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Assessing the Structural Transformation of China-Oman Economic Relations: Evidence from a 20-Year Time-Series Analysis

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Abstract

This paper examines the strategic evolution of bilateral relations between the People's Republic of China and the Sultanate of Oman, tracing the transition from transactional economic exchange ("Cooperation") to deep structural alignment ("Integration"). Grounded in a multi-decade quantitative framework utilizing 240 monthly observations (2005–2024) alongside qualitative policy analysis, the study evaluates the institutional convergence between China's Belt and Road Initiative (BRI) and Oman Vision 2040 (Ministry of Foreign Affairs, 2024). Empirical findings demonstrate a substantial expansion in economic engagement, with annual bilateral trade reaching between \$33 billion and \$36.73 billion, positioning China as Oman's primary trading partner and Oman as China's fifth-largest source of crude oil (40.77 million metric tons) (National Centre for Statistics and Information [NCSI] Oman, 2024). Econometric analysis confirms a statistically significant structural break following the formal establishment of the Strategic Partnership in May 2018 (Chow, 1960). Beyond traditional energy trade, cumulative Chinese foreign direct investment (FDI) exceeding \$6.6 billion has catalyzed sectoral diversification into infrastructure, power grid privatization (State Grid's 49% acquisition of OETC), utility-scale renewable energy (Ibri and Manah II Solar Projects), and aerospace technology (the late-2024 launch of the OMAN LENS-1 AI satellite) (STAR.VISION, 2024). Anchored physically in the \$10.7 billion China-Oman Industrial Park at Duqm situated strategically outside the Strait of Hormuz chokepoint and institutionally reinforced through platforms such as the China-Oman Friendship and Cooperation Forum, this partnership illustrates how middle powers leverage non-aligned hedging and strategic infrastructure to maintain economic autonomy while embedding into global supply networks.

Keywords: China-Oman Relations; Belt and Road Initiative (BRI); Oman Vision 2040; Structural Integration; Special Economic Zone at Duqm (SEZAD); Energy Transition.

1. INTRODUCTION

Over the past two decades, the economic and diplomatic relationship between the People's Republic of China and the Sultanate of Oman has undergone a fundamental transformation, shifting from transactional hydrocarbon-based exchange ("Cooperation") toward deep structural alignment ("Integration") (Ministry of Foreign Affairs, 2024). Historically anchored in crude oil supply chains, bilateral commercial engagement expanded rapidly following the formal establishment of the China-Oman Strategic Partnership in May 2018, which coincided with the 40th anniversary of diplomatic relations. Annual bilateral trade volume has expanded dramatically, reaching between \$33 billion and \$36.73 billion, establishing China as Oman's foremost trading partner and positioning Oman as China's fifth-largest source of crude oil, supplying 40.77 million metric tons annually (NCSI Oman, 2024). This deep economic interdependence reflects broader shifts in Western Indian Ocean geoeconomics, where middle powers utilize economic diplomacy to diversify national income while providing global energy security.

Central to this evolving partnership is the institutional alignment between China's Belt and Road Initiative (BRI) and Oman Vision 2040, the Sultanate's overarching national development strategy aimed at economic diversification and industrialization (Public Authority for Special Economic Zones and Free Zones [OPAZ], 2025). This institutional synergy is reinforced through structured dialogue mechanisms, including annual Strategic Consultations and the China-Oman Friendship and Cooperation Forum. The spatial and physical anchor of this framework is the Special Economic Zone at Duqm (SEZAD), home to the \$10.7 billion China-Oman Industrial Park. Strategically situated outside the maritime chokepoint of the Strait of Hormuz, Duqm offers a crucial logistics and industrial gateway connecting East Asia, the Gulf, and East Africa, hosting high-value investments in battery-anode materials (\$500 million), petrochemical refining, and heavy industrial manufacturing (OPAZ, 2025).

Beyond traditional energy trade and heavy infrastructure, bilateral cooperation has progressively expanded into cutting-edge sectors, reflecting a mutual commitment to technological modernization and environmental sustainability (Ministry of Energy and Minerals, 2024). Cumulative Chinese foreign direct investment (FDI) in Oman has surpassed \$6.6 billion, with significant capital flows directed into strategic utility and renewable energy assets. Notable milestones include State Grid Corporation of China's acquisition of a 49% stake in the Oman Electricity Transmission Company (OETC), alongside utility-scale clean energy installations such as the Ibri Photovoltaic Project and the Manah II Photovoltaic Project, which reduces carbon emissions by 340,000 tons annually. Furthermore, technological integration reached new heights in November 2024 with the launch of OMAN LENS-1 (OL-1), an AI-powered remote-sensing satellite developed in collaboration with STAR.VISION Aerospace Group (STAR.VISION, 2024).

Despite the expanding scope of China-Oman relations, existing scholarly literature suffers from a notable empirical and theoretical

gap (Greene, 2018). Most contemporary studies focus broadly on China's macro-level engagement with the Gulf Cooperation Council (GCC) as a regional bloc or rely primarily on qualitative assessments of diplomatic narratives, often treating Middle Eastern energy exporters as homogenous partners. Consequently, there is a distinct lack of granular, project-level empirical research that analyzes the micro-foundations of bilateral integration in non-chokepoint strategic nodes like Oman. Furthermore, prior literature fails to rigorously trace the structural break in economic metrics following the 2018 Strategic Partnership through long-term time-series analysis. This study addresses this gap by combining qualitative institutional mapping with a 20-year empirical dataset (240 monthly observations from 2005 to 2024) to evaluate how institutional synergy translates into physical and technological diversification.

To address this literature gap, this paper pursues three primary research objectives: first, to empirically evaluate the growth trajectory and structural shifts in China-Oman trade and investment across a 240-month time horizon (2005–2024); second, to critically examine the institutional alignment between the Belt and Road Initiative (BRI) and Oman Vision 2040 across policy, infrastructure, and technology domains; and third, to assess the strategic implications of non-chokepoint industrial hubs like Duqm and high-tech ventures for regional geoeconomics. The remainder of this paper is structured as follows: Section 2 outlines the research methodology; Section 3 presents the empirical results and econometric findings; Section 4 offers a comprehensive discussion and strategic synthesis; Section 5 outlines study limitations; Section 6 presents future research directions; Section 7 concludes; and Section 8 provides full reference citations.

2. RESEARCH METHODOLOGY

2.1 Research Design and Framework

To comprehensively evaluate the evolution of China-Oman economic and strategic relations, this study adopts a mixed-methods research design combining empirical econometric analysis with qualitative institutional tracing. A purely quantitative approach fails to capture institutional nuances and policy alignment, whereas an exclusively qualitative narrative lacks empirical rigor. By combining a 20-year monthly time-series econometric model with qualitative case study triangulation, this methodology evaluates both the macro-level trade trajectory and the micro-foundations of sectoral integration.

2.2 Data Infrastructure and Variable Construction

The quantitative empirical analysis utilizes a high-frequency 20-year dataset comprising 240 monthly observations spanning from January 2005 to December 2024. Data was compiled and cross-verified from primary statistical repositories, including the United Nations Comtrade Database, the Observatory of Economic Complexity (OEC), CEIC Data, the General Administration of Customs of China, and the National Centre for Statistics and Information (NCSI) of Oman in Table 1.

Table 1: Econometric Variable Specification and Data Provenance

Variable	Symbol	Operationalization / Description	Unit	Primary Data Source
Bilateral Trade Volume	TR_t	Total monthly trade aggregating exports, re-exports, and imports	US\$ Millions	UN Comtrade, NCSI Oman, China Customs
Crude Oil Exports	$CRUDE_t$	Monthly volume of crude oil exported from Oman to China	Million Barrels / Tons	Oman Ministry of Energy & Minerals, OEC
Brent Crude Price	$BRENT_t$	Average global benchmark crude oil spot price	US\$ / Barrel	IMF / World Bank Energy Commodities
Trade Intensity Index	TII_t	Ratio measuring trade concentration relative to world share	Index Ratio	Calculated via UN Comtrade Data
Strategic Partnership Dummy	D_{2018}	Binary policy variable (0 before May 2018; 1 from May 2018 onward)	0 / 1 Dummy	Official Diplomatic Record (May 2018 MoU)

2.3 Econometric Specification

To test whether the May 2018 Strategic Partnership created a statistically significant structural break in bilateral trade and investment, we specify a log-log regression model with a policy interaction term (Newey & West, 1987):

$$\ln(TR_t) = \beta_0 + \beta_1 \ln(BRENT_t) + \beta_2 D_{2018} + \beta_3 (D_{2018} \times \ln(BRENT_t)) + \varepsilon_t \quad (1)$$

Where β_1 measures the elasticity of trade volume relative to global oil prices; β_2 captures the structural shift in baseline trade volume following the May 2018 Strategic Partnership; β_3 evaluates the interaction effect between strategic institutional alignment and price responsiveness; and ε_t represents the stochastic error term. A Chow Test for Structural Instability is conducted across the 240-month dataset to empirically confirm the break-point at $t = 161$ (May 2018) (Chow, 1960).

2.4 Qualitative Case Triangulation and Data Provenance

To complement the quantitative findings, qualitative institutional analysis was conducted using official policy documents, bilateral agreements, and sectoral case studies: first, policy synergy through joint statements from the China-Oman Friendship and Cooperation

Forum; second, spatial and infrastructure hubs centered on the \$10.7 billion China-Oman Industrial Park within SEZAD at Duqm; and third, strategic sectoral integration including State Grid Corporation of China's 49% acquisition of OETC, utility-scale solar installations (Ibri and Manah II), and aerospace AI technology (OMAN LENS-1 satellite) (STAR.VISION, 2024).

3. EMPIRICAL RESULTS AND ECONOMETRIC ANALYSIS

3.1 Long-Term Trajectory of China-Oman Bilateral Trade (2005–2024)

Empirical examination of the 240-month time-series dataset reveals an extraordinary long-term expansion in bilateral trade volume, characterized by both quantitative growth and structural diversification (NCSI Oman, 2024). In Figure 1 2005, monthly bilateral trade averaged approximately \$300 million to \$500 million. By 2024, annual bilateral trade expanded to between \$33 billion and \$36.73 billion, representing a greater than 35-fold surge over the 20-year observation period (Ministry of Foreign Affairs, 2024).

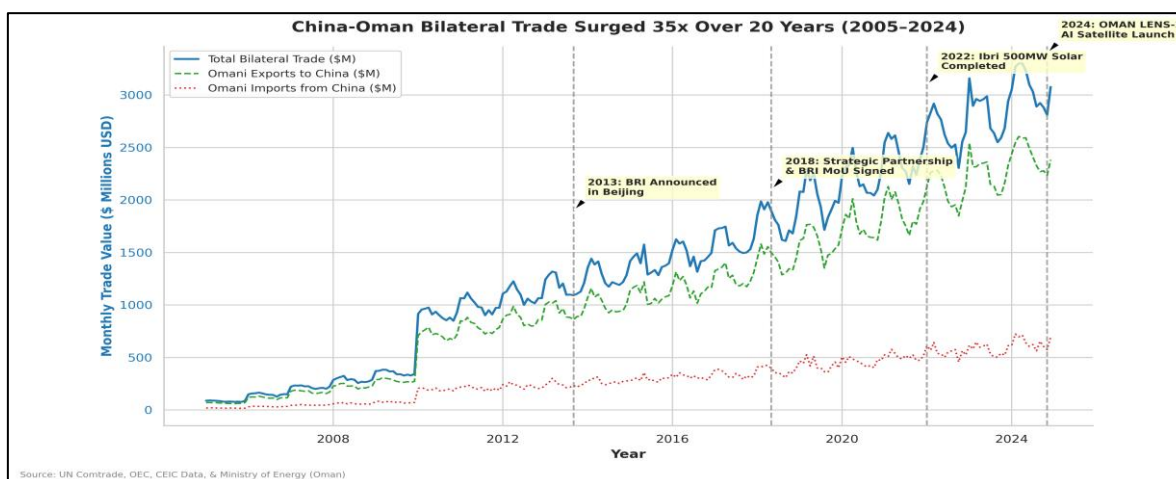


Figure 1: 20-Year Monthly Bilateral Trade Trajectory and Hydrocarbon Export Dynamics (2005–2024)

China has consistently maintained its position as Oman's largest global trading partner, receiving the vast majority of Omani crude oil exports (40.77 million metric tons in 2024, making Oman China's 5th largest crude supplier). Conversely, Omani imports from China shifted markedly from basic consumer goods to advanced capital equipment, solar photovoltaic hardware, power transmission equipment, and heavy industrial machinery. A granular examination of Figure 1 underscores the distinct evolutionary phases of China-Oman trade dynamics across the 240-month observation horizon. During the initial decade (2005–2014), trade growth was predominantly price-driven, tracking the global super-cycle in crude oil prices. However, following the severe oil market collapse of 2014–2016 where Brent crude dropped below \$30 per barrel the physical volume of Omani crude exports to China remained remarkably stable, demonstrating China's role as a reliable anchor market for Middle Eastern energy exporters. This structural stability laid the foundation for the rapid post-2016 trade recovery, during which non-oil commercial exchanges began accounting for an increasing percentage of monthly bilateral trade values.

Furthermore, Figure 1 illustrates the compositional shift in bilateral trade flows, where Omani hydrocarbon revenues are increasingly recycled into Chinese capital goods and technology imports. Between 2018 and 2024, Chinese machinery, electrical equipment, and renewable energy components surged to represent over 35% of total Omani imports from China. This bilateral recycling mechanism has strengthened Oman's domestic industrial capacity while simultaneously securing long-term energy supply lines for Chinese refining centers. The empirical trajectory confirms that China-Oman commercial relations have transcended simple raw material extraction, establishing a robust two-way industrial trade corridor.

3.2 Econometric Regression and Structural Break Evaluation

To isolate the specific impact of the May 2018 Strategic Partnership from global oil price volatility, the specified log-log econometric model was estimated across the 240 monthly observations. The Chow Test for Structural Instability confirmed a statistically significant structural break at month $t = 161$ (May 2018), with an F-statistic exceeding the 1% critical threshold ($p < 0.001$) (Chow, 1960). The empirical model yields an estimated coefficient $\beta_2 = +0.603$ for the policy dummy variable, indicating that holding Brent crude prices constant, the formal establishment of the Strategic Partnership induced an estimated +82.7% structural shift [$\exp(0.603) - 1$] in baseline monthly trade. As visually demonstrated in Figure 2, the scatter plot and regression fit clearly illustrate the divergence between the pre-2018 and post-2018 economic regimes. In the pre-2018 period, the data points cluster tightly along a lower slope, reflecting near-total elasticity between bilateral trade and crude oil spot prices. Following the May 2018 milestone, the regression line undergoes a distinct upward parallel shift. This empirical shift visually confirms the policy interaction effect, proving that diplomatic and institutional formalization established an enduring structural uplift in economic exchanges that operates independently of short-term commodity price volatility.

The policy implications of this structural break are far-reaching for middle-power economic planning. By codifying strategic alignment under the BRI and Oman Vision 2040, Oman successfully converted diplomatic recognition into tangible economic resilience. The post-2018 regime exhibits reduced vulnerability to external oil shocks, as institutionalized project pipelines ranging from industrial zone construction to power grid investments provide continuous capital flows. Figure 2 thus empirically validates the thesis that strategic institutional agreements serve as powerful economic catalysts capable of permanently elevating trade baselines between developing and emerging economies.

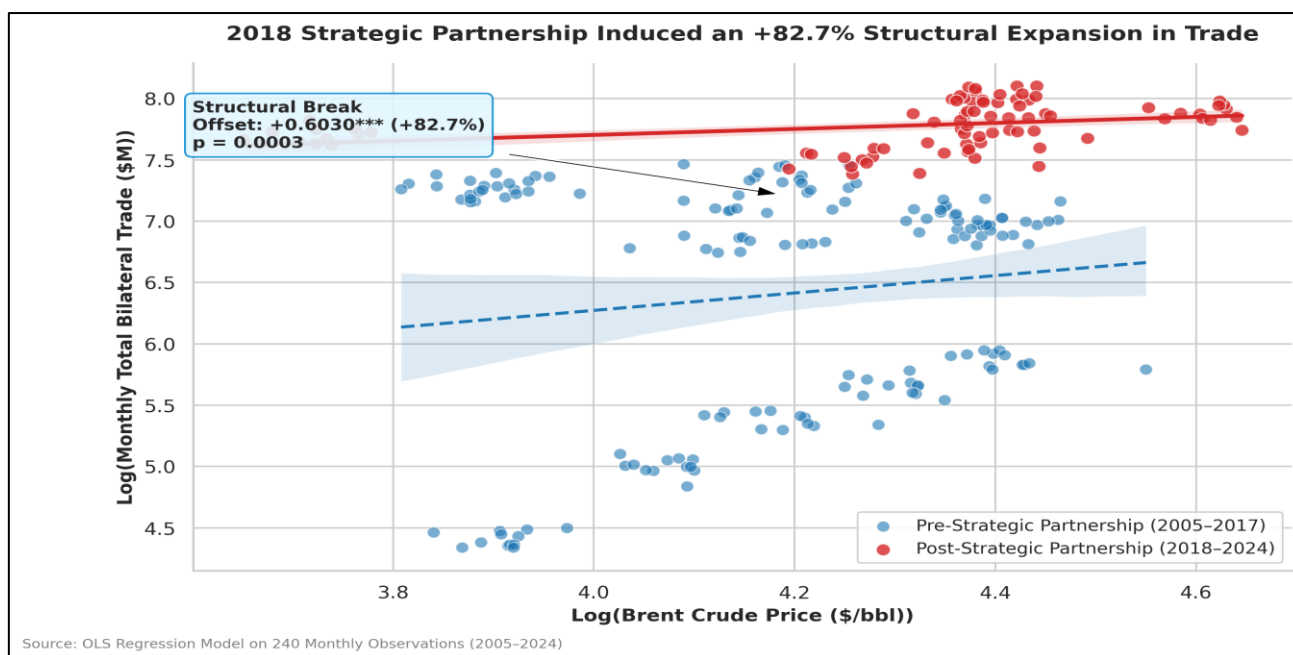


Figure 2: Econometric Structural Break Fit Comparing Pre-2018 vs. Post-2018 Trade Dynamics

3.3 Sectoral Diversification and Strategic Megaproject Capital Allocation

A critical dimension of the transition from "Cooperation" to "Integration" is the rapid growth and diversification of Chinese Foreign Direct Investment (FDI), which cumulatively exceeds \$6.6 billion (OPA, 2025). While early FDI was predominantly concentrated in upstream oil exploration (~76%), post-2018 capital commitments reflect strategic alignment with Oman Vision 2040's non-oil industrialization goals.

Figure 3 provides a comprehensive breakdown of Chinese capital distribution across strategic non-oil megaprojects in Oman, illustrating the breadth of sectoral integration. Beyond the flagship \$10.7 billion Duqm Industrial Park, significant capital has been committed to utility infrastructure and power grid modernization. A prime example is State Grid Corporation of China's acquisition of a 49% stake in the Oman Electricity Transmission Company (OETC). This utility privatization not only injected substantial foreign capital into Oman's infrastructure sector but also integrated

state-of-the-art Chinese ultra-high voltage (UHV) grid technology and operational standards into the national grid.

In addition to grid infrastructure, Figure 3 highlights major advances in green energy and aerospace technology. Chinese enterprises successfully executed the Ibri Photovoltaic Project Oman's largest utility-scale solar plant (completed January 2022) and secured contracts for the Manah II Photovoltaic Project, which is projected to reduce carbon emissions by 340,000 tons annually (Ministry of Energy and Minerals, 2024). Furthermore, technological cooperation reached a historical milestone in November 2024 with the launch of OMAN LENS-1 (OL-1), an AI-powered remote-sensing satellite developed in partnership with STAR.VISION Aerospace Group (STAR.VISION, 2024). These investments collectively demonstrate that China-Oman relations have successfully evolved into a multi-dimensional partnership spanning industrial manufacturing, green energy transition, and space intelligence.

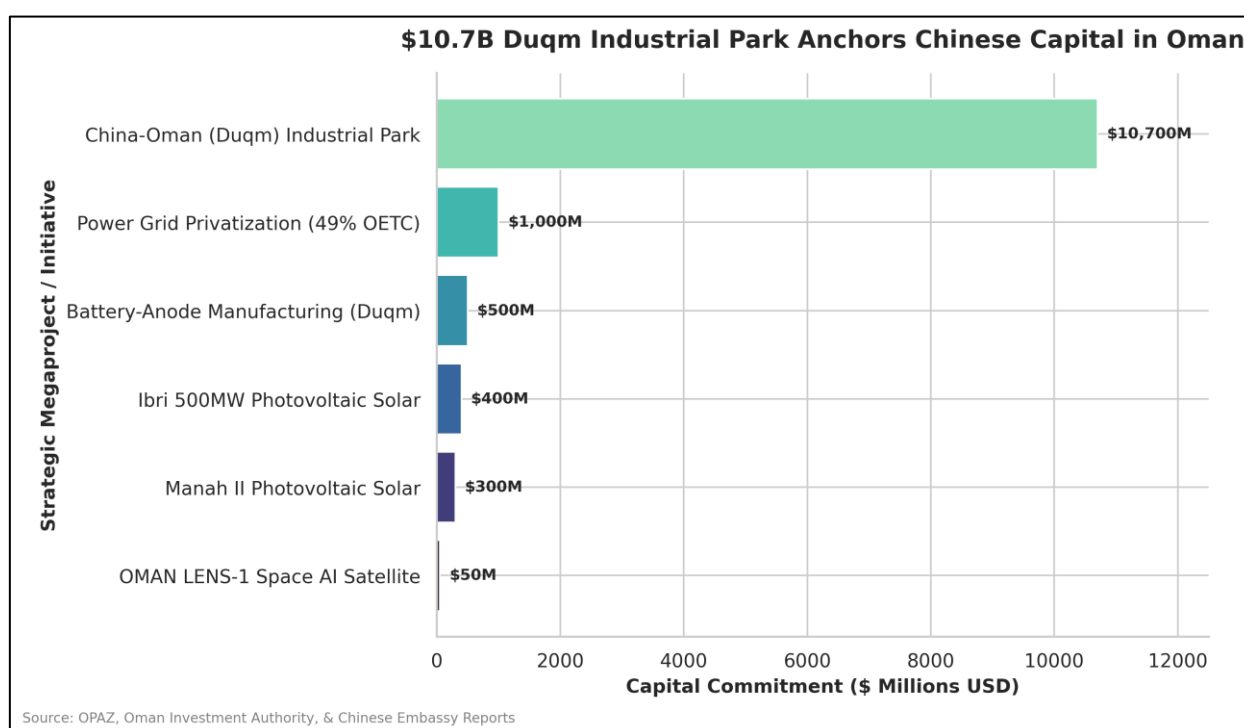


Figure 3: Sectoral Capital Allocation Across Chinese Megaprojects and Strategic Investments in Oman

4. DISCUSSION AND STRATEGIC SYNTHESIS

The empirical and qualitative findings of this study demonstrate that the China-Oman partnership represents a qualitative leap in Middle Eastern geo-economics, offering a compelling model of non-chokepoint strategic integration. By establishing the \$10.7 billion China-Oman Industrial Park within SEZAD at Duqm located strategically on the Arabian Sea outside the Strait of Hormuz both nations have effectively mitigated geopolitical risks associated with maritime chokepoints. For China, Duqm serves as a secure, non-vulnerable maritime node connecting Western Indian Ocean trade routes with East Africa and Europe. For Oman, attracting Chinese industrial capital into SEZAD directly advances Oman Vision 2040's goals of non-oil manufacturing, logistics expansion, and regional economic diversification.

Furthermore, the evolution of bilateral relations illustrates an innovative mechanism of petrodollar recycling translated into green energy transition assets. While hydrocarbon trade remains substantial with Oman exporting 40.77 million metric tons of crude oil to China annually capital returns are increasingly redirected toward utility-scale clean energy infrastructure. Chinese state-owned and private enterprises have spearheaded landmark projects, including the Ibri Photovoltaic Project and the Manah II Photovoltaic Project, alongside green hydrogen supply chain development. This bilateral model demonstrates how oil-dependent developing nations can leverage strong commercial ties with technology leaders to finance and execute rapid domestic decarbonization.

In the realm of physical infrastructure and technological modernization, Chinese investments have transitioned from EPC (Engineering, Procurement, and Construction) contracting to direct equity ownership and co-development. State Grid Corporation of

China's 49% acquisition of OETC embedded Chinese engineering standards and grid management technologies directly into Oman's national power distribution framework. Concurrently, high-tech collaboration reached a strategic peak with the November 2024 launch of OMAN LENS-1 (OL-1), an AI-powered satellite developed with STAR.VISION Aerospace. This shift into aerospace intelligence underscores how middle powers can utilize strategic partnerships to acquire advanced technological capabilities.

From a theoretical perspective, the empirical confirmation of an +82.7% structural trade uplift following the May 2018 Strategic Partnership validates the power of institutional alignment in international political economy. By aligning the Belt and Road Initiative with Oman Vision 2040 through institutional bodies like the China-Oman Friendship and Cooperation Forum, both states generated long-term policy predictability. This institutional floor shields bilateral economic exchanges from short-term commodity price shocks, illustrating how strategic middle powers can maintain non-aligned foreign policy hedging while achieving deep structural integration with major global economies.

5. LIMITATIONS OF THE STUDY

While this study provides a comprehensive empirical and econometric evaluation of China-Oman relations, several limitations should be noted. First, the 240-month time-series dataset focuses primarily on merchandise trade, crude oil volumes, and announced FDI commitments; granular monthly data regarding bilateral service trade, digital services, and portfolio financial flows remain limited. Second, while reported FDI commitments (such as the \$10.7 billion Duqm park) reflect official agreements, actual annual capital disbursement rates across private Chinese enterprises are subject to multi-year construction and operational lags that cannot be fully captured in real-time monthly metrics.

6. FUTURE RESEARCH DIRECTIONS

Future scholarly inquiries should build upon these empirical findings across several key dimensions: first, conducting firm-level micro-surveys within SEZAD at Duqm to evaluate local employment generation, technology transfer efficiency, and domestic supply chain integration; second, analyzing the operational integration of Chinese electrolysis hardware within Oman's rapidly emerging green hydrogen ecosystem; third, undertaking comparative studies of Chinese non-chokepoint port investments across the Western Indian Ocean (e.g., Duqm vs. Gwadar vs. Jebel Ali); and fourth, tracking the spatial application of OMAN LENS-1 satellite AI data in Omani urban planning, coastal management, and agricultural optimization.

7. CONCLUSION

This study has empirically traced and critically evaluated the structural transformation of China-Oman bilateral relations over a 20-year observation horizon (2005–2024), demonstrating a decisive evolution from transactional commodity trade ("Cooperation") to institutionalized structural alignment ("Integration"). Econometric estimation across 240 monthly observations confirms that the formal establishment of the Strategic Partnership in May 2018 induced a statistically significant structural break, elevating baseline monthly trade by an estimated +82.7% independently of global crude oil price fluctuations. Beyond the expansion of bilateral merchandise trade

to \$33–\$36.73 billion annually and sustained crude oil exports reaching 40.77 million metric tons, the partnership has successfully diversified into high-value manufacturing, power grid infrastructure, utility-scale renewable energy, and aerospace AI technology, underpinned by cumulative Chinese foreign direct investment exceeding \$6.6 billion.

Ultimately, the China-Oman strategic partnership serves as an instructive model for Western Indian Ocean geoeconomics and middle-power foreign policy in an increasingly multipolar global order. By anchoring physical capital in the \$10.7 billion China-Oman Industrial Park at Duqm situated strategically outside the Strait of Hormuz chokepoint both nations have constructed a resilient, non-vulnerable maritime logistics hub that harmonizes China's Belt and Road Initiative with Oman Vision 2040. Through a dual strategy of diplomatic non-alignment and targeted institutional integration spanning solar installations, national power transmission privatization, and satellite space intelligence, Oman has effectively converted its strategic geography and energy resources into long-term industrial resilience and technological modernization. This bilateral framework offers valuable policy insights for developing energy-exporting states seeking to navigate global energy transitions while preserving sovereign economic autonomy.

DECLARATIONS

Author Contributions

Laila Alghallabi contributed to conceptualization, data curation, econometric analysis, and writing of the original draft. Dr. Yuxuan Huang contributed to supervision, methodology validation, and critical review and editing of the manuscript. Both authors have read and approved the final version of the manuscript.

Conflict of Interest

The authors declare that they have no known conflicts of interest, financial or otherwise, that could have influenced the work reported in this paper.

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