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**PROSPECTS FOR ALGERIA–EUROPEAN UNION ECONOMIC RELATIONS : A STRATEGIC
FORESIGHT STUDY USING MICMAC AND MACTOR TECHNIQUES**

***Abstract.** This study examines the future of economic relations between Algeria and the European Union in light of global energy transitions and geopolitical shifts. Algeria remains a key energy supplier to Europe but is seeking to diversify its economy beyond hydrocarbons. The EU, meanwhile, is reducing its fossil fuel dependence and promoting green energy. These opposing dynamics necessitate a strategic reassessment of their partnership. Using MICMAC and MACTOR techniques, the study identifies critical variables and influential actors shaping this relationship. MICMAC highlights structural factors, while MACTOR maps actor influence and goal alignment. Together, they reveal areas of convergence and conflict. The analysis emphasizes the potential for cooperation in energy, innovation, and trade. It also underlines the importance of adapting strategies to regional and global uncertainties. The study offers forward-looking insights to support a resilient and mutually beneficial economic partnership.*

Keywords : Algeria; EU; MICMAC; MACTOR; Strategic Foresight

Introduction

In a rapidly transforming global economic landscape, the relationship between Algeria and the European Union (EU) holds critical importance both geopolitically and economically [Barbieux & Bouris, 2024]. Algeria, as one of the key nations in the southern Mediterranean, possesses a wealth of strategic resources, particularly hydrocarbons, which have historically served as the cornerstone of its economic exchanges with Europe [Tahchi, 2024a]. On the other hand, the European Union remains Algeria's largest trading partner, accounting for the majority of its foreign trade flows [Azubuike et al., 2018]. However, the traditional nature of this partnership, based largely on energy dependency and commodity exchange, has come under increasing scrutiny in light of the EU's energy transition goals, Algeria's economic diversification efforts [Aczel et al., 2018; Benasla et al., 2024], and regional security dynamics. These shifts raise fundamental questions about the future trajectory of the Algeria-EU economic relationship.

The current context is marked by several pivotal developments. First, the EU is aggressively pursuing policies aimed at achieving carbon neutrality and reducing its reliance on fossil fuels [Casagrande & Dallago, 2025], which directly impacts Algeria's core export sector [Bayssi et al., 2024; Seeger et al., 2025]. Second, Algeria has been taking steps to reduce its dependence on hydrocarbons by promoting economic diversification [Metaiche, 2024], investing in renewable energy, and enhancing its industrial base [Bouckaert, 2024; Boudghene Stambouli et al., 2024; Cardinale, 2023; Stambouli, 2011]. Third, regional and global uncertainties—including the energy crisis exacerbated by the Russia-Ukraine conflict, instability in the Sahel, and the evolving geopolitical role of emerging powers like China and Turkey—are exerting significant influence on the strategic interests of both Algeria and the EU [Donelli & Cannon, 2025; Jackson, 2024; Sour & Лотфи, 2024; Zoubir, 2023]. These dynamics necessitate a reassessment of bilateral economic ties and demand forward-looking strategies to ensure mutual benefit and resilience.

In light of these complexities, this study aims to explore the prospects for future economic relations between Algeria and the European Union using a strategic foresight approach. Specifically, it employs two well-established foresight methodologies: the MICMAC [Nazlabadi et al., 2023] and MACTOR [Kadaifci, 2024] techniques. MICMAC is used to identify the most influential variables shaping the future of the bilateral relationship, while MACTOR provides a framework to analyze the interplay of strategic actors and their alignment or conflict regarding key objectives.

The use of these complementary methods allows for a systemic understanding of the Algeria-EU economic relationship. MICMAC helps determine which factors are structurally dominant, which are dependent, and which are emerging or autonomous within the system. It thus informs policymakers and stakeholders about leverage points and potential risks. MACTOR, on the other hand, enables the mapping of key actors—such as governments, corporations, research institutions, and international organizations—in terms of their influence and strategic positioning, as well as their alignment with various economic, environmental, and geopolitical goals. By integrating these approaches, the study seeks to provide a holistic vision of future scenarios and to identify possible paths for cooperation and mutual development.

Literary Review

Recent research reconceptualizes Algeria–EU relations beyond the classic hydrocarbon supplier–buyer model, emphasizing multiple, competing pathways. Near-term analyses of gas diplomacy and pipeline politics show how Algeria became an alternative supplier after the Russia–Ukraine conflict [*Another Round of Algerian Gas for Europe*, s. d.; Tahchi, 2024b; Voytyuk, 2023]. Other studies project the medium-term challenge and opportunity of green hydrogen and renewable exports, highlighting Algeria’s significant solar and wind endowments and pilot hydrogen projects [*2022 Algeria- Challenges of Energy Security in Europe- Can Algeria Be an Alternative to Russia?*, s. d.; Guillot & Assoumou, 2025; Kouache et al., 2025; Seutame Oupa Maiméle, 2023]. In parallel, the European Green Deal introduces stringent climate and trade instruments (CBAM, sustainable finance taxonomy) which reshape Algeria’s market access and future export strategies [Dennis, 2006; Futures Entrepreneurship Centre, Mast House, Plymouth University, Plymouth, Devon, England et al., 2015]. Nevertheless, most of this scholarship analyzes technological, economic, and political variables in isolation rather than through an integrated systemic framework.

In parallel, economic foresight studies in other contexts increasingly rely on methodological tools such as MICMAC, MACTOR, scenario building, and the Delphi method. For instance, [Toumache & Rouaski, 2016] investigated Algeria’s economic growth prospects by 2025 using MICMAC to identify key influencing variables; they concluded that oil revenues, fiscal policy, and foreign investment were the main structural drivers, though their analysis remained confined to Algeria’s domestic context without considering bilateral or multilateral linkages. [Bobadilla et al., 2024] applied MICMAC to the coffee sector in Peru’s Amazonas region, illustrating how foresight can incorporate environmental and institutional dynamics at the local-industry level. Similarly, [Sossa et al., 2024] studied

Brazil's leather agro-industrial chain through a Delphi–scenario combination, aligning foresight outcomes with open innovation strategies. More recently, [Sanhueza-Aros et al., 2025] integrated systems thinking and participatory scenarios to guide agricultural development in Chile's Araucanía region, underscoring the importance of stakeholder engagement and feedback loops in shaping credible foresight exercises.

These studies demonstrate both the flexibility and applicability of foresight tools across different sectors and geographies, but also highlight a significant gap. Existing foresight research on Algeria has so far been sector-specific or internally focused, without situating Algeria's structural drivers within its external partnerships, particularly with the EU. Conversely, the Algeria–EU economic literature focuses on energy, trade, and policy issues, but rarely incorporates formal foresight methodologies that capture interdependencies and actor strategies in a structured manner.

This paper aims to bridge that divide. By applying MICMAC to map key structural variables and MACTOR to analyze actor strategies and potential coalitions, the study provides an integrated foresight framework that links Algeria's domestic constraints with European regulatory and market dynamics. In doing so, it adds methodological novelty to the literature, complements existing sectoral projections, and delivers policy-relevant insights into the future of Algeria–EU economic relations under scenarios shaped by both energy transition and geopolitical realignments.

Method

This research adopts a qualitative strategic foresight approach to explore the evolving economic relationship between Algeria and the European Union. Specifically, it applies two complementary techniques from the field of prospective analysis: MICMAC and MACTOR. The MICMAC technique was used to identify and classify the key variables influencing Algeria–EU economic relations. Through expert consultation and documentary analysis, 20 variables were selected (*Table 1*), ranging from hydrocarbon exports and foreign investment to climate commitments and migration. These variables were then analyzed using MICMAC software to assess their direct and indirect influence and dependence, providing a structural map of the system's dynamics.

Table 1: List of variables

N°	VARIABLE	VARIABLE CODE
1	Algeria's Hydrocarbon Exports to the European Union	V1
2	European Investments in Algeria	V2
3	Diversification of Algeria's Production Base	V3
4	Balance of Payments	V4
5	Global Energy Price Trends	V5
6	Volume of Bilateral Trade Exchanges	V6
7	Existing Trade Agreements	V7
8	Tariff and Non-Tariff Barriers	V8
9	Stability of Economic Policies in Algeria	V9
10	European Policy Toward Southern Mediterranean Countries	V10
11	National Strategies for Economic Diversification	V11
12	Digital Transformation in Algeria	V12
13	Cooperation Opportunities in Green Technology and Renewable Energy	V13
14	Level of Scientific Research and Innovation	V14
15	Unemployment in Algeria	V15
16	Societal Acceptance of Foreign Partnerships	V16
17	European Environmental Commitments	V17
18	Regional Security in the Sahel	V18
19	Algeria's Relations with Other Countries (China, Russia, USA)	V19
20	Irregular Migration	V20

Source: MICMAC output

The listed variables present a comprehensive overview of the factors influencing economic relations between Algeria and the European Union, reflecting the complex interplay of political, economic, and social dimensions shaping their cooperation dynamics. To begin with, Algeria's hydrocarbon exports to the European Union are a cornerstone variable that

defines the nature of economic ties, given Europe's heavy reliance on Algerian energy sources, which directly impacts trade balances and investment flows.

Closely linked to this is European investments in Algeria, which signify investor confidence in Algeria's economic and political environment and play a crucial role in fostering economic development and diversification, as captured by the variable diversification of Algeria's production base. Economic diversification is essential for reducing dependency on hydrocarbons and enhancing economic resilience.

The balance of payments serves as a key financial indicator reflecting the net flow of exports, imports, and capital, while global energy price trends underscore external factors that can directly affect Algeria's oil revenues and economic stability.

Variables such as volume of bilateral trade exchanges and existing trade agreements provide direct measures of economic exchange and the legal framework regulating trade relations. In contrast, tariff and non-tariff barriers can either hinder or facilitate trade, affecting the competitiveness of Algerian products in the European market.

The stability of economic policies in Algeria represents a vital internal factor that influences the business environment and attracts foreign investment. Simultaneously, European policy toward Southern Mediterranean countries reflects the EU's strategic approach and its broader regional influence, encompassing economic support or political pressures.

Strategically, variables like national strategies for economic diversification and digital transformation in Algeria serve as key drivers for modernizing the Algerian economy and enhancing its competitiveness, especially amid the rising importance of digital technologies and innovation.

Cooperation opportunities in green technology and renewable energy align with global environmental trends and European environmental commitments, signaling a shift towards sustainable and eco-friendly economic models.

The level of scientific research and innovation indicates Algeria's capacity to develop local technological solutions that underpin diversification and export potential, while unemployment in Algeria highlights ongoing social and economic challenges that require effective policy responses.

Societal acceptance of foreign partnerships plays a critical role in the success of international cooperation, as public opinion can significantly influence investment policies and bilateral relations. In the security realm, regional security in the Sahel underscores the

importance of political stability and security in the broader region, which directly affect economic cooperation.

Additionally, Algeria's relations with other countries (China, Russia, USA) point to a multi-polar foreign policy landscape, offering alternative strategic partnerships that influence Algeria's economic and political decision-making.

Lastly, irregular migration presents both a security and humanitarian challenge with significant implications for domestic and regional policies.

Overall, these variables depict a complex network of interrelated economic, political, and social factors, highlighting the need for a nuanced understanding of internal and external influences. Effective analysis of these factors is crucial for developing balanced strategies that promote sustainable development and foster mutually beneficial relations between Algeria and the European Union.

The MACTOR method was employed to analyze the positions, strategies, and influence levels of key actors involved in the bilateral relationship. 13 actors were identified (*Table 2*), including public institutions, private companies, international organizations, and civil society. The analysis mapped their relationships and their alignment with 18 strategic objectives (*Table 3*), allowing the identification of potential alliances, conflicts, and influence patterns across the strategic landscape.

Table 2: List of Actors

ACTOR	ACTOR CODE
ALGERIAN GOVERNMENT (MINISTRY OF TRADE, MINISTRY OF ENERGY, MINISTRY OF FINANCE)	A1
MAJOR ALGERIAN COMPANIES (SONATRACH, SONELGAZ, CEVITAL...)	A2
BUSINESS ORGANIZATIONS (FORUM OF BUSINESS LEADERS – FCE, CONFEDERATION OF INDUSTRIALISTS)	A3
UNIVERSITIES AND RESEARCH CENTERS	A4
PUBLIC OPINION AND MEDIA (EU)	A5
EUROPEAN COMMISSION (DG TRADE, DG NEAR...)	A6
MAJOR EUROPEAN GOVERNMENTS (FRANCE, GERMANY, ITALY)	A7
EUROPEAN ENERGY COMPANIES (TOTAL, ENI, ENGIE...)	A8
EUROPEAN-ALGERIAN CHAMBERS OF COMMERCE	A9
EUROPEAN PARLIAMENT	A10
WORLD TRADE ORGANIZATION (WTO)	A11
WORLD BANK / INTERNATIONAL MONETARY FUND (IMF)	A12
EMERGING ACTORS (CHINA, RUSSIA, TURKEY)	A13

Source: MACTOR output

The list of actors involved in the Algerian-European economic and trade dynamics reflects a complex and multilayered ecosystem where national, regional, and international players interact. At the national level, the Algerian government—through key ministries such as Trade, Energy, and Finance—plays a central role in designing policies that shape the country's economic orientation. Alongside it, major public and private companies like Sonatrach and Cevital act as direct economic agents, driving exports and investment. Business organizations and research institutions further contribute by representing the private sector and supporting innovation and cooperation in key sectors such as energy and digital transformation. Public opinion and media, although indirect, help frame perceptions and influence decision-making over time.

On the European side, actors such as the European Commission and major national governments (France, Germany, Italy) are strategic policy shapers with direct economic stakes in Algeria. European energy companies depend significantly on Algerian gas, making them sensitive to bilateral developments. Institutions like the European Parliament and chambers of commerce play supporting but important roles, either through regulatory influence or through the promotion of trade and investment.

At the global level, multilateral organizations such as the WTO, World Bank, and IMF provide legal and financial frameworks that shape Algeria's integration into the global economy. Meanwhile, emerging powers such as China, Russia, and Turkey are increasingly asserting themselves as geo-economic competitors, seeking to expand their influence in Algeria's market. This complex web of actors suggests that Algeria's economic and trade strategies must balance domestic priorities with geopolitical realities and international obligations.

Table 3: List of objectives

OBJECTIVE	OBJECTIVE CODE
INCREASE ALGERIAN EXPORTS TO THE EU	O1
ENSURE ENERGY SECURITY FOR THE EUROPEAN UNION	O2
DIVERSIFY ALGERIA'S PRODUCTION BASE BEYOND HYDROCARBONS	O3
ATTRACT MORE EUROPEAN FOREIGN DIRECT INVESTMENT (FDI)	O4
STRENGTHEN BILATERAL AND MULTILATERAL TRADE AGREEMENTS	O5
REDUCE ALGERIA'S DEPENDENCE ON OIL REVENUES	O6
PROMOTE DIGITAL AND TECHNOLOGICAL TRANSFORMATION IN ALGERIA	O7
ENHANCE SCIENTIFIC RESEARCH AND INNOVATION COOPERATION	O8
SUPPORT GREEN ENERGY AND ENVIRONMENTAL SUSTAINABILITY	O9
IMPROVE ALGERIA'S BUSINESS CLIMATE AND REGULATORY FRAMEWORK	O10
STABILIZE MACROECONOMIC INDICATORS (E.G., BALANCE OF PAYMENTS)	O11
INCREASE PRIVATE SECTOR PARTICIPATION IN THE ALGERIAN ECONOMY	O12
ENSURE RESPECT FOR ENVIRONMENTAL AND HUMAN RIGHTS STANDARDS	O13
EXPAND ALGERIA'S GLOBAL PARTNERSHIPS (E.G., WITH CHINA, RUSSIA)	O14
ENHANCE REGIONAL SECURITY AND POLITICAL STABILITY IN THE SAHEL	O15
MANAGE MIGRATION FLOWS AND REDUCE IRREGULAR MIGRATION	O16
STRENGTHEN THE INFLUENCE OF EUROPEAN NORMS AND VALUES	O17
BOOST PUBLIC TRUST AND SOCIETAL ACCEPTANCE OF FOREIGN PARTNERSHIPS	O18

Source: MACTOR output

The list of strategic objectives (*Table 3*) reflect the multifaceted nature of Algeria–EU relations and the broader geopolitical context in which they operate. These goals capture both economic priorities, such as boosting Algerian exports, attracting foreign direct investment, and diversifying the production base, and broader structural ambitions like digital transformation, environmental sustainability, and scientific cooperation. At the same time,

they highlight geopolitical concerns shared by both sides, including regional security, migration management, and energy interdependence. Some objectives, like expanding partnerships with non-European powers, may introduce elements of divergence or competition, especially from the EU's perspective. Others, such as improving the business climate or promoting private sector engagement, represent common ground for both Algerian reformists and international institutions. Overall, these objectives provide a coherent foundation for analyzing the alignment and conflicts of interest among various actors through the MACTOR method.

This dual-method approach allows for a comprehensive understanding of both the structural factors (MICMAC) and stakeholder strategies (MACTOR) that will likely shape the future of Algeria–EU economic cooperation. The integration of both techniques provides a robust foundation for scenario building and strategic recommendations.

Results

In this study, two core input matrices underpin the analysis conducted through the MICMAC and MACTOR techniques. These matrices serve as the foundation for identifying system structure and actor dynamics.

For the MICMAC technique, the analysis begins with the construction of a direct influence-dependence matrix (*Table 4*). This square matrix captures the degree of direct influence each variable exerts on all other variables in the system. The scale typically ranges from zero (no influence) to three (strong influence), allowing a structured quantification of interactions among variables such as hydrocarbon exports, foreign investment, policy stability, and scientific innovation. This matrix was instrumental in classifying variables into influence-dependence quadrants—determining which factors are driving forces, resulting outcomes, or relatively autonomous.

Table 4: Matrix of Direct Influences (MDI)

	1: V1	2: V2	3: V3	4: V4	5: V5	6: V6	7: V7	8: V8	9: V9	10: V10	11: V11	12: V12	13: V13	14: V14	15: V15	16: V16	17: V17	18: V18	19: V19	20: V20
1: V1	0	2	3	1	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2: V2	2	0	0	1	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
3: V3	3	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4: V4	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5: V5	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6: V6	2	2	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
7: V7	1	2	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0
8: V8	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
9: V9	0	0	1	1	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
10: V10	0	0	0	0	0	0	0	0	2	0	3	0	0	0	0	0	0	0	0	0
11: V11	0	0	0	0	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0
12: V12	0	0	0	0	0	0	0	0	0	1	2	0	2	1	0	0	0	0	0	0
13: V13	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0
14: V14	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0
15: V15	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	0	0
16: V16	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0
17: V17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0
18: V18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0
19: V19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
20: V20	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

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Source: MICMAC output

In parallel, the MACTOR method is supported by two interlinked matrices. The first is the actor–actor influence matrix (Table 5), which evaluates the power relationships among the identified stakeholders—governmental bodies, companies, EU institutions, and international organizations. It measures the degree to which each actor can affect others’ behavior or strategic positioning.

Table 5: Actor–Actor Influence Matrix

MID	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
A1	0	3	2	2	1	3	3	2	2	1	1	2	1
A2	2	0	3	1	0	2	2	3	2	1	0	1	2
A3	2	3	0	1	1	1	1	1	3	1	0	1	1
A4	1	1	1	0	2	2	1	1	0	0	0	0	0
A5	0	0	0	1	0	1	1	0	1	1	0	0	0
A6	3	2	1	2	1	0	3	3	2	2	1	2	1
A7	3	2	1	1	1	3	0	2	2	3	1	2	2
A8	2	3	1	1	0	3	2	0	2	1	0	1	1
A9	2	2	3	0	1	2	2	2	0	1	0	1	1
A10	1	1	1	0	1	2	3	1	1	0	1	1	0
A11	1	0	0	0	0	1	1	0	0	1	0	2	0
A12	1	1	0	0	0	2	2	1	1	1	2	0	1
A13	1	2	1	0	0	1	2	1	1	0	0	1	0

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Source: MACTOR output

The second MACTOR matrix is the actor–objective matrix (Table 6), which maps each actor’s position toward a predefined set of strategic objectives. Actors may support, oppose, or remain neutral toward goals such as export diversification, scientific cooperation,

or alignment with environmental norms. These matrices enabled the identification of convergences, divergences, potential alliances, and areas of strategic conflict between actors.

Table 6: Actor–Objective Matrix

2MAO	O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13	O14	O15	O16	O17	O18
A1	3	2	3	2	3	2	3	2	2	3	3	2	0	1	2	1	0	2
A2	3	2	2	2	2	1	2	1	1	2	2	2	-1	2	1	0	-1	1
A3	2	1	3	3	2	1	2	1	0	3	2	3	-1	2	0	0	-2	1
A4	1	0	2	1	1	2	3	3	2	1	1	2	2	1	1	1	1	1
A5	1	1	2	0	1	1	2	1	2	1	1	1	2	0	0	0	0	2
A6	2	3	2	2	3	2	2	2	3	2	2	1	3	-1	2	2	3	1
A7	2	3	2	2	2	2	1	1	3	2	2	1	3	-2	2	2	3	1
A8	2	3	1	1	2	1	0	0	3	1	1	0	2	-2	1	1	2	0
A9	3	2	2	3	3	2	1	1	2	3	2	2	-1	1	1	1	2	2
A10	1	1	1	1	2	2	2	2	3	1	1	1	3	-1	2	3	3	2
A11	2	2	2	2	3	2	1	1	2	2	3	1	2	-1	2	2	2	1
A12	2	2	2	2	2	3	1	1	2	3	3	2	2	-1	2	2	1	1
A13	0	0	1	0	1	-1	1	0	0	0	0	1	-2	3	1	0	-2	0

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Source: MACTOR output

Together, these structured matrices form the analytical backbone of the foresight study, allowing for a systemic exploration of future scenarios and the identification of leverage points within the Algeria–EU economic relationship.

Table 7: Properties of the Direct Influence Matrix among Variables

INDICATOR	VALEUR
Matrix Size	20
Number of Iterations	2
Number of 0	336
Number of 1	24
Number of 2	28
Number of 3	12
Number of P	0
Total	64
Filling Rate	16%

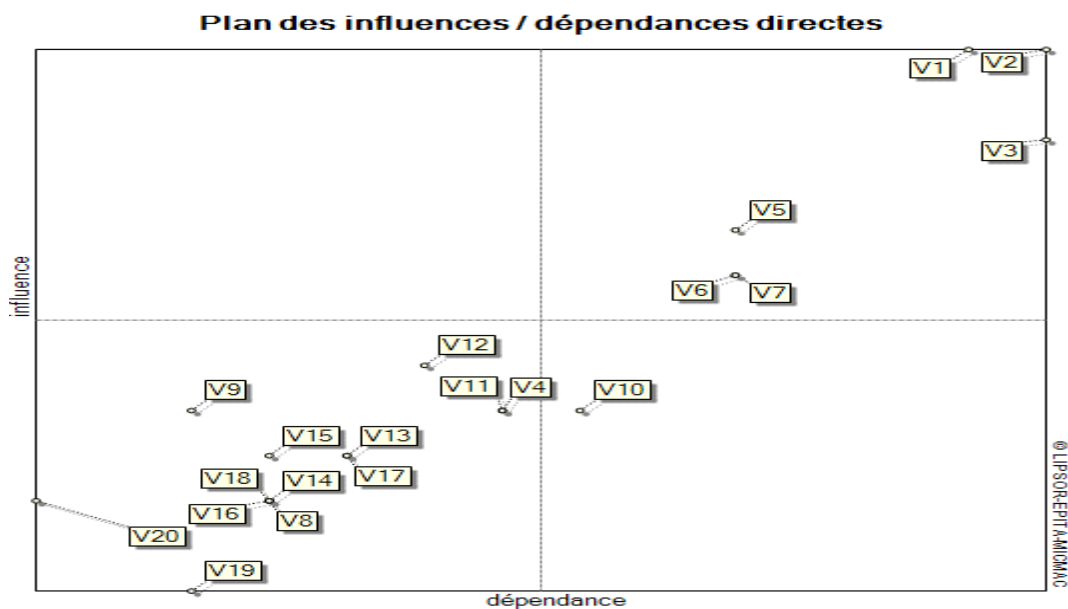
Source: MICMAC output

The direct influence matrix consists of 20 variables, with a total of 64 direct influence relationships identified out of a possible 400 (20 × 20), resulting in a filling rate of 16%. This relatively low filling rate indicates a sparse matrix, suggesting that only a limited number of variables exert significant influence on others. The distribution of influence levels shows 24

low-intensity influences (value 1), 28 medium-level influences (value 2), and 12 strong influences (value 3), while 336 interactions were evaluated as having no influence (value 0). Notably, there were no potential or uncertain influences (P), indicating a fully deterministic evaluation of relationships. The matrix was stabilized after 2 iterations, which confirms the robustness and convergence of the influence structure. Overall, the structure reveals a system with selective and focused interdependencies among the variables (*Table 7*).

The Direct Influence-Dependence Map (*Fig 1*) is constructed by analyzing the matrix of direct influences among variables (*Table 4*). Each variable is assessed for how strongly it influences and is influenced by the others, using a standardized scale (typically from 0 = no influence to 3 = strong influence). Once the matrix is completed, the total influence and dependence scores are calculated for each variable by summing the values across rows and columns, respectively. These scores are then plotted on a Cartesian plane, with influence on the x-axis and dependence on the y-axis. The resulting map visually categorizes variables into four zones : determinants, relay variables, resultant variables, and autonomous factors, highlighting their structural roles in the system.

Fig 1: Direct influence-dependence Map



Source: MICMAC output

This influence-dependence diagram presents the systemic positioning of 20 variables shaping the economic and trade dynamics between Algeria and the European Union. The map

categorizes variables based on their direct influence on the system and their dependence on other variables, offering a strategic framework for prioritizing interventions.

Quadrant I: Driving Variables (High Influence, Low Dependence)

- V1: Algeria's Hydrocarbon Exports to the EU
- V2: European Investments in Algeria

These variables are the most influential and relatively autonomous, indicating that they initiate systemic changes rather than react to them. They serve as primary levers in shaping the Algeria-EU economic relationship.

V1 drives economic flows, fiscal balance, and political leverage.

V2 reflects the EU's strategic interest in Algeria and can catalyze technological transfer, employment, and infrastructure development.

Strategic Implication:

Policies strengthening hydrocarbon export management and enhancing the investment climate will have cascading effects across the system.

Quadrant II: Relay Variables (High Influence, High Dependence)

V3: Diversification of Algeria's Production Base

This variable plays a dual role: it is both influenced by upstream drivers (like energy exports and investment flows) and exerts influence on multiple dependent variables such as trade structure, unemployment, and innovation.

Strategic Implication:

V3 is a pivot point. Any disruption or progress here will significantly affect the overall system. Thus, support for industrial diversification policies, SME development, and local value chains is vital.

Quadrant III: Dependent Variables (Low Influence, High Dependence)

- V10: European Policy Toward Southern Mediterranean Countries
- V4: Balance of Payments
- V11: National Strategies for Economic Diversification
- V12: Digital Transformation in Algeria

These are outcome variables — they respond to changes in external and internal drivers. For example, V10 is influenced by EU geopolitics, while V11 and V12 rely heavily on investment, institutional will, and international cooperation.

Strategic Implication:

These variables signal the effectiveness of upstream strategies and should be monitored to evaluate impact.

Quadrant IV: Autonomous or Marginal Variables (Low Influence, Low Dependence)

- V19: Algeria's Relations with China, Russia, USA
- V20: Irregular Migration
- V18: Regional Security in the Sahel
- V16: Societal Acceptance of Foreign Partnerships

These variables are weakly connected to the system in terms of direct influence/dependence. Their role may be contextual or indirect, but they should not be ignored — especially in scenarios involving geopolitical shifts or social backlash.

Strategic Implication:

They may act as latent disruptors or stabilizers. Their indirect influence may grow over time, particularly V19 and V18, which are sensitive to global alignments and regional conflicts.

Quadrant V: Intermediate/Connector Variables

Some variables fall close to the center and play a moderating role:

- V6: Volume of Bilateral Trade
- V7: Existing Trade Agreements
- V5: Global Energy Prices
- V9: Stability of Economic Policies in Algeria

These connect more dominant variables with dependent ones and translate strategic decisions into operational outcomes.

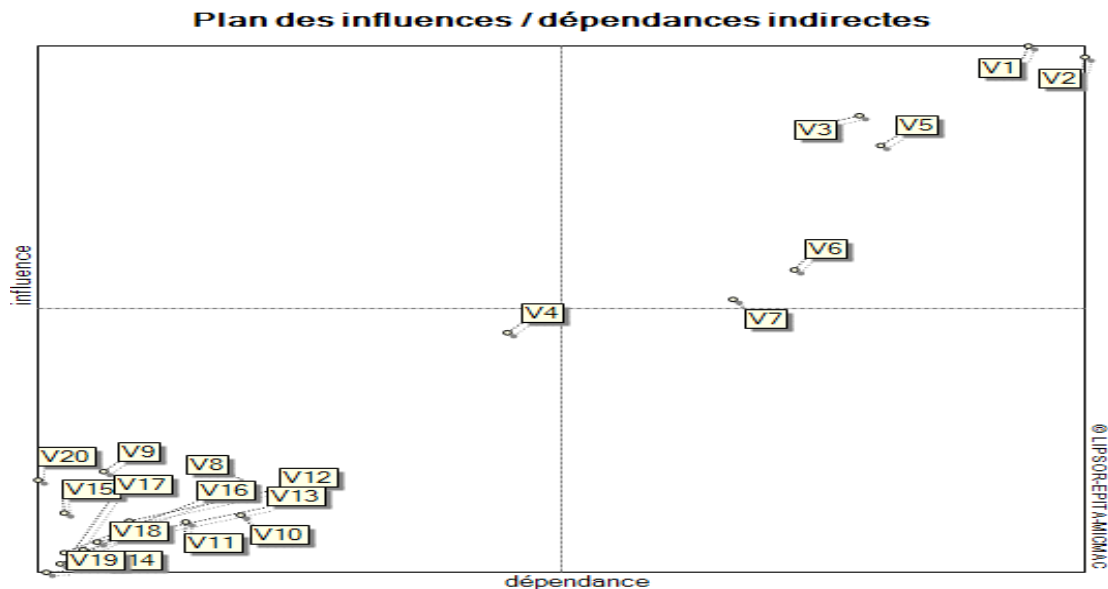
Strategic Implication:

Efforts to stabilize these variables (through trade diplomacy, legal harmonization, and macroeconomic governance) can enhance system resilience.

The Indirect Influence-Dependence Map (*Fig 2*) is constructed by extending the analysis of the direct influence matrix to account for the chain effects between variables. Using matrix multiplication techniques, the indirect influence of each variable on others is calculated by considering not only its direct impact but also the influence it exerts through intermediate variables. This process reveals hidden or amplified dependencies that are not immediately visible in the direct matrix. Once the total indirect influence and dependence values are computed for each variable, they are plotted on a Cartesian graph—influence on

the x-axis and dependence on the y-axis—similar to the direct map. The indirect map often highlights emerging or latent variables that may become structurally important over time, offering a deeper understanding of systemic dynamics and long-term strategic drivers.

Fig 2: Indirect influence-dependence Map



Source: MICMAC output

Comparison of Direct vs. Indirect Influence/Dependence Maps

Direct Map shows immediate, observable relationships between variables.

Indirect Map reveals second-order and cascading effects — how changes propagate through the system.

• Variables that Maintain Strong Influence in Both Maps

(Consistently located in the top right quadrant)

- V1: Algeria's Hydrocarbon Exports to the EU
- V2: European Investments in Algeria
- V3: Diversification of Algeria's Production Base
- V5: Global Energy Price Trends

These variables are structural drivers. Their consistent influence in both direct and indirect maps confirms their central, strategic importance to the system. They cause immediate effects and also trigger long-term systemic shifts.

Implication: These are high-leverage variables. Policy actions targeting them will yield both short-term and long-term benefits.

✓ Variables That Shift in Influence or Dependence

V4: Balance of Payments

Direct Map: Near the center (moderate influence/dependence).

Indirect Map: At the center (pivot point).

Interpretation: V4 is not a primary driver, but it reflects the cumulative effect of other variables. It acts as a system integrator and a performance outcome.

V6: Volume of Bilateral Trade Exchanges

Moves slightly lower in indirect influence, showing it is less capable of systemic propagation.

Remains relevant but less central indirectly.

V7: Existing Trade Agreements

Maintains low influence but higher dependence in both maps.

Suggests institutional rigidity — trade agreements are reactive elements rather than strategic levers.

• Variables with Strong Decrease in Influence (in Indirect Map)

These variables show reduced systemic power when indirect links are considered:

- V12: Digital Transformation in Algeria
- V13: Green Technology Cooperation
- V14: Scientific Research and Innovation
- V15: Unemployment
- V16: Societal Acceptance
- V17: EU Environmental Commitments
- V18: Regional Security
- V19: Relations with China, Russia, USA
- V20: Irregular Migration

All these variables are clustered in the bottom left quadrant in the indirect map, indicating low systemic propagation capacity. While they may react to changes, they do not generate ripple effects throughout the system.

Implication: These are contextual or peripheral variables. They should not be the starting point for systemic change, though they matter for sectoral stability.

Variables Acting as Relay or Mediators (Only in Direct Map)

V10: European Policy Toward Southern Mediterranean

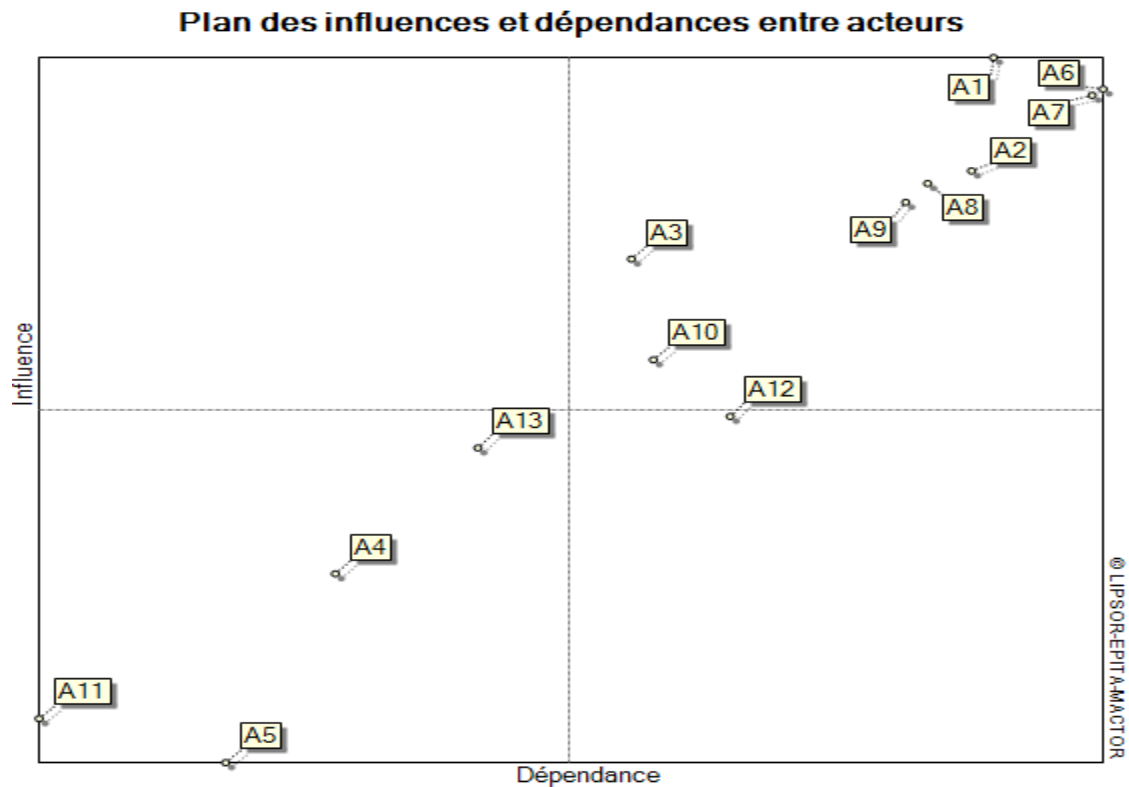
V11: National Economic Diversification Strategies

In the direct map, these were central and moderately dependent. But in the indirect map, they shift toward the bottom left, losing systemic influence.

Implication: These are influenced more than they influence over the long term. Their impact is diluted across layers of variables. Coordination with more dominant drivers is essential.

The Influence/Dependence Map of Actors (*Fig 3*), visually represents the strategic positioning of each actor based on their ability to influence others and their level of dependence within the system. Using the actor–actor influence matrix (*Table 5*), the influence score for each actor is calculated by summing the impact they exert on all other actors, while the dependence score reflects how much they are influenced by others. These scores are then plotted on a two-dimensional graph, with influence on the x-axis and dependence on the y-axis.

Fig 3: The influence/dependence map of actors



Source: MACTOR output

The influence/dependence map provides a visual representation of the power dynamics among the 13 actors involved in the Algerian-European economic relationship. The actors are positioned according to two key dimensions: their capacity to influence others (vertical axis) and their level of dependence on the system (horizontal axis):

• **Dominant and strategic actors (top-right quadrant):**

Actors A1 (Algerian Government), A2 (European Commission), A6 (European Energy Companies), and A7 (European Governments) are positioned as highly influential yet relatively dependent. This reflects their central role in shaping decisions while also being affected by others' strategies. These actors are at the core of the system's dynamics and form the driving forces of potential cooperation or conflict.

• **Influential but less dependent actors (top-left quadrant):**

Actor A3 (Algerian State-Owned Companies) occupies a strategic position of high influence and low dependence. This suggests a powerful role in steering outcomes, especially in export and energy-related matters, without being heavily constrained by external dynamics.

• **Balanced actors (center of the map):**

Actors A9 (EU-Algerian Chambers of Commerce), A10 (Parliament), and A12 (WTO) show moderate levels of influence and dependence. These actors often act as mediators or facilitators within the system. They may support cooperation but rarely lead major strategic shifts.

• **Actors with low influence and high dependence (bottom-right quadrant):**

Actors A4 (Algerian Business Organizations) and A5 (Universities & Research Centers) appear marginal in terms of influence but are highly dependent on the system's evolution. Their limited capacity to drive change may constrain their strategic significance unless empowered by alliances or policy shifts.

• **Marginal actors (bottom-left quadrant):**

Actor A11 (Emerging Goeconomic Players) appears to be both weakly influential and weakly dependent, suggesting a minimal current role in the core interactions. However, this might change depending on geopolitical developments.

• **Isolated or neutral actor:**

Actor A13 (Public Opinion & Media) sits near the origin, implying limited influence and dependence. This actor may play a soft-power role, especially in shaping narratives or legitimacy, but lacks direct strategic leverage.

The Actors/Objectives Correspondence Map (*Fig 4*) is constructed using the actor–objective matrix (*Table 6*), where each actor's level of support or opposition to a set of strategic objectives is evaluated using a standardized scale (e.g., from –3 for strong opposition to +3 for strong support). Once the matrix is completed, the degree of alignment or divergence among actors regarding each objective is analyzed. The map is then built by plotting the objectives based on how many actors support or oppose them, revealing areas of consensus, conflict, or neglect. This visualization helps identify which objectives are widely endorsed, which are contested, and which lack sufficient backing, providing strategic insight into where cooperation is likely and where negotiation or advocacy may be needed.

Actor A13 (Public Opinion & Media) is located near O14 (Promote climate and environmental sustainability), showing that public discourse is more concerned with environmental goals than immediate economic outcomes. Similarly, A10 (Parliament) and A4 (Business Organizations) are positioned near distinct objectives, possibly indicating specific legislative or sectoral interests.

• **Actors with weak correspondence:**

Some actors such as A7 (European governments) and A8 (Research institutions) are not closely aligned with any dominant cluster, possibly indicating a neutral or multifaceted stance.

Overall, this map helps identify where cooperation is likely and where tensions or gaps in interest may arise between key stakeholders and their strategic goals.

Discussion

The results obtained from the MACTOR method provide deep insights into the strategic landscape surrounding the future of economic relations between Algeria and the European Union. The actor-actor influence/dependence map reveals that actors such as the Algerian government (A1), European Commission (A6), and European governments (A7) occupy dominant positions with high influence and medium to high dependency. These actors are central to shaping and adjusting economic cooperation strategies, as their actions have significant repercussions on other stakeholders.

Meanwhile, actors such as universities and research centers (A4) and the general public/media (A5) are positioned with lower influence and higher dependency, suggesting a more reactive role in the overall dynamic. However, their potential to indirectly affect strategic narratives through public discourse and innovation should not be overlooked.

The actor-objective map (MAO) confirms the alignment between influential actors and key strategic goals. For instance, objectives such as O1: Increase Algerian non-hydrocarbon exports, O3: Attract more European investment, and O4: Diversify Algeria's production base are supported by multiple influential actors. These objectives represent shared priorities and serve as potential anchors for joint action plans. Conversely, objectives like O14: Promote inclusive scientific research or O18: Enhance climate cooperation are less supported, suggesting a need to mobilize greater engagement and awareness.

Conflicts of interest also emerge : while the European Commission (A6) may strongly support climate-related goals such as O17 and O18, Algerian actors may prioritize immediate

economic and trade benefits over environmental commitments. This tension must be addressed through phased strategies and mutual benefit frameworks.

Complementing the MACTOR findings, the MICMAC analysis offers further depth by categorizing the variables according to their direct and indirect influences and dependencies. Variables such as Algeria's hydrocarbon exports to the EU (V1) and European investments in Algeria (V2) occupy dominant positions in both influence and dependency quadrants, confirming their central, structuring role in the dynamics of the bilateral relationship. These are key leverage points whose fluctuation could ripple throughout the system.

On the other hand, variables like irregular migration (V20), regional security (V18), and societal acceptance of foreign partnerships (V16) exhibit low influence but relatively high sensitivity, marking them as resultant or passive factors. Though they do not directly drive change, their evolution is strongly shaped by more influential drivers — and they can become sources of instability if neglected.

The indirect MICMAC map further emphasizes the peripheral but potentially catalytic roles of variables such as scientific research and innovation (V14) and cooperation in green technology (V13). These remain outside the central system but could shift toward greater influence if strategic emphasis is placed on sustainable, innovation-driven development.

The identification of structural variables : global energy price trends (V5), EU environmental commitments, (V17) as high in influence but low in dependency indicates that exogenous factors must be carefully monitored. These variables are less controllable yet highly impactful, requiring robust scenario planning and flexible policy frameworks from Algerian and European stakeholders alike.

In conclusion, the MICMAC analysis supports a layered understanding of the system: it reveals both core strategic levers (energy, investment, trade policy) and emerging or latent dimensions (innovation, climate, social legitimacy) that must be considered to ensure a robust, future-oriented partnership.

Conclusion

This study has examined the future prospects of economic relations between Algeria and the European Union through a strategic foresight lens, employing the MICMAC and MACTOR methodologies to identify key variables, actors, and objectives that will shape this evolving partnership. The dual analysis revealed that while energy and investment remain at

the core of current relations, emerging dynamics—such as climate commitments, innovation potential, and geopolitical shifts—are gaining relevance.

MACTOR results confirmed the centrality of actors like the Algerian government, European institutions, and large national and European firms in driving strategic objectives such as export diversification and increased investment. However, the divergence in priorities—especially on environmental issues and institutional reform—signals the need for careful policy alignment and phased cooperation strategies.

MICMAC analysis further underscored the structural role of hydrocarbons and trade policy, while highlighting the passive but sensitive nature of factors like migration and regional security. Variables related to scientific research and green technology, though currently peripheral, hold significant transformative potential if adequately supported.

Taken together, the findings suggest that while the Algeria-EU relationship remains anchored in traditional economic exchanges, there is a clear opportunity to broaden the scope toward a more balanced, sustainable, and innovation-led partnership. Building such a future requires not only aligning influential actors with forward-looking objectives but also integrating underrepresented variables and stakeholders.

Strategic foresight must therefore remain an ongoing process—supporting mutual understanding, anticipating disruptions, and guiding both sides toward resilient and inclusive economic cooperation in a rapidly changing global environment.

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