuz-risk scenario planning.

Employment effects are particularly significant for Gulf policymakers pursuing economic diversification beyond hydrocarbons. Baloch et al., (2023) and Sampieri & Bagader, (2024) both document how tourism development — particularly in heritage and ecotourism modalities — generates employment across skill levels, including in sectors where women's labour force participation rates are higher than in the broader economy. This distributional characteristic aligns tourism development with SDG 5 (Gender Equality) and SDG 8 (Decent Work) objectives (Healy & Carvao, 2025).

Environmental costs, however, are non-trivial and require active management. Baloch et al., (2023) identify pollution, water depletion, and biodiversity loss as material negative externalities of tourism development in ecologically sensitive areas. Sampieri & Bagader, (2024) add social vulnerability — the displacement of low-income residential communities by tourism gentrification — as an underappreciated cost in heritage tourism contexts. These costs are not inevitable; they are the consequence of

governance failures that fail to internalise environmental and social externalities into tourism operator decision-making.

Artificial Intelligence as a Structural Catalyst for Sustainable Tourism

The role of AI in sustainable tourism has evolved rapidly from a peripheral adjunct to a core governance instrument. Zhang & Deng, (2024) document five AI-enabled mechanisms through which smart ecotourism achieves sustainability gains: real-time biodiversity monitoring, adaptive visitor management, digital environmental education, remote sensing of ecological indicators, and IoT-based resource efficiency optimisation. Taken together, these mechanisms transform ecotourism from a relatively passive sustainability practice into an actively managed, data-driven environmental stewardship system. Suanpang & Pothipassa, (2024) extend this analysis to urban smart tourism, demonstrating how integrated platforms combining Generative AI, NLP, and IoT sensors can simultaneously improve accessibility for disabled visitors, personalise cultural itineraries, facilitate environmental monitoring, and reduce the administrative burden on destination management organisations. The accessibility dimension is particularly noteworthy: by removing language and mobility barriers, AI-enabled platforms expand the effective market for heritage and ecotourism to previously underserved visitor segments.

At the macroeconomic level, Siddik et al., (2025) provide the most comprehensive empirical treatment to date of AI's contribution to sustainable tourism growth. Using panel data from 30 countries covering 2010–2022, they establish that AI adoption significantly boosts tourism sector efficiency, interacts positively with GDP growth, FDI inflows, and urbanisation, and moderates the negative environmental impacts of tourism expansion. Critically, they find that AI's sustainability benefits are context-dependent: destinations with robust digital governance frameworks capture significantly larger sustainability dividends from AI adoption than those with fragmented institutional environments.

Li & Mahasuweerachai, (2026), through a bibliometric synthesis of the AI-tourism literature spanning 2015–2025, identify three emergent research frontiers: (1) AI-mediated visitor experience personalisation; (2) AI-enabled destination governance and policy analytics; and (3) AI-driven environmental sustainability monitoring. These frontiers map directly onto the governance, experience, and sustainability pathways that our proposed framework articulates. Florido-Benítez & del Alcázar Martínez, (2024) contribute a critical governance perspective, noting that AI-powered marketing, while demonstrably effective at revenue optimisation and investment attraction, demands high capital investment and specialised technical competencies that many smaller or less-developed destinations cannot readily supply. This creates a risk of AI-driven competitiveness divergence: large, well-capitalised destinations that adopt AI early consolidate competitive advantages, while smaller destinations with limited digital infrastructure fall progressively further behind. This dynamic has significant equity implications for smaller Gulf-adjacent nations and deserves explicit attention in regional tourism policy frameworks.

Proposed Integrative Research Framework

Drawing on the thematic synthesis above, we propose a multi-dimensional integrative framework for comprehending sustainable tourism under geopolitical risk in Gulf and analogous contexts. The framework comprises five interconnected dimensions, each operationalised through measurable components and grounded in the theoretical pillars identified in Section 2.

Framework Logic

The framework conceptualises tourism destinations as complex adaptive systems in which internal governance capabilities (Dimension 2) shape how tourism types (Dimension 1) leverage smart technology infrastructure (Dimension 3) to achieve sustainability outcomes (Dimension 4), subject to exogenous moderation by geopolitical risk variables (Dimension 5). This architecture reflects three theoretical commitments: the TBL's insistence on multi-dimensional outcome assessment; Stakeholder Theory's emphasis on participatory governance; and Smart Destination Theory's characterisation of AI as a governance mediator rather than merely a technological add-on.

The Hormuz risk dimension (Dimension 5) operates as a set of exogenous moderating variables that affect the strength and direction of relationships between the other dimensions. Specifically, Hormuz disruptions are theorised to moderate: (a) the flow volume and composition of inbound tourism (Dimension 1); (b) investor willingness to fund governance infrastructure (Dimension 2); (c) the connectivity and energy conditions that enable smart technology deployment (Dimension 3); and (d) economic and environmental outcome trajectories (Dimension 4). Testing these moderation pathways empirically — through event-study designs, scenario analysis, or structural equation modelling with external shock variables — constitutes the primary empirical research agenda implied by this framework.

Research Agenda

Future empirical studies should operationalise this framework through multi-country GCC panel datasets, integrating AI adoption metrics alongside standard tourism competitiveness indicators (arrivals, receipts, employment, environmental performance indices). Scenario analysis modules should simulate Hormuz disruption events of varying severity — from temporary navigational restrictions to full blockade — and trace their effects through the framework's transmission channels. Mixed-methods designs combining quantitative panel estimation with qualitative stakeholder interviews would capture governance dynamics that aggregate data cannot reveal. Longitudinal case studies of individual Gulf destinations would complement cross-national analyses by illuminating idiosyncratic institutional factors.

Discussion: Implications and Limitations

Theoretical Implications

This review makes three primary theoretical contributions. First, it demonstrates the inadequacy of purely technological or purely governance-centred explanations of sustainable tourism performance: sustainable outcomes consistently require their integration. Second, it theorises geopolitical risk as a structural rather than incidental variable in tourism sustainability models — a theoretical move that has significant implications for how destination resilience is conceptualised and measured. Third, it bridges the hitherto separate literatures on Gulf heritage tourism, AI-enabled smart destinations, and Hormuz security, generating a unified analytical architecture that neither literature has previously offered.

Policy Implications

For Gulf region policymakers, the framework generates several actionable insights. Heritage and ecotourism development strategies should explicitly incorporate AI governance infrastructure from the outset, rather than treating digital technology as a subsequent layer of sophistication. Community co-governance mechanisms should be institutionalised in national tourism frameworks, not left to the discretion of individual destination management organisations. Geopolitical risk scenario planning — including Hormuz disruption protocols — should be integrated into tourism ministry strategic planning processes, with tourism impact assessments commissioned alongside military and energy sector analyses.

For international development organisations supporting Gulf tourism diversification, the framework highlights the risk of AI-driven competitiveness divergence and the corresponding need for capacity-building programmes that extend digital governance capabilities to smaller and less-capitalised destinations.

Limitations

This review is subject to several limitations that qualify its conclusions. First, the absence of empirical studies directly measuring Hormuz disruption impacts on tourism necessitates a degree of inferential extrapolation from macroeconomic and general tourism resilience literatures. Second, language restriction to English-language publications may have excluded relevant Arabic, Persian, or French-language scholarship on Gulf heritage tourism. Third, as with all systematic reviews, publication bias may have skewed the evidence base toward positive findings. Fourth, the proposed framework has not yet been empirically tested; its validity is therefore theoretical rather than demonstrated. These limitations define the research agenda that the framework is designed to stimulate.

Conclusion

This paper has presented the systematic synthesis explicitly linking sustainable tourism, artificial intelligence, and geopolitical risk in the Gulf and Middle Eastern context. The evidence base is unambiguous on two of three core claims: heritage-based and ecotourism modalities, when governed through participatory stakeholder frameworks and augmented by AI-enabled monitoring and management systems, consistently achieve superior sustainability outcomes across economic, environmental, and social dimensions. AI has transitioned from a peripheral enabler to a structural catalyst of tourism sustainability — reshaping governance, experience, and competitiveness simultaneously.

The third claim — that Strait of Hormuz disruptions represent a critical, systematically neglected moderating variable in Gulf tourism sustainability models — rests on inferential synthesis rather than direct empirical evidence. This is itself the most significant finding: that a waterway through which 20% of global oil transits has generated virtually no tourism-specific research despite its profound implications for destination connectivity, investor confidence, energy costs, and travel advisory environments. Filling this gap is not merely an academic exercise; for nations pursuing ambitious tourism diversification as a strategic response to hydrocarbon dependency, understanding and preparing for Hormuz-linked tourism volatility is a matter of economic security.

The integrative research framework proposed here offers a theoretically grounded and empirically actionable structure for future investigations. By combining tourism typology, governance dynamics, AI infrastructure, sustainability outcomes, and geopolitical risk moderation into a unified model, it provides researchers, policymakers, and destination managers with a shared conceptual architecture for navigating the complex, high-stakes challenge of sustainable tourism in one of the world's most strategically consequential regions.

Declarations

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Figures

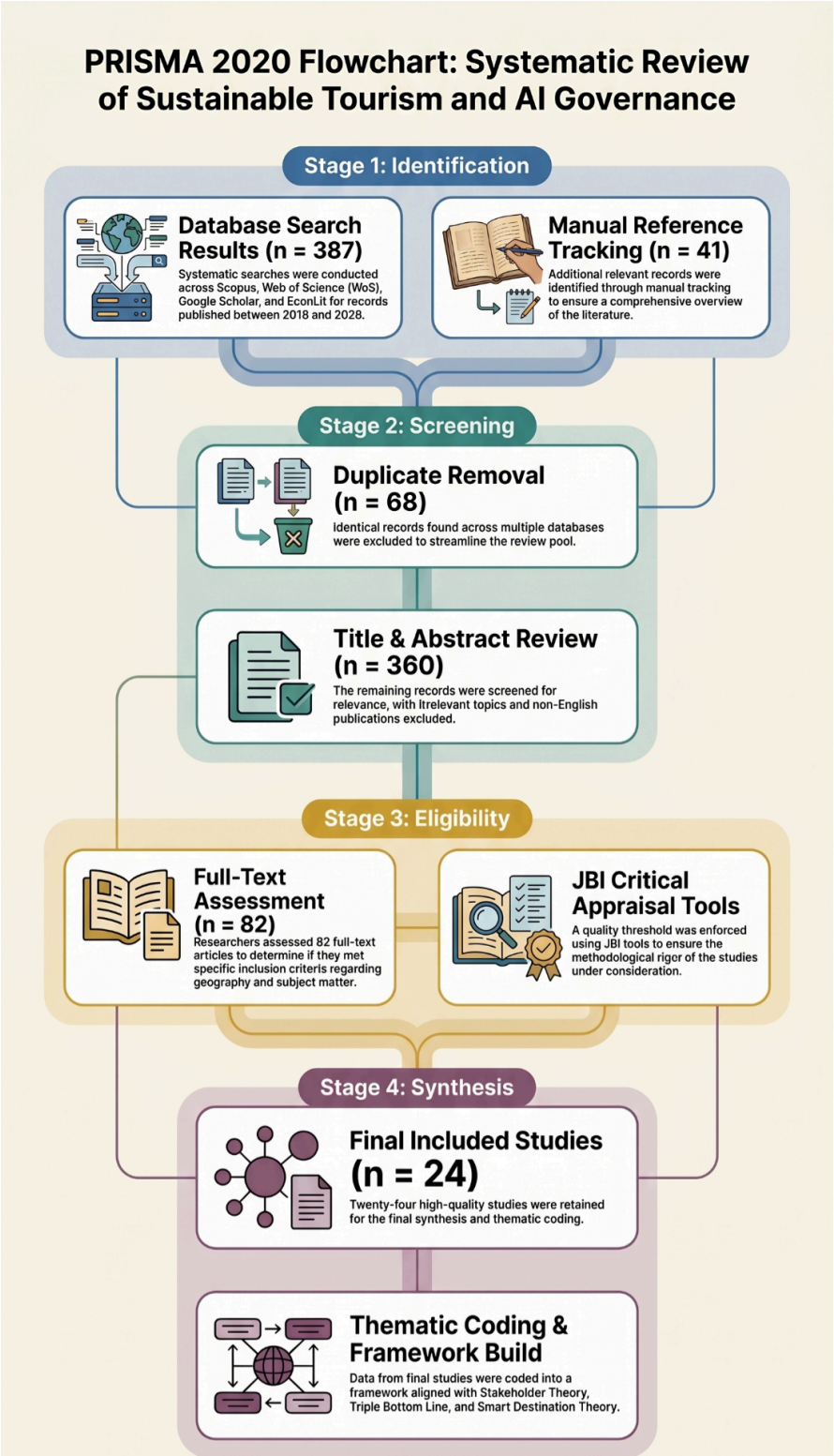

Figure 1

Unnumbered image in the Methodology section.

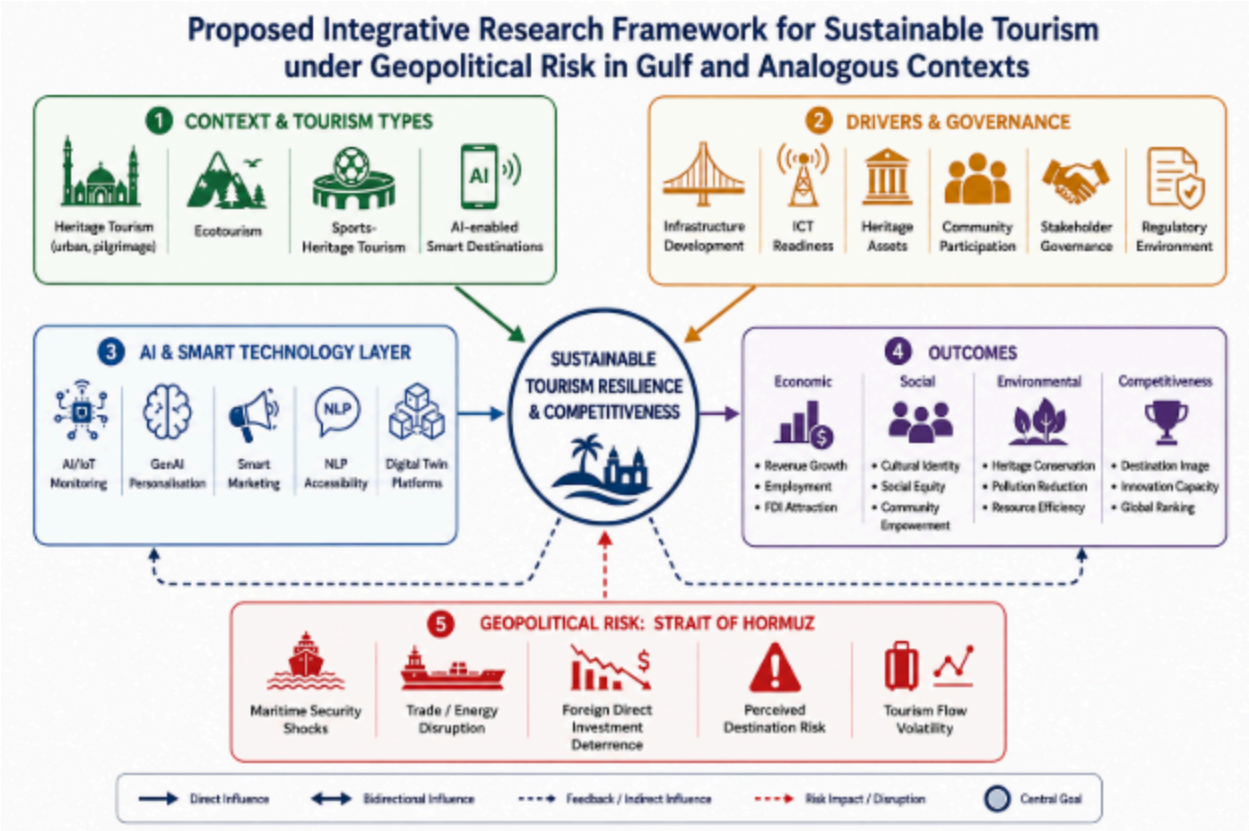

Figure 2

Unnumbered image in the Findings and Discussion section.