

AVIATION GEOPOLITICAL RESILIENCE ENABLEMENT (AGRE): A THEORY-DRIVEN CONCEPTUAL FRAMEWORK FOR ORGANISATIONAL RESILIENCE AND PREPAREDNESS IN THE MALAYSIAN AVIATION INDUSTRY

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ABSTRACT:

Geopolitical disruption has become a persistent structural condition for the global aviation industry rather than an episodic external risk, yet aviation preparedness remains conceptually fragmented, particularly in the Malaysian context where post-pandemic recovery intersects with intensifying cost, capacity and geopolitical pressures. This conceptual paper presents a theory-driven integrative review that synthesises scholarship on organisational resilience, dynamic capabilities, crisis management, strategic risk management, supply chain resilience, government and regulatory support, and digitalisation. It advances an original contribution, the Aviation Geopolitical Resilience Enablement (AGRE) framework, which argues that generic resilience models are insufficiently differentiated to explain preparedness in a heavily regulated, ecosystem-dependent industry such as aviation. Departing from prior capability-based and critique-based resilience frameworks, AGRE positions organisational resilience as the mediating mechanism through which five antecedent enablers are translated into anticipatory, absorptive, adaptive and recovery-oriented preparedness within a dual-layer architecture comprising organisational and ecosystem-institutional influences. Beyond the synthesis, the review further weighs competing interpretations within the literature, including the tension between compliance-oriented and strategic risk management and the trade-off between supply chain efficiency and resilience. Six direct-effect propositions, five indirect-effect propositions and a structured doctoral research agenda are advanced to guide future quantitative validation using PLS-SEM testing within the Malaysian aviation ecosystem.

Keywords: AGRE, aviation preparedness, dynamic capabilities, geopolitical disruption, Malaysian aviation, organisational resilience.

INTRODUCTION

Aviation is among the most globally integrated yet externally exposed industries in the modern economy. Its operating model depends simultaneously on sovereign airspace access, harmonised safety standards, fleet availability, fuel price stability, regulatory coordination, digital infrastructure and globally distributed supply chains [1], [2]. This interdependence means that a shock in one domain, for example an airspace closure, a sanctions measure, or a cyber intrusion, can ripple across route networks, fleet planning, maintenance schedules and passenger confidence simultaneously [3], [4].

The contemporary disruption landscape has made it untenable to treat geopolitical risk as occasional or event-bounded. The COVID-19 pandemic, the Russia-Ukraine war, Middle East instability and persistent aircraft delivery delays demonstrate that aviation disruption can be prolonged, institutionally complex and cross-border in character [1], [5], [6]. López et al. [7] confirm that geopolitical disruptions affect supply chains through overlapping mechanisms, such as trade restrictions, policy shocks, conflict-related disruption and strategic reconfiguration, all of which converge acutely in aviation.

Malaysia offers a theoretically distinctive, not merely practically convenient, setting for this review. Unlike hubs with large domestic markets or deep aircraft-supply capacity, Malaysian aviation preparedness is shaped by international traffic dependence, heavy reliance on imported technical assets, regional connectivity and regulatory centrality through the Civil Aviation Authority of Malaysia (CAAM), which assumed the regulatory functions of the Malaysian Aviation Commission (MAVCOM) with effect from 1 August 2025 [8]. This combination of exposure and regulatory concentration makes Malaysia a theoretically meaningful setting for extending resilience theory beyond firm-level resources, because preparedness here cannot be explained without institutional coordination, regulatory judgement and cross-border dependency. Notably, Malaysia Aviation Group has reported in Q1 2026 that Middle East instability and fuel-price spikes are constraining profitability despite recovery momentum, with fuel comprising roughly 40% of operating cost and every US\$1-per-barrel increase adding approximately RM50 million in annual expenditure [9]. Comparable pressures have prompted fuel-efficiency programmes and route-specific capacity adjustments across other Malaysian carriers [10], [11], [12].

The academic problem is threefold. First, aviation preparedness remains under-theorised relative to the complexity of prolonged geopolitical disruption. Second, preparedness, crisis management, business continuity and resilience are frequently conflated despite representing distinct capabilities [13]. Third, generic resilience frameworks risk theoretical insufficiency when applied to heavily regulated, institutionally constrained and globally interconnected sectors [14], a condition that describes aviation precisely. Accordingly, this paper proposes the AGRE logic, a sector-specific extension of resilience theory in which organisational resilience mediates the conversion of five antecedent enablers into aviation preparedness.

The review is guided by three questions:

RQ1: How has preparedness for geopolitical disruption been conceptualised in aviation and related management literature?

RQ2: What antecedent enablers influence organisational resilience within Malaysian aviation organisations?

RQ3: How does organisational resilience mediate the relationship between antecedent enablers and aviation organisational preparedness?

THEORETICAL FOUNDATIONS AND LITERATURE REVIEW

The reviewed literature converges on five streams. The first concerns organisational resilience. Pradana and Ekowati [15] position resilience as a capability structure integrating fragmented definitions, Barasa et al. [16] identify resources, governance, leadership and collaborative networks as resilience-enabling conditions, and Duchek [13] offers the most granular process model, comprising anticipation, coping and adaptation. Weber et al. [17] further show that translating these enabling conditions into measurable management-control practice remains difficult, reinforcing that empirical measurement of resilience is contested and that few validated scales exist for aviation [15].

The second stream critically evaluates resilience frameworks. Zungu et al. [14] argue that sector-neutral models overemphasise firm-internal resources while neglecting regulatory dependency and public-private governance. Although this critique originates in the construction industry, Wandelt et al.'s [18] review of air transport management research independently identifies the same gap, noting that aviation-specific theorising of resilience and regulatory interdependence remains underdeveloped. The convergence of a cross-sector critique and an aviation-specific gap analysis strengthens the warrant for a sector-specific extension. Lengnick-Hall et al. [19] offer a counterpoint, showing that strategic human resource management still meaningfully builds resilience even in regulated settings. This tension is treated in the present framework as complementary rather than substitutive. Internal and ecosystem-level antecedents jointly shape preparedness.

The third stream concerns geopolitical disruption and supply chains. López et al. [7] identify restrictions, policy shocks, conflict-related disruption and reconfiguration as the primary mechanisms, while Han et al. [20] structure supply chain resilience into readiness, response and recovery capabilities, building on foundational conceptualisations of visibility, flexibility, redundancy and collaboration [21], [22], [23]. A persistent debate concerns the tension between efficiency and resilience. Baghersad et al. [24] show that supply-chain disruptions can produce substantial extended effects on firm performance, reinforcing the importance of visibility, flexibility, redundancy and collaboration identified in the resilience literature [21], [22], [23]. Both López et al. and Han et al. note aviation as under-researched, and neither addresses the added layer of safety certification and regulatory approval that governs aviation supply chains, a gap this review addresses directly.

The fourth stream, dynamic capabilities theory, explains adaptation through sensing, seizing and reconfiguring [25], [26], later shown to manifest as replicable organisational routines [27]. Cruz-Sánchez et al.'s [28] antecedents-decisions-outcomes and theory-context-method organising logic informs how this review structures its own synthesis around antecedents, a mediator and an outcome. Because dynamic capabilities theory was developed for competitive firm strategy rather than regulatory compliance, applying it to aviation requires translation. Sensing must incorporate regulatory and geopolitical intelligence, seizing must respect certification timelines, and reconfiguring must occur within airworthiness constraints.

The fifth stream concerns aviation-specific regulation and digitalisation. Authoritative sources [1], [2], [3], [4], [29], [30], [31], [32] document recovery trajectories, supply bottlenecks and regulatory coordination. Vial [33] shows that digital transformation improves decision-making only when embedded in governance routines, a conditional relationship reinforced by more recent evidence that digital-economy tools strengthen supply chain resilience only when paired with organisational absorptive capacity [34], [35], [36]. This body of evidence supports treating digitalisation as a governance-embedded, rather than deterministic, antecedent of preparedness.

REVIEW METHODOLOGY

This paper adopts an integrative literature review approach guided by systematic search principles [37], [38], [39], appropriate given a topic spanning organisational resilience, crisis management, strategic risk management, supply chain resilience, regulatory governance and digital transformation. Unlike a full PRISMA systematic review or meta-analysis, the aim is to integrate fragmented literature into a conceptual model suitable for future empirical testing, following the transparent review practices demonstrated by Pradana and Ekowati [15], Barasa et al. [16], Han et al. [20], López et al. [7] and Cruz-Sánchez et al.'s [28] ADO/TCM structuring.

Searches were conducted across Scopus, Web of Science, ScienceDirect, Emerald Insight, Taylor & Francis Online, SpringerLink and Google Scholar, supported by industry sources from IATA, ICAO, CAAM and MAVCOM. Boolean search terms combined "aviation preparedness," "geopolitical disruption," "geopolitical risk," "organisational resilience," "dynamic capabilities," "crisis management," "strategic risk management," "supply chain resilience," "regulatory support" and "digitalisation." Studies were included if they addressed aviation disruption, preparedness or resilience; contributed theoretically to organisational resilience or dynamic capabilities; examined strategic risk, supply chain resilience, regulatory governance or digital transformation in disruption-sensitive sectors; or provided authoritative aviation industry evidence. Non-academic opinion pieces, duplicates and sources with weak conceptual relevance were excluded.

Three screening stages were applied: title/abstract relevance, full-text theoretical assessment, and thematic coding into capability domains. As this is a condensed integrative review rather than a registered PRISMA systematic review, exact database-level hit counts at each stage were not separately tracked. To avoid conveying false precision, this paper reports only the final retained corpus rather than an unverified intermediate count. The final corpus comprised 43 sources: 30 peer-reviewed scholarly publications, nine official or industry publications, and four reputable news reports used exclusively for Malaysian contextual illustration. Searches were conducted between January and July 2026 and covered English-language literature published from 1997 to 2026.

Table I summarises the review protocol.

Review type	Integrative review, guided by systematic search principles
Databases and publisher platforms	Scopus, Web of Science, ScienceDirect, Emerald, Taylor & Francis Online, SpringerLink, Google Scholar
Supporting sources	IATA, ICAO, CAAM, MAVCOM industry reports
Inclusion	Peer-reviewed, conceptual and credible industry sources on preparedness, resilience, risk, supply chains, regulation, digitalisation
Exclusion	Duplicates, non-academic opinion, weak conceptual relevance
Final corpus	30 scholarly sources; 9 official or industry sources; 4 news reports used for contextual illustration

THEMATIC RESULTS AND DISCUSSION: ANTECEDENTS OF PREPAREDNESS

A. Crisis Management Capability

Crisis management capability denotes an organisation's ability to prepare for, respond to, communicate during and learn from disruptive events, including escalation protocols and regulatory reporting [2], [40]. Its limitation is that event-based crisis models privilege immediate response over the long-horizon strategic readiness that prolonged geopolitical disruption demands [13], because shocks such as Cruz-Sánchez et al.'s [28] antecedents-decisions-outcomes and theory-context-method organising logics airspace restrictions, sanctions and diplomatic tensions may unfold over months or years rather than as single incidents with clear start and end points.

P1: Crisis management capability positively influences organisational resilience within the Malaysian aviation industry.

B. Strategic Risk Management Practices

Strategic risk management addresses uncertainties affecting long-term objectives rather than operational hazards alone [41]. A central debate in this literature is whether organisations treat risk management as compliance documentation or as strategic intelligence. Risk registers disconnected from planning and resource reconfiguration create symbolic rather than genuine readiness, whereas risk management that informs scenario planning, early warning and cross-functional escalation strengthens resilience [25], [42]. In Malaysian aviation, this distinction matters because geopolitical shocks affect fuel cost, routing, demand and maintenance simultaneously rather than independently.

P2: Strategic risk management practices positively influence organisational resilience within the Malaysian aviation industry.

C. Supply Chain Resilience

Supply chain resilience concerns the readiness, response and recovery capacity of supply networks [20], critical for aviation given dependence on globally sourced aircraft, engines, spare parts and maintenance services [3]. As noted above, a persistent efficiency-resilience trade-off means lean, cost-optimised inventories reduce flexibility precisely when disruption occurs [7], [24]. This tension is amplified in aviation because spare-parts delays or maintenance, repair and overhaul (MRO) constraints translate directly into route capacity and safety-compliance risk, not merely cost.

P3: Supply chain resilience positively influences organisational resilience within the Malaysian aviation industry.

D. Government and Regulatory Support

Unlike many commercial sectors, aviation preparedness is shaped as much by regulatory authorisation as by internal decision-making [2]. Zungu et al.'s [14] critique of generic resilience models is especially salient here, and is reinforced by Wandelt et al.'s [18] observation that aviation governance research still treats regulatory coordination as background context rather than a direct capability. The Government and Regulatory Support is therefore modelled as an ecosystem-institutional antecedent. Regulatory intensity and cross-border interdependence are treated as contextual boundary conditions that shape how this antecedent is translated into organisational resilience.

P4: Government and regulatory support positively influence organisational resilience within the Malaysian aviation industry.

E. Digitalisation and Real-Time Intelligence

Digital systems such as dashboards, cyber monitoring, route and demand intelligence strengthen sensing and coordination [25], [33]. However, technology does not automatically produce resilience. Data must be interpreted, trusted and acted upon within clear decision routines [34], and recent digital-transformation evidence confirms that supply chain and operational benefits from digital tools materialise only when paired with governance capacity rather than technology adoption alone [35], [36]. Accordingly, digitalisation and real-time intelligence are modelled as a governance-embedded sensing capability whose contribution depends on interpretation, trust and decision routines rather than technology adoption alone.

P5: Digitalisation and real-time intelligence capability positively influences organisational resilience within the Malaysian aviation industry.

ORGANISATIONAL RESILIENCE AS MEDIATOR: THE AGRE LOGIC

Organisational resilience is positioned as the mediating mechanism linking five antecedent enablers to aviation preparedness. AGRE operates within a dual-layer enablement architecture. Crisis management, strategic risk management, supply chain resilience and digitalisation and real-time intelligence primarily represent organisational-level enablers, while government and regulatory support captures the ecosystem-institutional layer. Organisational resilience itself remains a single mediating construct comprising anticipation, absorption, adaptation and recovery.

Consistent with Barasa et al. [16], Duchek [13] and Pradana and Ekowati [15], resilience is treated as anticipation, absorption, adaptation and recovery rather than mere post-disruption recovery. None of the five antecedents automatically produces preparedness. A digital dashboard generates information only if leaders interpret and act on it, and regulatory guidance strengthens preparedness only if it is translated into operational decisions [34].

This is where the AGRE logic departs from generic resilience theory, in three respects that distinguish it from the frameworks reviewed above. First, unlike Duchek's [13] and Pradana and Ekowati's [15] sector-neutral capability-structure models, AGRE incorporates regulatory support as an ecosystem-institutional antecedent, while regulatory intensity and cross-border interdependence are treated as contextual boundary conditions. Second, unlike Barasa et al. [16], who identify resilience-enabling conditions within a single organisation, AGRE locates one mediating construct (organisational resilience) within a dual-layer enablement architecture comprising organisational and ecosystem-institutional influences. Third, unlike Zungu et al.'s [14] critique, which identifies the insufficiency of generic frameworks without proposing a testable alternative, AGRE operationalises the critique into six direct-effect and five indirect-effect propositions, including an explicit test of resilience as a mediating mechanism (P7a-P7e) rather than treating resilience as a broad outcome, addressing a gap in under-tested mediation logic noted within capability-based reviews [28]. Table II summarises this differentiation.

TABLE I
AGRE'S DIFFERENTIATION FROM PRIOR RESILIENCE FRAMEWORKS

Framework	Core Logic	AGRE's Extension
Duchek [13]	Capability process: anticipation, coping, adaptation	Adds ecosystem-institutional enablers to the antecedent architecture surrounding the organisational resilience process
Barasa et al. [16]	Resilience nurtured via resources, governance, leadership, networks	Extends nurturing conditions across the firm/regulator boundary
Pradana & Ekowati [15]	Resilience as an integrative capability structure	Formalises resilience as a testable mediating mechanism (P7a-P7e), not only a descriptive structure
Zungu et al. [14]	Critiques generic frameworks as insufficient for regulated sectors	Operationalises the critique into a falsifiable, aviation-specific framework

P6: Organisational resilience positively influences aviation preparedness for geopolitical disruption.

P7a-P7e: Organisational resilience mediates the respective relationships between the five antecedent enablers and aviation preparedness.

PROPOSED CONCEPTUAL FRAMEWORK

The AGRE framework positions five antecedent enablers as predictors, organisational resilience as the mediating mechanism, and aviation preparedness as the outcome. The framework operates within a dual-layer enablement architecture combining organisational capabilities with ecosystem-institutional support. It integrates Dynamic Capabilities Theory (sensing, seizing and reconfiguring) with Organisational Resilience Theory (anticipation, absorption, adaptation and recovery).

The proposed unit of analysis is the aviation organisation operating within the Malaysian aviation ecosystem. Government and regulatory support are treated as an external institutional antecedent, while organisational resilience and aviation organisational preparedness are modelled at the organisational level. Industry-level implications will be developed through comparison and aggregation across stakeholder groups. Fig. 1 summarises the framework logic.

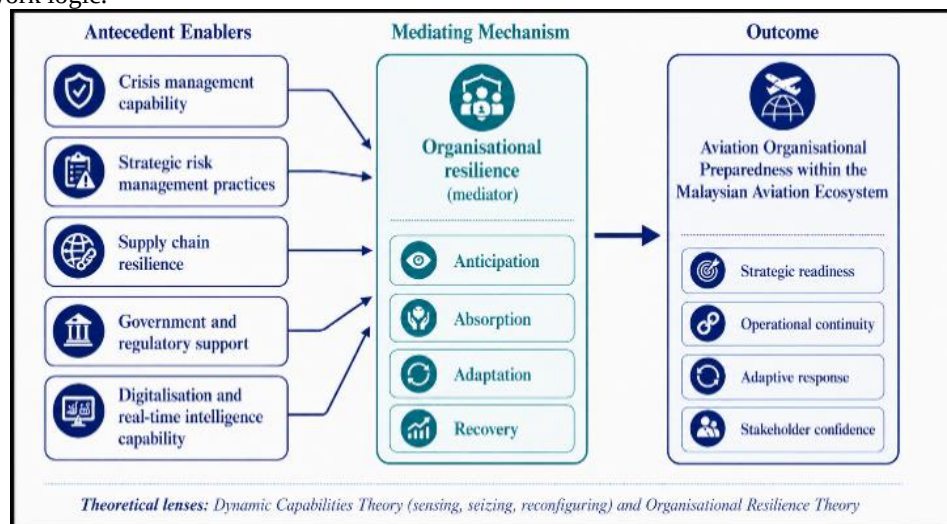


Fig. 1 The Aviation Geopolitical Resilience Enablement (AGRE) conceptual framework.

Table III lists the resulting propositions for future empirical testing that may employ PLS-SEM [43], where the research orientation is predictive and the measurement specifications support its use, subject to an a priori power analysis and rigorous assessment of the measurement model.

TABLE II
SUMMARY OF RESEARCH PROPOSITIONS

#	Proposition Statement
P1	Crisis management capability → organisational resilience
P2	Strategic risk management → organisational resilience
P3	Supply chain resilience → organisational resilience
P4	Government and regulatory support → organisational resilience
P5	Digitalisation & real-time intelligence → organisational resilience
P6	Organisational resilience → aviation preparedness
P7a-P7e	Five antecedent enablers → organisational resilience → aviation preparedness

RESEARCH GAPS AND FUTURE AGENDA

Five gaps are identified. First, aviation-specific evidence on geopolitical disruption, as opposed to pandemics or operational disruption, remains limited. Second, the Malaysian aviation context is under-represented despite its theoretical distinctiveness. Unlike larger aviation hubs with deeper domestic markets or broader aircraft-supply capacity, Malaysia's preparedness is shaped by a combination of international traffic dependence, regulatory centrality, regional connectivity, imported technical assets and exposure to external fuel and geopolitical shocks, offering a theoretically meaningful, not merely convenient, setting to examine how dynamic capabilities operate within a regulated ecosystem. Third, organisational resilience is rarely tested as a mediating mechanism rather than treated as a broad outcome. Fourth, government and regulatory support is under-integrated into capability models as an antecedent rather than background context. Fifth, digitalisation is often discussed optimistically without being linked to governance and decision routines.

A future empirical agenda should collect multi-stakeholder data from airlines, airports, MRO providers, ground handlers and regulators, testing the AGRE model quantitatively via PLS-SEM, followed by a qualitative phase

explaining how regulatory judgement and institutional coordination shape preparedness in practice. Table IV summarises these directions.

TABLE III
RESEARCH GAPS AND FUTURE DIRECTIONS

Gap	Future Direction
Limited aviation-specific geopolitical evidence	Study sanctions, airspace restrictions, fuel volatility
Underdeveloped Malaysian context	Multi-stakeholder survey/interview design
Limited mediation testing	Test resilience as mediator via PLS-SEM
Regulatory support under-integrated	Model regulatory support as antecedent
Digitalisation-behaviour disconnect	Link digitalisation and real-time intelligence to governance capacity

IMPLICATIONS AND CONCLUSION

A. Theoretical Implications

This review distinguishes preparedness from crisis management, business continuity and resilience; integrates Dynamic Capabilities and Organisational Resilience Theory; and, through the AGRE logic, extends resilience theory to ecosystem-dependent, regulated industries, directly responding to Zungu et al.'s [14] call for sector-specific theoretical translation while operationalising that call into testable propositions rather than critique alone.

B. Practical and Policy Implications

For airlines, preparedness should integrate geopolitical risk into route planning, fleet strategy, fuel procurement and supplier diversification, with digital dashboards linked explicitly to escalation authority. For airports, preparedness requires infrastructure readiness, passenger-flow contingency planning and coordinated digital monitoring with airline partners. For MRO providers, preparedness depends on parts-supply visibility, supplier diversification and contingency maintenance planning, given the efficiency-resilience trade-off identified above. For regulators and policymakers, preparedness should be treated as an ecosystem governance priority, with shared risk intelligence and public-private coordination integrated into preparedness models rather than treated as external context [2].

C. Conclusion

Aviation preparedness for geopolitical disruption should be understood as a dynamic, regulatory, digital and ecosystem-based capability rather than a narrow extension of crisis response. The AGRE logic's principal contribution is positioning organisational resilience as the single mediating mechanism through which five antecedent enablers are translated into preparedness, within a dual-layer architecture comprising organisational and ecosystem-institutional influences. The Malaysian aviation context provides a theoretically meaningful setting in which to examine how preparedness may emerge through institutional, operational and technological interdependencies, providing a structured basis for the doctoral empirical work to follow.

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