

CORRIDORIZATION IN FRAGMENTED SKIES: AIR CONNECTIVITY AND THREE-DIMENSIONAL ECONOMIC CORRIDORS IN THE EURO-MEDITERRANEAN REGION

Mehmet Ilhanli

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Corridorization in Fragmented Skies: Air Connectivity and Three-Dimensional Economic Corridors in the Euro-Mediterranean Region

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Introduction

On 28 February 2026, a joint military attack by the United States (US) and Israel against Iran significantly escalated geopolitical tensions across the Middle East and the Eastern Mediterranean. The resulting closure and disruption of regional airspace temporarily displaced major commercial flight routes and exposed the vulnerability of the aerial networks that underpin contemporary international connectivity. While such disruptions are often treated as short-term consequences of geopolitical crises, they also reveal a broader structural issue: the functioning of transnational connectivity depends not only on what happens on the ground and at sea, but also in the air.

The expansion of contemporary economic corridors has been driven by efforts to connect markets, production centres, ports, and cities through increasingly integrated networks of infrastructure. Initiatives such as China's Belt and Road Initiative (BRI), the European Union (EU)'s Global Gateway, and the India-Middle East-Europe Economic Corridor (IMEC) exemplify this broader transformation of connectivity. Yet these projects and the scholarship surrounding them continue to be conceptualised predominantly through terrestrial and maritime infrastructures. This paper argues that such a horizontal understanding of corridorization provides only a partial account of how connectivity is produced and sustained.

Instead, the paper examines the aerial dimension of economic corridors and asks how air connectivity and airspace interact with terrestrial and maritime infrastructure. Drawing on the Euro-Mediterranean region as a case study, it explores how airports, air routes, and airspace contribute to the movement of goods and people and how their integration with existing

corridor infrastructures can reshape regional connectivity. By bringing the aerial dimension into the analysis, the paper seeks to develop a more comprehensive understanding of economic corridors as multidimensional infrastructures rather than exclusively horizontal networks.

Background: economic corridors, the emergence of corridorization, and the Euro-Mediterranean space

Infrastructural initiatives and economic corridors

Economic corridors that “connect economic agents along a defined geography” (Brunner, 2013, p. 1) have become an increasingly prominent feature of international politics, as the movement of people, goods, capital, energy, and information across borders has intensified in the 21st century. In this context, transnational connectivity projects have emerged not only as instruments of economic integration and development, but also as important sites of geopolitical competition and the exercise of political power (Flint & Zhu, 2019).

Against this backdrop, China's BRI has emerged as one of the most ambitious contemporary connectivity projects. The initiative was launched in 2013 as the “One Belt, One Road” (OBOR), comprising the land-based Silk Road Economic Belt and the Maritime Silk Road. Encompassing infrastructure projects across Asia, Europe, Africa, and beyond, the BRI seeks to enhance transnational connectivity through investments in transport,

energy, and related infrastructure (Sidaway & Woon, 2017). Beyond its economic dimension, the initiative has also been interpreted as part of China's broader effort to reshape global economic relations and strengthen its position within the international system, reflecting its values and interests for a more prominent global role (Zhou & Esteban, 2018).

As connectivity increasingly emerged as a key geoeconomic arena, major and middle powers began developing alternative initiatives to China's growing footprint. Among these, the EU's Global Gateway, launched in December 2021, represents one of the most significant institutional responses to the BRI. With a stated investment target of €300 billion for the 2021-2027 period (European Commission, 2021), the initiative seeks to promote sustainable, secure, and high-quality infrastructure partnerships across the world. While framed primarily around sustainable development and connectivity, the Global Gateway also reflects the EU's broader effort to advance European standards and values, strengthen supply-chain resilience, and enhance its geopolitical influence (Wientzek et al., 2023; Benaglia & Ergenc, 2025).

Simultaneously, IMEC emerged as another major connectivity initiative, announced at the G20 Summit in New Delhi in 2023. The memorandum of understanding (MoU) was signed by India, the US, the United Arab Emirates (UAE), Saudi Arabia, France, Germany, Italy, and the EU (Balasubramanian et al., 2025). Designed to connect India with Europe through maritime and rail networks across the Middle East, IMEC also aims to enhance trade connectivity, diversify supply chains, and strengthen economic cooperation among participating countries. The initiative has also been widely viewed as complementary to the EU's Global Gate-

way and as part of broader efforts to reduce dependence on China-centred trade routes (Rizzi, 2024).

The emergence of corridorization

These connectivity initiatives collectively demonstrate that economic corridors have become the central arenas of geopolitical and geoeconomic contestation among major, middle, and regional powers in the 21st century (Abels & Bieling, 2024). This friction has resulted in growing academic debates surrounding what James Sidaway (2025) calls "corridorization".

What fundamentally distinguishes 21st-century corridors from their historical antecedents is their transnational scale, financial magnitude, and growing geopolitical significance. Contemporary corridors extend beyond the movement of goods and people, linking infrastructure investment with trade, energy, finance, and supply-chain networks across multiple geographies. By shaping the routes through which resources, capital, and commodities circulate, they generate economic interdependencies and provide states with opportunities to influence partner countries and strategic regions (Reisinezhad & Reisinezhad, 2025). In this sense, corridors increasingly operate as geoeconomic and geopolitical instruments through which states seek to secure markets and supply chains, expand political influence, and reshape regional economic geographies (Mayer & Zhang, 2021; Schindler et al., 2022; Reisinezhad & Reisinezhad, 2025).

In parallel with the rise of these practical megaprojects, academic interest in corridorization has expanded substantially. Existing literature has examined economic corridors through a diverse array of theoretical and conceptual lenses, including

geopolitics (DiCarlo & Schindler, 2022), geoeconomics (Abels & Bieling, 2024), critical logistics (Grappi, 2018), and security studies (Karrar, 2022). More recently, postcolonial and ecological approaches have also been applied, particularly in the context of the BRI, highlighting systemic issues such as severe local environmental degradation (Harlan, 2021), postcolonial conditions and dependency (Vegliò, 2026), regional uneven development (Dwyer, 2020), and the emergence of a “infrastructure-led, authoritarian neoliberal urbanism” along logistics nodes (Apostolopoulou, 2021, p. 845).

Despite this rich and growing body of literature, an analytical limitation remains deeply entrenched. Most contemporary analyses continue to rely on a fundamentally “flat” understanding of economic corridors, viewing them merely as vectors connecting point A to point B through “linear passages” (Tassadiq et al., 2025, p. 1962). Such an understanding privileges horizontal connectivity while neglecting the increasingly important role of volume, airspace, and aerial mobility. However, contemporary connectivity increasingly operates not only through roads, railways, and maritime ports, but also through airports, air cargo networks, and commercial flight paths. The growing importance of aviation in just-in-time global supply chains, high-tech manufacturing logistics, and international commerce demonstrates that airspace has become an essential, inseparable component of contemporary corridorization.

Corridorization of the Euro-Mediterranean space

This theoretical and practical issue becomes particularly visible in the Euro-Mediterranean region, where multiple major connectivity projects – the BRI, the

Global Gateway, and IMEC – directly intersect with highly fragmented geopolitical spaces. As a strategic crossroad linking Europe, Asia, and Africa, the region depends heavily on the precise synchronisation of terrestrial, maritime, and aerial infrastructures. As set out in the section on Bringing the third dimension into the discussion: air connectivity, economic corridors and the Euro-Mediterranean, regional airports increasingly function as multimodal logistical hubs interconnected directly with deep-water ports, railways and highways. At the same time, however, the Euro-Mediterranean region is structurally characterised by fragmented and heavily contested airspaces shaped by protracted regional conflicts, geopolitical rivalries, and regulatory and infrastructural fragmentation.

Recent developments in the region clearly illustrate this profound interdependence between aerial and terrestrial connectivity. The long-standing Turkey-Greece disputes over the Aegean airspace boundaries, the long-term flight restrictions caused by protracted conflicts in Palestine, Iraq, Syria, and Libya, and the catastrophic flight diversions following the recent US-Israel attack on Iran have all directly degraded broader transportation and trade networks. When commercial and cargo flights are forced to reroute around unstable or closed sovereign airspaces, the immediate results are increased fuel consumption, elevated transportation costs, extended delivery times, and a severe degradation of logistical reliability.

For instance, as demonstrated by Cassel Salpeter (2026), the US-Israel attack on Iran severely disrupted global air travel, leading to the cancellation of nearly 52,000 flights and a doubling of jet fuel prices. The forced rerouting of long-haul flights extended transit times by up to

three hours on key routes, markedly increasing fuel burn and degrading overall logistics efficiency. In this respect, it can be said that fragmented skies directly undermine the efficiency and economic viability of economic corridors designed to connect regions, people, and goods.

Therefore, contemporary corridorization cannot be adequately understood solely through the study of roads, railways, ports, and maritime shipping lanes. Air route networks and connectivity increasingly constitute a strategic, highly volatile layer of connectivity politics. The growing importance of aerial mobility requires a broader and more sophisticated understanding of economic corridors that moves beyond flat, two-dimensional spatial imaginaries. Consequently, this paper argues that corridorization must be systematically reconceptualised through a volumetric understanding of geopolitics and geoeconomics, wherein vertical and horizontal infrastructures operate together as an interdependent, three-dimensional matrix.

Theoretical framework: conceptualising corridorization through verticality and volume

Contemporary corridorization strategies are predominantly organised around terrestrial and maritime infrastructures. Given the structural distribution of global trade, this emphasis initially appears pragmatic. Maritime transport accounts for approximately 80-90% of global trade by volume (International Chamber of Shipping, n.d.), while road and rail networks carry the majority of intra-continental freight. Air cargo, by contrast, represents less than 1% of global trade by weight (Puente-Mejia &

Lange, 2025). A weight-based understanding of global connectivity could therefore suggest that the aerial dimension is marginal to corridorization. Such an interpretation, however, overlooks the changing economic structure of contemporary globalisation.

The significance of air connectivity cannot be assessed through physical weight alone. Although air transport carries a relatively small proportion of global trade by volume, it accounts for approximately 30% of global trade by economic value (International Air Transport Association, 2026). Within the EU, air transport accounted for 27.1% of exports and 18.3% of imports by value in 2024 (Eurostat, 2025). Air transport is therefore disproportionately important for the movement of high-value and time-sensitive commodities, including advanced electronics, pharmaceuticals, high-value components, and perishable goods. Its significance is further reinforced by the increasing reliance of global production on just-in-time logistics, rapid inventory turnover, and time-sensitive supply chains. As Itoh et al. (2026) argue, air infrastructure constitutes a form of strategic economic infrastructure whose configuration can directly affect the resilience of global supply chains. The relatively small physical volume of air freight should therefore not be equated with limited geoeconomic significance.

The aerial dimension of connectivity is also important because economic corridors facilitate the movement of people as well as commodities. Business executives, skilled workers, international students, tourists, and other mobile populations constitute an essential component of transnational economic integration. The scale of this mobility is reflected in the fact that 58% of international tourists travelled by air in 2023, highlighting the

importance of aviation connectivity for cross-border movement (Air Transport Action Group et al., 2025). Therefore, airports and aviation networks function not merely as transport infrastructure but as nodes through which economic, social, and political relations are organised across space. From this perspective, connectivity cannot be reduced to the movement of material goods along horizontal routes. It also involves the circulation of people and activities through airspace, thereby extending the spatial organisation of corridors beyond the terrestrial surface.

This observation provides an important starting point moving beyond Weizman's (2002, 2004) critique of the flatness of conventional geopolitical thinking. Weizman's concept of the "politics of verticality" demonstrates how political power operates not only across territorial surfaces but also through the control and organisation of space above and below them. His analysis of the West Bank illustrates how sovereignty and security can be produced through the simultaneous control of ground-level settlements, elevated surveillance structures, subterranean infrastructures, and airspace. Verticality, in this sense, challenges the assumption that political space can be adequately represented through a two-dimensional territorial map.

This insight has subsequently been developed and broadened within critical geography. Stephen Graham (2004), for example, conceptualises "vertical geopolitics" as an approach that examines how political power, violence, and security are organised across different vertical layers of space. Rather than treating territory as a flat surface, vertical geopolitics draws attention to the political significance of airspace, underground infrastructures, elevated structures, and the

technological systems that connect these different levels. Such an approach demonstrates that political and economic processes do not simply occur across territory; they are increasingly organised through the vertical differentiation of space.

Stuart Elden (2013) develops a related argument by challenging the tendency to conceptualise territory primarily as a bounded area. His concept of "volumetric" territory emphasises that territorial power operates through three-dimensional spaces involving not only surfaces but also height and depth. This perspective is particularly relevant to contemporary infrastructure, where tunnels, pipelines, underground cables, airspace, aviation routes, satellite systems, and elevated infrastructures increasingly form interconnected networks. Space, therefore, should be understood not merely as an area over which states exercise authority, but as a volume within which political, economic, technological, and security relations are produced and contested.

The importance of the aerial dimension has also been emphasised by scholars of mobility and aeriality. Peter Adey (2010), for instance, challenges the idea of airspace as an empty or neutral realm through which aircraft simply move, emphasising instead how aerial mobility is constituted through broader social and political relations. These relations, arguably, also extend to the infrastructures and technologies through which aerial mobility is organised and regulated. He further argues that "both the ground and the air reside together in vertical reciprocity" (Adey, 2010, p. 2). From this perspective, aviation networks constitute a distinctive spatial layer of contemporary connectivity, whose interaction with terrestrial infrastructures and projects is both inevitable and consequential.

Taken together, these perspectives suggest that contemporary corridorization should not be conceptualised simply as the construction of linear routes between geographically distant points. Economic corridors increasingly constitute three-dimensional and multi-layered formations of connectivity in which terrestrial, maritime, aerial, and subterranean infrastructures interact. Although a growing body of scholarship has begun to examine connectivity through air transportation and volumetric understandings of space (Lin & Ai, 2020; Kamnde & Wu, 2024; Chen & Zreik, 2025), limited attention has been paid to how verticality can condition economic connectivity, commercial logistics, and transnational corridorization.

Building on the literature on vertical geopolitics and volumetric space, this study therefore reconceptualises economic corridors through the theoretical lens of verticality and volume, arguing that air connectivity constitutes a crucial yet under-theorised dimension of regional integration.

The analytical importance of this shift lies in the co-constitutive relationship between horizontal and vertical connectivity. Airports depend upon road and rail networks for the distribution of cargo and passengers, while disruptions to airspace can alter terrestrial and maritime logistics, affecting just-in-time cargo circulation and supply-chain resilience. Aerial and surface-based infrastructures therefore operate as interconnected spatial systems rather than separate modes of transportation. This relationship is particularly significant in the Euro-Mediterranean region, a strategic crossroads characterised by overlapping connectivity initiatives and fragmented and contested airspaces. Considering air connectivity in Euro-Mediterranean space alongside land and maritime infrastructure therefore provides

a more complete understanding of regional connectivity.

Methodology

This study adopts a qualitative research design to examine the multidimensional nature of contemporary Euro-Mediterranean corridorization.

First, this research employs a case study approach focusing on the Euro-Mediterranean region as a strategic intersection of China's BRI and the EU's Global Gateway, two major connectivity initiatives that have produced tangible infrastructure investments across the region. This regional focus enables an analysis of how competing geopolitical and geoeconomic visions materialise in a given space through overlapping transport, logistics, and connectivity networks.

Second, the study conducts a qualitative analysis of infrastructure projects across maritime, terrestrial, and aviation domains. While ports, railways, highways, and logistics hubs are examined as manifestations of horizontal connectivity, airports, air corridors, and aviation mechanisms are analysed as expressions of the vertical dimension of corridorization. This approach allows the study to identify whether contemporary economic corridors are evolving toward genuinely integrated, three-dimensional connectivity systems or remain constrained by surface-based spatial imaginaries.

The empirical analysis draws upon primary and secondary sources, including policy documents from European and Chinese institutions, transport and aviation authority reports, infrastructure project documents, and open-source aviation data. These materials are examined

through the concepts of verticality and volume. These frameworks are used to investigate how corridors, infrastructure, and mobility are organised across different spatial dimensions.

Lastly, through this methodological framework, the study addresses the following research questions:

1. How do the BRI and the Global Gateway conceptualise and implement connectivity across the Euro-Mediterranean region, and what role does air connectivity play within these corridor strategies?
2. What infrastructural, regulatory, and geopolitical factors constrain the emergence of integrated three-dimensional connectivity in the Euro-Mediterranean region?
3. To what extent can a volumetric understanding of connectivity contribute to more resilient and sustainable economic corridor development?

The Euro-Mediterranean region in two-dimensional connectivity projects

Situated at the maritime and terrestrial crossroads of Europe, Africa, and Asia, the Mediterranean basin has historically functioned as a primary artery of global trade and cultural exchange. In the 21st century, this historical prominence has re-emerged with renewed geopolitical intensity as global and regional powers deploy massive infrastructure projects designed to connect various continents. Consequently, the Euro-Mediterranean region has transformed into a critical global node where competing geoeconomic visions converge. To date, the BRI, the

Global Gateway, and IMEC all intersect within this volatile space. While the operationalisation of IMEC remains legally and logistically nascent due to regional volatility, two major initiatives have already established a concrete material footprint in the region. An examination of these initiatives reveals how contemporary corridorization operates across the Euro-Mediterranean region, while highlighting their shared reliance on a two-dimensional understanding of spatial connectivity.

The Belt and Road Initiative

The Mediterranean constitutes a vital maritime node within the overarching architecture of China's BRI, serving as Beijing's primary gateway to European consumers. Given that China remains one of the EU's largest trading partners, particularly through maritime routes, securing trade corridors through the Suez Canal and the Mediterranean is a core strategic priority for Beijing. Recognising this value, Chinese state-owned enterprises (SOEs), such as COSCO Shipping, have systematically expanded their presence across the basin, securing MoUs with nearly all states in the Eastern Mediterranean region.

This capital influx is most visible in the acquisition and modernisation of critical deep-water ports, logistics hubs and highways. The flagship of this strategy is the Piraeus Port in Greece (Belt and Road Portal, 2025b), which COSCO transformed into one of the busiest container hubs in the Mediterranean, acting as the maritime anchor for the Land-Sea Express Route into Central Europe. Similarly, Chinese investments have targeted Kumport in Türkiye (Belt and Road Portal, 2022b), Ashdod and Haifa ports in Israel (Belt and Road Portal, 2022a), Trieste in Italy (Belt and Road Portal, 2019) - al-

though the agreement was subsequently cancelled in 2022 - (Zhang & Xiao, 2023), El Hamdania Port in Algeria (Xinhua News Agency, 2018), and the Suez Canal Economic Zone in Egypt (Belt and Road Portal, 2025a). Beyond ports, the BRI has financed overland extensions, such as the Bar-Boljare motorway in Montenegro (Belt and Road Portal, 2022c) and Kičevo-Ohrid highway in North Macedonia (Belt and Road Portal, 2017) to bind maritime nodes to continental markets.

The Global Gateway

In direct institutional response to China's expanding footprint, the EU's Global Gateway initiative seeks to offer an alternative model anchored in transparency, sustainability, and democratic standards (European Commission, n.d.-b; Benaglia & Ergenc, 2025). In the Euro-Mediterranean region, the Global Gateway focuses heavily on highways and railways in addition to digital connectivity and green energy integration, aiming to bind the Southern Neighbourhood - specifically North Africa and the Levant - cohesively to the European mainland.

Several flagship transport infrastructure projects further illustrate this strategy. In Albania, the Tirana Bypass Project aims to connect the Tirana-Durrës and Tirana-Elbasan motorways as part of the Blue Highway corridor linking Italy and Greece. Another important initiative is the Vorë-Hani i Hotit railway line, which seeks to integrate Albania more closely into the Trans-European Transport Network (TEN-T) Mediterranean Corridor. In Montenegro, the Bar-Vrbnica railway rehabilitation project involves the modernisation of 168 kilometres of railway infrastructure to establish a multimodal maritime-rail transport route connecting the Port of

Bar with the wider Western Balkans region. On the southern shore of the Mediterranean, investments have been directed toward the Rabat Public Transport Project and the upgrading of Morocco's conventional rail network, including climate-resilient infrastructure, enhanced safety measures, and improved flood protection systems. In Egypt, the modernisation of the 118-kilometer Tanta-El Mansoura-Damietta railway line has been undertaken to improve national and regional connectivity (see European Commission, n.d.-c).

In sum, whether through maritime port acquisitions or the development of rail and highway corridors under the BRI and the Global Gateway, these initiatives are grounded in a fundamentally horizontal understanding of Euro-Mediterranean connectivity. They optimise connectivity by mapping horizontal vectors across land and sea surfaces, while the vital vertical dimension tends to receive less attention in their strategic calculations.

Bringing the third dimension into the discussion: air connectivity, economic corridors and the Euro-Mediterranean region

Building on the theoretical discussion of the aerial dimension of corridorization developed in the preceding sections, this chapter turns to its manifestation in the Euro-Mediterranean region. The region provides a particularly revealing context in which to examine how air connectivity intersects with established land- and sea-based corridor infrastructures. While major connectivity initiatives in the Euro-

Mediterranean region have traditionally prioritised ports, railways, highways, and maritime routes, airports and air networks increasingly form part of the wider infrastructure through which regional mobility, trade, and economic integration are organised. The following section therefore focuses specifically on the Euro-Mediterranean context, examining how aerial connectivity interacts with existing corridor systems.

The Belt and Road Initiative

In 2017, Chinese President Xi Jinping introduced the Air Silk Road as a complementary pillar of the BRI (Civil Aviation Administration of China, 2025a), designed to support and reinforce the initiative's land-based and maritime connectivity projects. The strategy focuses on the construction of new airports, modernisation of existing aviation infrastructure, expansion of international air transport networks, enhancement of technical cooperation, and deeper collaboration in civil aviation management and logistics.

The growing importance of the Air Silk Road is reflected in recent aviation statistics. According to the *Development Report on the Air Silk Road*, China has established passenger flight connections with 61 BRI partner countries and cargo services with 33 partner states. Between 2017 and June 2025, China and participating countries recorded a cumulative total of 1.559 million flights, carrying approximately 200 million passengers and 5.951 million tons of cargo and mail. These figures accounted for 59.3% of international flights, 59.2% of international passenger traffic, and 25.8% of international cargo transportation (Civil Aviation Administration of China & National Development and Reform Commission, 2025).

Despite these impressive developments, the aviation dimension of the BRI has received considerably less attention in the Euro-Mediterranean region than its maritime and overland counterparts. While ports, railways, and logistics corridors have become central features of BRI-related discussions, airport infrastructure and aviation connectivity remain relatively underexplored.

One of the most notable air-related projects associated with the Air Silk Road in the Euro-Mediterranean region is the expansion of Houari Boumediene Airport in Algeria. Supported by Chinese state-owned enterprises, the project represents one of the largest aviation infrastructure investments associated with Chinese engagement in North Africa (Gupta, 2024). Together with existing facilities, the expansion aims to transform the airport into one of the largest international aviation hubs on the African continent, enhancing Algeria's role in regional and intercontinental connectivity.

Another significant case is the expansion of Antalya Airport in Türkiye. Although the project is not formally presented as part of the BRI, it illustrates how broader Eurasian connectivity initiatives increasingly intersect in the Mediterranean. Located on one of the region's most important tourism corridors, Antalya Airport is undergoing substantial expansion supported by financing from the Asian Infrastructure Investment Bank (AIIB). The project seeks to accommodate growing passenger demand, integrate sustainable infrastructure solutions, and strengthen Türkiye's position as a major gateway between Europe, Asia, and the Mediterranean basin (Asian Infrastructure Investment Bank, 2025).

Egypt also represents an emerging area of aviation development. Since 2024, dis-

cussions have continued regarding the modernisation and expansion of Cairo International Airport and Hurgada International Airport. Particular attention has been given to plans for establishing a logistics cargo city around Cairo Airport, aiming to improve Egypt's role as a regional air cargo and logistics hub linking Africa, the Middle East, and Europe (Arab Finance, 2024).

Beyond airport construction and modernisation, the Air Silk Road also seeks to enhance connectivity with the Euro-Mediterranean region through the expansion of flight networks and regulatory cooperation. Recent examples include the launch of direct China Southern Airlines flights between Guangzhou and Madrid, as well as new cargo routes connecting China's Xinjiang region with major Mediterranean destinations in Spain and Greece (Civil Aviation Administration of China, 2025b). At the regulatory level, cooperation between Chinese and European aviation authorities has also intensified. The CAAC-EASA Aviation Safety Conference organised by the Civil Aviation Administration of China (CAAC) and the European Union Aviation Safety Agency (EASA), for instance, has emerged as an important platform for dialogue, technical exchange, and cooperation between China and the EU in the field of civil aviation safety and governance (Civil Aviation Administration of China & National Development and Reform Commission, 2025).

The Global Gateway

Similar to the BRI, the EU's Global Gateway strategy promotes multimodal connectivity through investments in sustainable, resilient, and secure infrastructure networks. Nevertheless, aviation remains a relatively less visible component of the initiative compared to energy, digital, maritime, and rail projects.

In the Euro-Mediterranean context, aviation is incorporated into several strategic transport corridors linking Europe with Africa and neighbouring regions. The EU-Africa Strategic Corridors initiative seeks to strengthen North-South connectivity across the Mediterranean through multiple transport modes, including air transport. At the same time, TEN-T, particularly the Mediterranean Corridor, aims to enhance East-West connectivity across the European continent.

One of the most significant examples of air-related projects as part of the Global Gateway is Corridor VIII, a multimodal transport corridor connecting Southern Italy, Albania, North Macedonia, and Bulgaria to the Black Sea. The corridor integrates ports, roads, railways, and airports into a single transport network (European Commission, n.d.-c). A key objective is to improve intermodal connectivity by linking major airports to long-distance rail networks, thereby providing a competitive alternative to short-haul domestic flights and improving overall transport efficiency.

Another visible aviation-related project supported by the EU is the rehabilitation of N'Djamena Airport in Chad, where investments have focused on runway modernisation and operational improvements (European Commission, n.d.-c). Another example is Pisa Airport in Italy, which functions as a crucial node within the integrated Livorno Port-Pisa Airport-Interporto Toscana logistics system (Interporto Toscano Amerigo Vespucci, n.d.).

Beyond physical infrastructure, the EU has increasingly concentrated on improving air traffic management and reducing fragmentation within European airspace. In this regard, the European Investment Bank has provided financial support for upgrading air navigation systems in Serbia and Montenegro (European Invest-

ment Bank, 2025). These efforts complement the broader Single European Sky initiative, which seeks to enhance the safety, capacity, cost-efficiency, and environmental sustainability of European air traffic management. In recent years, the EU has also explored ways of extending aviation cooperation with neighbouring Mediterranean countries, including Jordan and several partners in the Southern and Eastern Mediterranean.

What hinders three-dimensional connectivity? Infrastructure, regulatory and geopolitical factors

Despite the growing recognition of air transport as a critical component of global connectivity, analyses of major connectivity initiatives either remain predominantly centred on maritime and land-based infrastructure or conceptualise sea, land, rail, and air transport as discrete and disconnected domains. As a result, the development of truly three-dimensional connectivity, integrating land, sea, and air transport systems, continues to face significant challenges.

The first challenge relates to infrastructure. Existing corridor projects have primarily prioritised ports, railways, roads, and logistics centres, reflecting the fact that the majority of international trade continues to move through maritime and terrestrial networks. Consequently, comparatively limited attention has been devoted to aviation infrastructure and air-space integration. While some airport construction, expansion and modernisation projects have been undertaken, as discussed above, including the expansion

of Houari Boumediene Airport in Algeria and Antalya Airport in Türkiye, the modernisation and expansion of Cairo International and Hurghada International Airports in Egypt, and the rehabilitation of N'Djamena Airport in Chad, airports remain less systematically incorporated as central nodes within broader connectivity strategies. Moreover, many existing facilities have yet to be fully upgraded to meet the technological and operational requirements of contemporary aviation systems (African Union Commission et al., 2023).

Beyond the issue of airport development itself, there remains no clear framework for integrating air infrastructure with maritime and land-based transport networks. Although major connectivity initiatives frequently describe themselves as multimodal transport systems, relatively little attention has been paid to how different transport modes can be effectively interconnected and transformed into integrated logistics and connectivity hubs.

For example, the integration of newly developed aviation infrastructure into broader multimodal connectivity networks remains uneven across the Euro-Mediterranean region. This challenge is also evident along the Mediterranean Corridor, where only 17% of the corridor's main airports met the high-speed rail connectivity criterion as of 2021 (European Commission, 2023). This figure is expected to reach 67% (European Commission, 2023). Similarly, efforts are underway to connect the Port of El Hamdania to other parts of Algeria through a 35-km road link to the East-West Highway and a 24-km connection to the national railway network (Radio Algérienne, 2018). However, it remains unclear how these investments will be integrated with the expansion of Algiers Airport and, more broadly, into a coherent multimodal connectivity system. Consequently, aviation remains insuffi-

ciently integrated into existing corridor frameworks.

Indeed, the Livorno Port-Pisa Airport-Interporto Toscana logistics system illustrates the strategic value of integrating maritime, air, and inland infrastructure within a single logistics network. Its main advantage lies in allowing different transport modes to perform complementary functions: maritime transport can handle large volumes over long distances, and air transport can provide rapid access for time-sensitive and high-value goods, while inland logistics infrastructure connects these flows to regional production and distribution networks. Such integration can therefore increase both the speed and flexibility of supply chains while reducing dependence on any single mode of transport.

Similar approaches could be envisioned elsewhere in the Mediterranean, as illustrated by planned projects such as the long-distance rail station at Nice Airport, the Toulouse Aerospace Express linking Toulouse Airport with Matabiau railway station, and the high-speed rail connection planned between Adolfo Suárez Madrid-Barajas Airport and Chamartín station, expected by 2030 (European Commission, 2023). These developments suggest that integrating air connectivity with existing rail, port, and inland logistics networks could provide a replicable model for strengthening multimodal connectivity across the region.

A second challenge concerns regulatory fragmentation. As Keith G. Debbage (2014) argues, states often adopt different regulatory frameworks when governing their national airspace and national borders continue to function as significant barriers to the movement of people, goods, and services. Unlike roads, railways, or maritime routes, aviation depends heavily on regu-

latory harmonisation, technical standards, and coordinated air traffic management systems. Consequently, fragmented regulatory environments significantly constrain the development of regional air connectivity in the region.

Both the EU and China have sought to address these challenges through their respective connectivity initiatives. The EU has promoted greater aviation integration through initiatives such as the Single European Sky, which aims to reduce fragmentation in European airspace and improve efficiency, safety, and environmental performance. Furthermore, Brussels has increasingly sought to extend aviation cooperation to neighbouring Mediterranean countries through the European Common Aviation Area (European Commission, n.d.-a). Similarly, China has expanded aviation cooperation with partner countries through the Air Silk Road, encouraging greater technical collaboration, connectivity, and institutional coordination.

However, progress remains limited. While both initiatives seek to facilitate cross-border connectivity, their implementation also takes place within a broader geopolitical and geoeconomic context. Differences in regulatory frameworks and institutional approaches make regulatory convergence and greater coordination important challenges for the development of more integrated aviation systems (see European Union Aviation Safety Agency, n.d.). As a result, regulatory fragmentation continues to complicate efforts to establish fully integrated air connectivity networks across the Euro-Mediterranean region.

A third challenge concerns geopolitics and security instability. Unlike ports, roads, or railways, air connectivity is exceptionally vulnerable to sudden geopolitical disruptions. While aviation is often portrayed as the fastest and most flexible mode of

transportation, it remains heavily dependent on secure and accessible airspace. Consequently, military conflicts, interstate rivalries, and regional crises can instantly disrupt established flight networks and undermine the functioning of broader connectivity corridors.

Recent developments in the Middle East and Eastern Mediterranean highlight the persistent vulnerability of air connectivity to geopolitical and security disruptions. The prolonged conflicts in Syria and Libya, for example, have led aviation authorities to designate their airspaces as high-risk zones, restricting or discouraging civilian operations (OPSGROUP, n.d.). More recent events such as the 7 October War and the US-Israeli strikes on Iran in 2025 and 2026 have further demonstrated how sudden geopolitical crises can disrupt regional air connectivity. Moreover, the increasing use of drones as military and security tools across the region has created additional risks for civil aviation and airspace security (International Civil Aviation Organization, 2026).

As mentioned earlier, emergency airspace closures across multiple states in the region, the suspension of commercial operations by major airlines, and the rerouting of passenger and cargo flights generated significant disruptions to global transportation networks (Cassel Salpeter, 2026). In several instances, long-established air corridors connecting Europe, the Middle East, and Asia were effectively severed, forcing aircraft to undertake lengthy and costly detours through alternative routes (Barrington & Plucinska, 2025). These disruptions not only increased transportation costs and transit times but also reduced the reliability of regional supply chains and logistics networks.

These disruptions demonstrate that contemporary economic corridors depend

not only on the security of physical infrastructure but also on the stability of the airspace above it. Persistent conflicts and security risks can therefore undermine three-dimensional connectivity by transforming airspace into a contested and fragmented geopolitical domain. The long-term viability of initiatives such as the BRI, the Global Gateway, and IMEC thus depends not only on infrastructure investment and regulatory coordination but also on the ability to maintain stable and secure airspace.

Rethinking corridorization in the Euro-Mediterranean region: towards a volumetric understanding of connectivity

The contemporary evolution of economic corridors demonstrates that connectivity within the Euro-Mediterranean region can no longer be evaluated solely through surface-level dynamics. As Lucy Budd (2014) highlights, air transport is an essential component of connectivity, facilitating the movement of people and goods across geographic spaces. However, as demonstrated throughout this study, long-standing infrastructural and regulatory deficiencies, together with persistent geopolitical challenges, continue to exert a destabilising influence on the air dimension of economic corridors. This vulnerability directly undermines aerial mobility, which serves as a foundational pillar for people-to-people diplomatic ties, cross-cultural exchanges, high-velocity commerce, and just-in-time trade. This structural fragility is particularly acute in the Euro-Mediterranean region, an area char-

acterised by deeply entrenched geopolitical tensions, recurring episodes of regional instability, and persistent infrastructural and regulatory shortcomings.

To this end, this paper invites scholars, policy-makers, and non-governmental organizations (NGOs) to fundamentally rethink Mediterranean connectivity projects through the conceptual lenses of volume and verticality. Rather than managing land, sea, and air infrastructures in institutional silos, future corridor planning in the basin must integrate these layers into a synchronised, three-dimensional matrix. To operationalise this volumetric framework, this study presents three core strategic recommendations.

Firstly, policy architectures must explicitly recognise that air transportation is an indispensable, core component of Euro-Mediterranean connectivity projects, rather than a separate luxury sector. Accounting for over one-third of global trade by economic value (Air Transport Action Group et al., 2025) and serving as the primary vehicle for high-velocity international human mobility, air corridors provide the temporal compression required to sustain globalisation. Ground-level corridors cannot function in isolation; their economic viability and corporate integration depend entirely on the vertical speed and transcontinental access that only civil aviation can secure across the Mediterranean skies.

Secondly, as analysed in the critique of two-dimensional corridors, traditional infrastructure planning in the basin remains overwhelmingly preoccupied with linking maritime ports, terrestrial rail networks, and highways to position the Mediterranean as a flat transit zone between Asia, Africa, and Europe. Moving forward, equal strategic and financial priority must be allocated to upgrading regional aviation in-

frastructure and multimodal airport hubs that seamlessly connect people, high-value goods, and services. A critical dimension of this infrastructural upgrade involves the political project of embracing common regulatory regimes and liberalising airspace to reduce institutional frictions (European Commission, n.d.-a). Overcoming these regulatory bottlenecks through cross-border functional airspace blocks is essential to unlocking the fluid potential of Mediterranean skies (European Commission, 2017).

Finally, although environmental sustainability has not been a central concern of this paper, the inclusion of air transport within a broader conceptualisation of connectivity necessarily brings this dimension into consideration. If connectivity is understood as a multidimensional system encompassing land, sea, and air, the environmental and climate implications of aviation cannot be separated from the wider sustainability of corridor development. This suggests that the expansion of vertical connectivity should be accompanied by greater attention to sustainable aviation fuels (SAF), cleaner aircraft technologies, and greener airport infrastructures.

Conclusion

Economic corridors are increasingly central to contemporary globalisation, yet their development has largely been conceptualised through terrestrial and maritime infrastructures. This paper has argued that such a two-dimensional understanding is insufficient for the Euro-Mediterranean region. By foregrounding airspace and air connectivity as a vertical dimension of corridor development, the paper demonstrates that the functioning of economic corridors depends not only

on ports, railways, and highways, but also on the capacity to integrate aviation infrastructure, air traffic systems, regulatory frameworks, and transnational flight networks. At the same time, the analysis shows that this vertical dimension remains particularly vulnerable to geopolitical instability, fragmented regulatory environments, and infrastructural constraints.

The central implication is that future approaches to Euro-Mediterranean connectivity should move towards a more integrated and multidimensional understanding of corridors in which land, sea, and air are treated as interconnected layers of the

same system. Such an approach requires greater institutional and infrastructural coordination, improved regulatory harmonisation, and greater resilience to geopolitical disruptions. It also requires environmental considerations to be incorporated into the expansion of air connectivity, particularly as aviation becomes increasingly embedded within corridor strategies. Ultimately, the long-term effectiveness of Euro-Mediterranean connectivity will depend not only on building infrastructure across land and sea, but also on the capacity to secure, integrate, and sustainably govern the airspace through which these corridors increasingly operate.

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