MARKET RESEARCH

AGRICULTURAL SECTOR 2026

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सत्यमेव जयते

Economic Diplomacy Division

Ministry of External Affairs

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PART I

POLITICAL AND ECONOMIC SITUATION OF VENEZUELA

PART I
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Geographic and Demographic Overview of Venezuela

Venezuela is located in the northernmost part of South America, bordering the Caribbean Sea to the north, the Cooperative Republic of Guyana and the Atlantic Ocean to the east, the Federative Republic of Brazil to the south, and the Republic of Colombia to the west. Its total area of 916,445 km² makes it the sixth largest country in Latin America [1]. The territory is administratively organized into 23 states, a Capital District, and Federal Dependencies, and is geographically articulated into five major natural regions: the Llanos region, the Andean region, the Coastal region, the Guayana region, and the Amazonian region.

In demographic terms, the National Survey of Living Conditions (Encuesta Nacional de Condiciones de Vida) produced by the Institute of Economic and Social Research of the Andrés Bello Catholic University (IIES-UCAB) estimates Venezuela's population at 29.37 million inhabitants for 2024[2], a figure that reflects the cumulative impact of sustained migratory outflows since 2015. The average population density is 30.8 inhabitants per km², although the distribution is markedly uneven: more than 75% of the population is concentrated in the northern coastal strip and in the country's central axis.

This extensive coastal strip, spanning more than 2,813 kilometers along the Caribbean Sea and 700 kilometers along the Atlantic Ocean, not only concentrates the majority of the population, but also grants the country a privileged geostrategic position as a gateway to Latin America. Its maritime location functions as a natural and direct channel linking the region to global markets in North America, Central America, the Caribbean, Europe, and Asia, while also facilitating access to the Panama Canal route.

Areas of Highest Population Concentration

The most populous states are Zulia (with its capital Maracaibo, the country's second most populated city), Miranda, Carabobo, Lara, and the Capital District (Caracas), which together concentrate approximately 55% of the national population[3]. The Caracas–Valencia–Maracay axis represents the country's highest-density industrial and services corridor. Venezuelan agricultural production also has a significant presence in this central strip, particularly regarding horticulture in the valleys of the coastal mountain range[4].

This demographic and industrial concentration in the north-central and western regions of the country greatly facilitates commercial penetration, given the strategic proximity to the main maritime terminals. With the majority of consumers concentrated within very short distances of key infrastructure such as Puerto Cabello, La Guaira, and the port of Maracaibo, a logistical advantage

[1] https://www.exteriores.gob.es/documents/fichaspais/venezuela_ficha%20pais.pdf
[2] https://cdn.prod.website-files.com/5d14c6a5c4ad42a4e794d0f7/6803aeed2dfc5c19a4ac96cd_ENCOVI%202024_presentacio%CC%81n_integrada.pdf
[3] https://www.proyectoencovi.com/encovi-2024
[4] https://www.fao.org/venezuela/venezuela/venezuela-en-una-mirada/es/

is created that expedites distribution and direct supply of the domestic market. These terminals thereby function as direct gateways to the most populated areas, reducing transit times. In this context, port economics function as the main artery of the nation's commercial and fiscal activity. Although in recent decades this model gave rise to a deep dependence on consumer goods imports, port infrastructure remains the irreplaceable engine for Venezuelan exports.

Areas of Lowest Population Concentration

The states with the lowest population density are located in the south and southeast of the country. The states of Amazonas, Delta Amacuro, and Bolívar have the lowest relative density, despite together covering more than 35% of the national territory[5]. This low density is explained by tropical rainforest coverage, a scarcity of road infrastructure, and the remoteness from consumption centers, although these regions hold the country's largest natural resource reserves, particularly those near the Orinoco Mining Arc (AMO).

Primary Mining Areas

Venezuelan mining activity is fundamentally concentrated in the Orinoco Mining Arc (AMO), which covers an area of more than 113,598 km² in Bolívar state, equivalent to 12.4% of the national territory, where reserves of gold, diamonds, coltan, copper, iron, and bauxite are found, with the potential participation of 150 companies from 35 countries[6].

Venezuela holds the world's largest proven oil reserves, with approximately 303 billion barrels according to data from the Organization of the Petroleum Exporting Countries (OPEC), a figure confirmed by multiple international organizations including the U.S. Energy Information Administration (EIA) and the BP Statistical Review[7]. The majority of these reserves are located in the Orinoco Oil Belt, situated across the states of Anzoátegui, Monagas, Guárico, and Apure, followed by reserves in the country's northwest in the states of Falcón and Zulia[8].

Primary Agricultural Areas

Venezuelan agricultural production is concentrated in the west-central and plains regions. Its geographic location gives the country strong potential for tropical agriculture, enabling high yields in permanent crops such as coffee, cocoa, oil palm, and fruit trees, or semi-permanent crops such as sugarcane, plantain, and cassava[9]. Portuguesa state is the country's main agricultural hub: with approximately 800,000 hectares suitable for farming, it generates more than 50% of national maize production, 65% of rice, and 52% of sugarcane[10].

The states of Barinas, Guárico, Cojedes, and Apure complete the plains axis of cereal and livestock production. In the Andean region, the states of Mérida, Táchira, and Trujillo concentrate

[5] https://www.proyectoencovi.com/encovi-2024
[6] https://www.sinembargo.mx/4746786/datos-tiene-petroleo-gas-oro-tierras-raras-venezuela-es-el-gran-pastel-para-eu/?__cf_chl_tk=NpjU6B6qRVeeIWXVKx6JqdmW8.tVq3mNM_7i3IsLyVg-1781282300-1.0.1.1-.ij62Lt12LNRFLcleePlTUmu0J8EmdWyY.iCRwKI.gU
[7] https://www.elimparcial.com/mundo/2025/12/01/venezuela-posee-303000-millones-de-barriles-de-petroleo-la-mayor-reserva-probada-del-mundo-confirmada-por-organismos-internacionales/
[8] https://www.analitica.com/economia/pdvsa-reservas-probadas-de-petroleo-de-venezuela-superan-los-300-800-millones-de-barriles/
[9] https://www.fao.org/venezuela/venezuela/venezuela-en-una-mirada/es/
[10] https://fedeagro.org/wp-content/uploads/2025/03/Resultados-2024-WEB.pdf

production of vegetables, potatoes, and coffee, with family-based operations adapted to hillside topography. Zulia state, in its Sur del Lago de Maracaibo sub-region, is the country's leading producer of plantain and oil palm. The states of Aragua, Carabobo, and Yaracuy form the central agro-industrial axis, with production of sugarcane, maize, and vegetables[11].

Political- Economic Perspectives and Institutional Reforms

Currently, the country is in a political situation of instability and forced environmental changes—especially in the political and economic spheres. De facto power operates under the figure of Delcy Rodríguez as acting president following her swearing-in on January 5, acting parallel to the influence of the United States in the process. According to the announcement by the United States Secretary of State, Marco Rubio, the evolution of events for Venezuela is projected in three operational phases: stabilization, economic recovery, and transition[12].

In this process, there coexists internal tensions between the interim government—whose stabilization depends on the support of the armed forces and U.S. approval—and opposition forces backed by the international community, which demand greater clarity regarding the process termed "transition." Despite the resilience of the Venezuelan economy, where the adoption of digital payments, de facto dollarization, and the adoption of crypto assets by people have guaranteed momentary stability, the inflation projection estimated by the International Monetary Fund (IMF) remains high for 2026, posing a hyperinflation scenario of 628.8%[13]. this, of course, with variables subject to unpredictability—and with the possibility of changes favoring market dynamics that were not considered by the study.

Therefore, in accordance with on-site events, diagnoses made by national or multilateral organizations are conditioned by the decisions that are made daily within public branches of government. Namely, the positive socioeconomic reforms are already materializing, such as the partial reform of the Ley de Hidrocarburos (January 2026)[14]—which, fundamentally, allows for greater private participation—the approval of the Industrial Property and Socioeconomic Rights Laws, and the contemplation of future laws regarding administrative dynamization or electrical modernization[15]. This acts as a catalyst for the economy, and the effectiveness of the reforms and proposals—beyond their legislative approval—can modify the initial perspectives on the evolution of the Venezuelan economy for the coming years.

Preliminarily, the expectations and reception of the domestic and foreign markets have been positive. For example, the exchange rate gap decreased to 34.94%[16] in early 2026, which is a significant improvement compared to the 90% recorded in December 2025[17]; this reduction acts as a natural stabilizer, as it slows down the implicit devaluation of purchasing power and grants greater

[11] Ibid.
[12] https://www.bbc.com/mundo/articles/cwywpd0xznzo
[13] https://www.bloomberglinea.com/latinoamerica/venezuela/fmi-proyecta-inflacion-de-682-en-venezuela-en-2026-ademas-de-contraccion-en-su-economia/
[14] https://www.bbc.com/mundo/articles/cg7y4kznyppo
[15] https://www.asambleanacional.gob.ve/noticias/parlamento-aprueba-plan-basico-legislativo-2026-2027
[16] https://www.bcv.org.ve/estadisticas/tipo-cambio-de-referencia-smc https://monitordolarve.com/precio-del-dolar-en-venezuela-hoy-tasa-bcv-y-monitor-27-de-febrero-de-2026/
[17] https://bitacoraeconomica.com/economistas-brecha-cambiaria-muertesubasta-bcv/

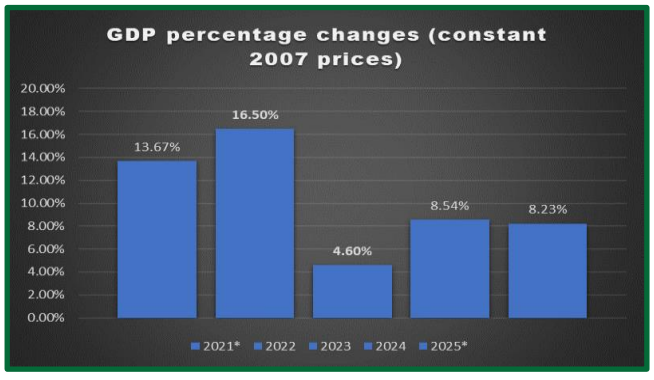
predictability in price structure to producers and consumers, which is vital for projecting the demand for goods. Also, a 30%[18] revaluation of the country's government bonds and those of PDVSA (the national company that monopolizes the hydrocarbon sector) was perceived, indicating that external anticipation of possible economic and institutional changes manifests favorably for the productive environment.

Within this framework, given the instability in the Middle East resulting from the conflict between Iran and the United States, Venezuela positions itself as a relevant actor in the international arena. This is because, in the short term, the increase in oil prices stimulates the demand for B2B services, corporate technology, and logistics, and improves general macroeconomic conditions, benefiting all sectors of the economy due to the interconnection between the economy and oil. However, in the long term—the one considered due to the unpredictability of the conflict's extension keeping prices high—Venezuela, as an energy provider for the United States and Europe, positions the country as an attractive hub for investments, which will possibly impact the country's productive environment, which boasts enormous potential.

Because Installed Capacity Utilization (ICU) is around 52%[19], Venezuela's strategic relevance in the hydrocarbon sector can materialize into growth across various high-growth sectors, such as those previously mentioned, by taking advantage of this idle capacity. Despite the optimism, basic infrastructure—such as the electrical grid—and monetary and fiscal policies—legal reserve requirements and tax levels—need favorable reforms for the productive sector in order to achieve the aforementioned production possibilities.

Economic Growth and GDP Dynamics

According to data provided by Banco Central de Venezuela (BCV) from the second quarter of 2021 to the third quarter of 2025, the Venezuelan economy has shown pronounced variations in its economic growth, with high growth rates (16.50%) in 2021, while shows difficulties for its consolidation, with a sharp drop in 2023 and a gradual recovery in the subsequent years.



Source: Own elaboration, based on data from Banco Central de Venezuela and the International Monetary Fund[20].

[18] https://www.bloomberglinea.com/mercados/bonos-de-venezuela-y-pdvsa-suben-mas-de-30-en-la-semana-pero-hay-desafios-por-delante/
[19] https://finanzasdigital.com/conindustria-capacidad-instalada-2025/
[20] Banco Central de Venezuela (2025). *Producto Interno Bruto*. Estadísticas. https://www.bcv.org.ve/estadisticas/producto-interno-bruto.

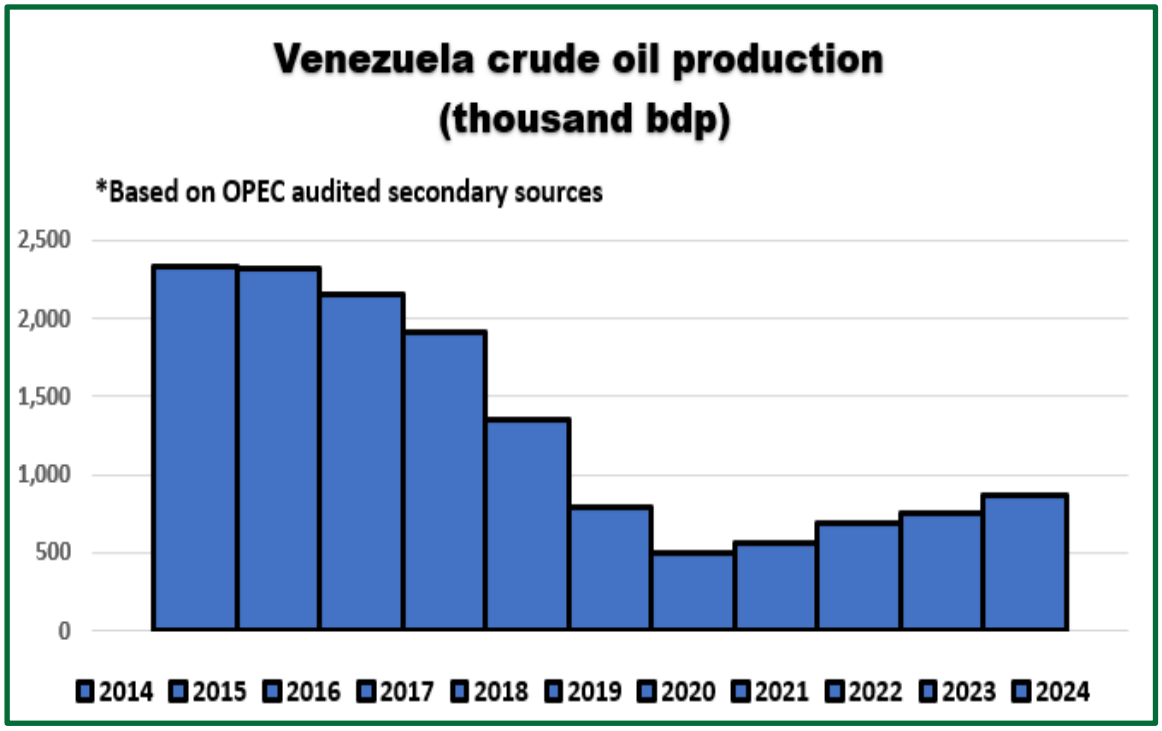
Now, in the following table, a comparison is made between Banco Central de Venezuela (BCV) and international multilateral organizations, comparing the percentage growth of the country's Gross Domestic Product (GDP). The most significant contrast is demonstrated in the data provided by the International Monetary Fund (IMF), which has projected notably lower percentages in 2024 and 2025 compared to those presented by the other organizations.

Percentage GDP growth			
Entity	**2023**	**2024**	**2025***
BCV	4.6	8.54	8.23
ECLAC[21]	3.2	8.5	6.5
UNDP[22]	4.7	8.5	5.8
IMF[23]	4	5.3	0.5

*2025 figures updated as of the end of the third quarter.

The growth currently observed in Venezuela, as a primarily oil-based economy, is attributed to the reactivation of the industry following its most critical years, spanning from 2014 to 2020: In contrast, for 2024, according to the Macroeconomic Performance Bulletin of Venezuela[24], oil activity generated at least 90% of foreign exchange, consolidating itself as the country's main source of income. Consequently, the rest of the non-oil productive sectors, which represent 89% of the economy and are considered a non-tradable sector, operate under an adverse efficiency and competitiveness environment. The correlation between these indicators and oil production is evident when considering the influence of oil production on macroeconomic indicators and, therefore, on all productive sectors of the country. Currently, oil production averaged 1,064 thousand barrels per day between January and December 2025, marking the country's best result since 2019 (UNDP, 2025)[25].

Banco Central de Venezuela. (2025, 16 de octubre). *La economía venezolana avanza: El PIB aumentó 8,71% en el tercer trimestre de 2025*. Nota de Prensa. https://www.bcv.org.ve/notas-de-prensa/la-economia-venezolana-avanza-el-pib-aumento-871-en-el-tercer-trimestre-de-2025
Banco Central de Venezuela. (2025, 01 de mayo). *La economía venezolana continúa avanzando: El PIB creció 9,32% en el primer trimestre de 2025*. Nota de Prensa. https://www.bcv.org.ve/notas-de-prensa/la-economia-venezolana-continua-avanzando-el-pib-crecio-932-en-el-primer-trimestre.
Banco Central de Venezuela. (2025, 22 de Julio). *La economía venezolana creció 6,65% en el segundo trimestre de 2025*. Nota de Prensa. https://www.bcv.org.ve/notas-de-prensa/la-economia-venezolana-crecio-665-en-el-segundo-trimestre-de-2025
International Monetary Fund. (s.f.). *Real GDP growth, Annual Percent Change*. Datamapper. https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/VEN?zoom=VEN&highlight=VEN.
[21] p129. https://www.cepal.org/es/publicaciones/84460-balance-preliminar-economias-america-latina-caribe-2025; https://www.cepal.org/sites/default/files/pr/files/tabla_prensa_pib_estudioeconomico2023-esp.pdf
https://www.mppef.gob.ve/venezuela-cierra-2023-con-un-crecimiento-economico-sostenido/
[22]https://www.undp.org/es/venezuela/publicaciones/desempeno-macroeconomico-de-venezuela-tercer-trimestre-2025
[23] https://www.undp.org/es/venezuela/publicaciones/desempeno-macroeconomico-de-venezuela-tercer-trimestre-2025,
[24] https://www.undp.org/sites/g/files/zskgke326/files/2025-04/boletin_pnud_4to_trimestre_digital.pdf
[25] https://www.undp.org/sites/g/files/zskgke326/files/2025-12/reporte_macroeconomico_nov25_digital.pdf



Source: Own elaboration based on OPEC annual reports (2014-2024)[26].

Likewise, the UNDP estimates that GDP growth in the third quarter of 2025 will reach 8.7%, driven primarily by the oil sector, which grew by +16.1%, and the non-oil sector, which recorded a +6.1% increase. According to BCV figures, although the recovery in non-oil activities such as construction (+16.40%), transport and storage (+9.35%), manufacturing (+8.98%), commerce, along with vehicle repair (+8.19%) and mining (+7.08%) have contributed positively to annual growth, significant challenges remain for their actual influence on the GDP.

Inflation and Purchasing Power

In particular, it is observed that these sectors operate in a context of high inflation, accelerated exchange rate depreciation, and a continuous loss of household purchasing power[27]. These conditions limit the ability of the non-oil productive sector to contribute effectively given the progressively declining demand, fiscal or operational costly requirements, and limited access to credit. In that vein, inflation has remained around 250% for 2025. Reality that, given the expectations of economic reforms, the progressive increase in oil production, and the facilitation of its export under the new political conditions, projects to the economy a scenario of moderate inflation.

[26] https://www.opec.org/assets/assetdb/annual-report-2021.pdf 2021 - 34,
https://www.opec.org/assets/assetdb/annual-report-2022.pdf 2022 - 33,
https://www.opec.org/assets/assetdb/annual-report-2023.pdf 2023 - 23,
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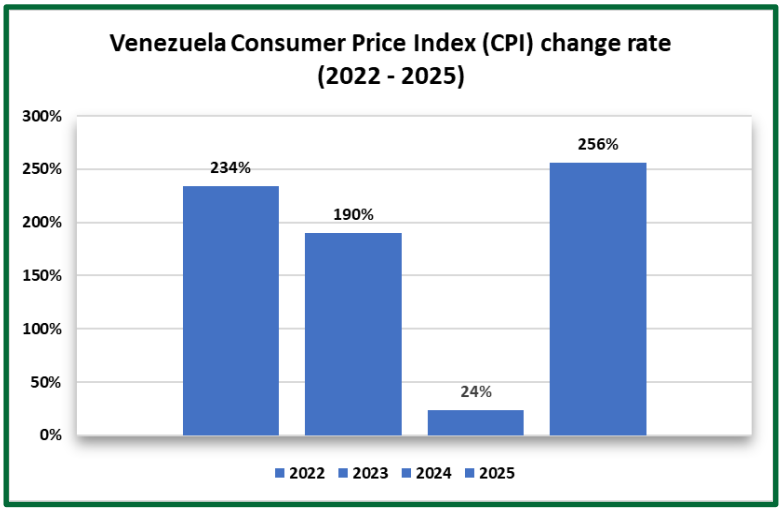
https://www.opec.org/assets/assetdb/annual-report-2018.pdf 2018 - 36-37.

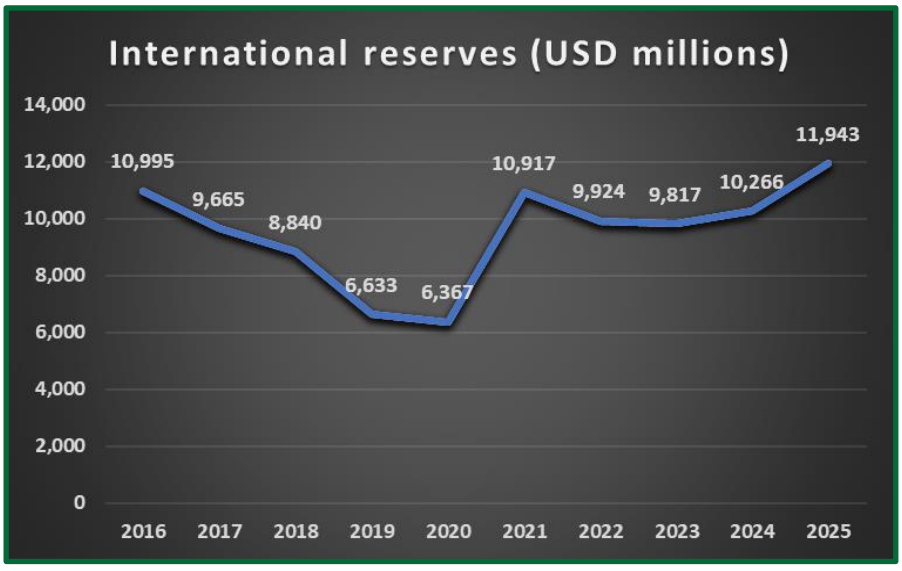
[27] https://www.bcv.org.ve/notas-de-prensa/la-economia-venezolana-avanza-el-pib-aumento-871-en-el-tercer-trimestre-de-2025 and
https://www.undp.org/sites/g/files/zskgke326/files/2025-12/reporte_macroeconomico_nov25_digital.pdf



Source: Own elaboration, data from ECLAC and UNDP.

International Reserves and External Debt

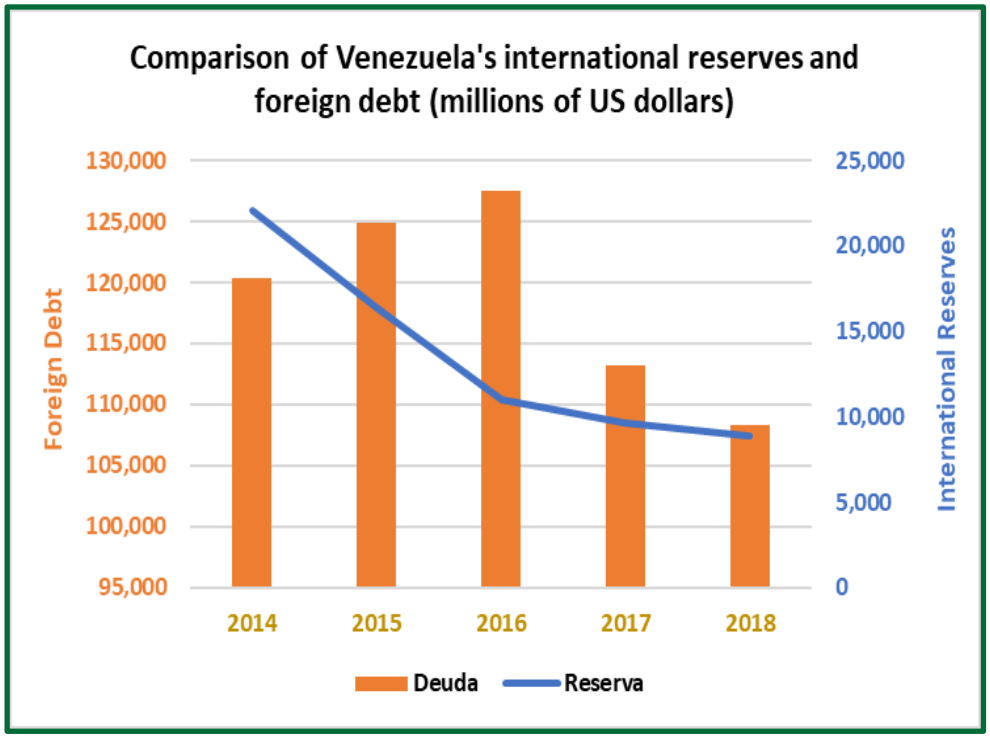
On the other hand, regarding international reserves, a gradual recovery is observed compared to the year 2020, Venezuela's lowest point in 45 years. The pressure created on the external balance has progressively diminished; however, the delayed pace of recovery denotes risks to macroeconomic sustainability in the face of rising external debt and a foreign exchange market constantly intervened by the State for exchange rate stabilization.



Source: Own elaboration, data from Banco Central de Venezuela[28].

Regard to the external debt—according to available data—, it has shown an upward trend, which contrasts negatively with the increase in the country's international reserves. It is estimated that, in recent years, the imbalance between debt and international reserves has damaged Venezuela's international investment position globally.

[28] https://www.bcv.org.ve/estadisticas/reservas-internacionales



Source: Own elaboration, data from Banco Central de Venezuela[29].

International Reserves Trade Balance and Bilateral Relations

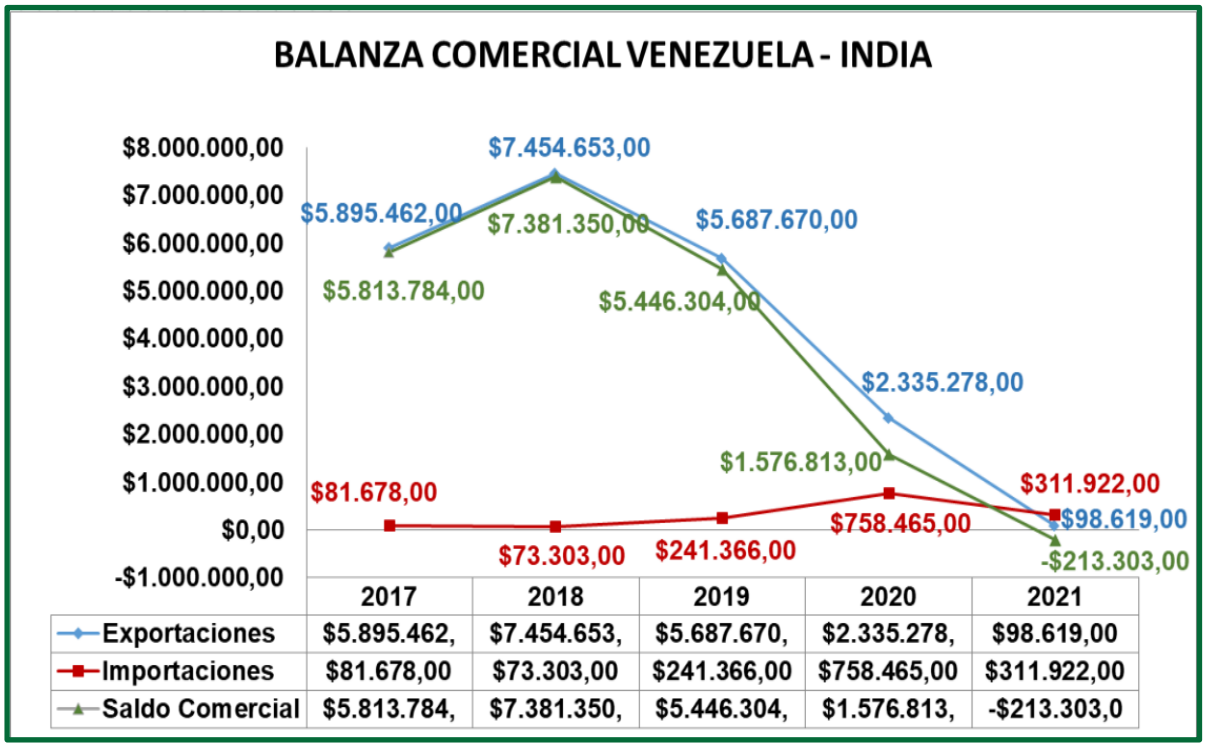
Venezuela's trade dynamics in recent years have resulted in a trade balance that depends on the volatility of hydrocarbon sector revenues and, consequently, on the international licenses permitted to Venezuela in this area. In 2024, the increase in oil production and the rise in external sales, especially from Chevron and Repsol, elevated the value of both total exports and total imports[30]. In parallel, this increase, coupled with the inflow of remittances, has contributed to generating a positive balance in the current account.

Regarding income distribution, 53% originated in Asia, 22% in the United States, and the remainder was managed by independent operators[31]. On its part, Ecoanalítica points out that for 2024, oil-related GDP grew by 11.8%, while non-oil GDP increased by 3.8%.

Meanwhile, for 2025, non-oil exports have recently grown, positioning themselves between 66% and 87% compared to 2024, highlighting items such as rum, marine resources (shrimp, crabs), and other raw materials (such as coffee, fruits, wood chips, and cement)[32]. Overall, the sectors that saw a production increase that year were: oil, agriculture, food industry, pharmaceuticals, paper, auto parts, plastics and rubber, technology, and commerce[33].

[29] https://www.bcv.org.ve/estadisticas/reservas-internacionales and https://www.bcv.org.ve/estadisticas/deuda-externa
[30] https://acading.org.ve/wp-content/uploads/2025/03/Balance-de-la-economia-venezolana-2024-y-perspectivas-2025.-Alejandro-Gutierrez.pdf
[31] https://www.elnacional.com/2026/01/balance-del-comercio-exterior-venezolano-2025-y-perspectivas-2026/
[32] https://www.elnacional.com/2026/01/balance-del-comercio-exterior-venezolano-2025-y-perspectivas-2026/
[33] https://www.elnacional.com/2026/01/balance-del-comercio-exterior-venezolano-2025-y-perspectivas-2026/

In perspective, according to the Observatory of Economic Complexity[34], Venezuela exported approximately 3.69 billion dollars and imported 20.6 billion dollars in 2025 from India, resulting in a negative balance of 17 billion dollars for Venezuela. The main exports from Venezuela to India, by November 2025, were aluminum products, lead, and their derivatives; while the majority of imports were medicines, ceramics and related products, paper and its derivatives. The Banco de Comercio Exterior (BANCOEX) developed the following chart tracking the trade balance between both countries.



Source: Banco de Comercio Exterior (2023)[35].

[34] https://oec.world/es/profile/bilateral-country/ven/partner/ind
[35] http://www.bancoex.gob.ve/wp-content/uploads/2024/02/Perfil-Pais-INDIA-2023.pdf

PART II

EXCHANGE MARKET AND PAYMENT MANAGEMENT

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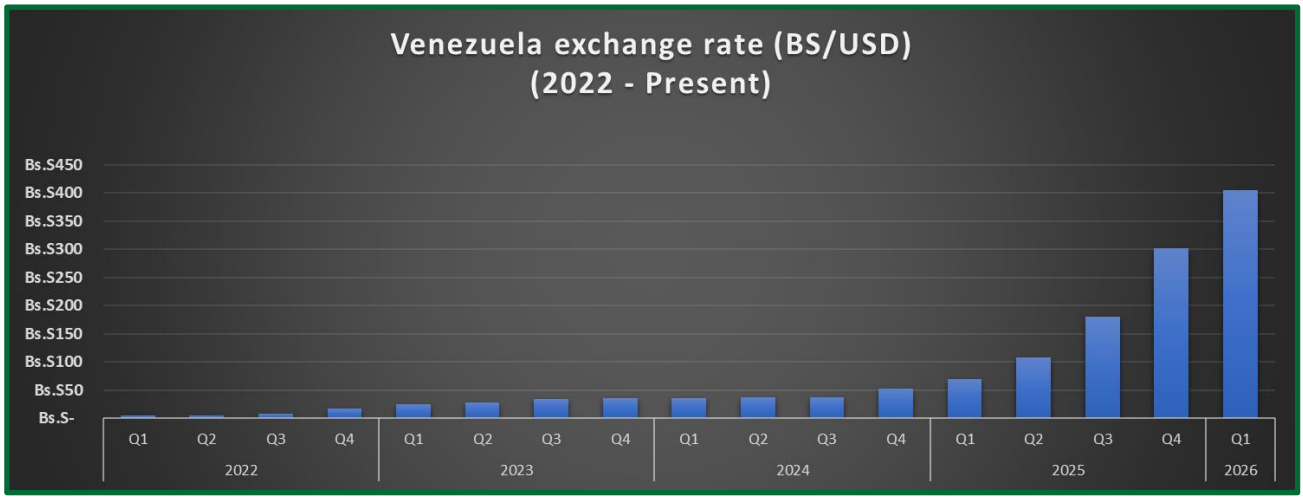
Characteristics of the exchange market in Venezuela

Historically, the Venezuelan exchange market has reflected the evolution of the country's balance of payments and a close connection with oil revenues[36]. In this sense, the State has attempted to maintain a fixed exchange rate which, combined with an expansionary monetary policy, has generated capital flight and parallel markets.

The main characteristic of the exchange market has been an overvaluation of the "digital bolivar"[37] as it has transitioned through multiple exchange control systems (RECADI, OTAC, CADIVI, SITME, SICAD, CENCOEX), a characteristic that, coupled with the fall in oil revenues and the monetization of the fiscal deficit by the BCV, generated the hyperinflationary cycle that reached its peak in 2018. In the last five-year period (2021-2026), following the repeal of the Illicit Exchange Law (2018) and the entry into force of Exchange Agreement No. 1[38], the State allowed—in practice—the free convertibility of the currency and the circulation of the dollar; which generated a temporary price stabilization due to spontaneous transactional dollarization, breathing life into commerce and allowing the industry to set prices and trade in foreign currency.

Dynamics of the exchange rate gap and supply deficit

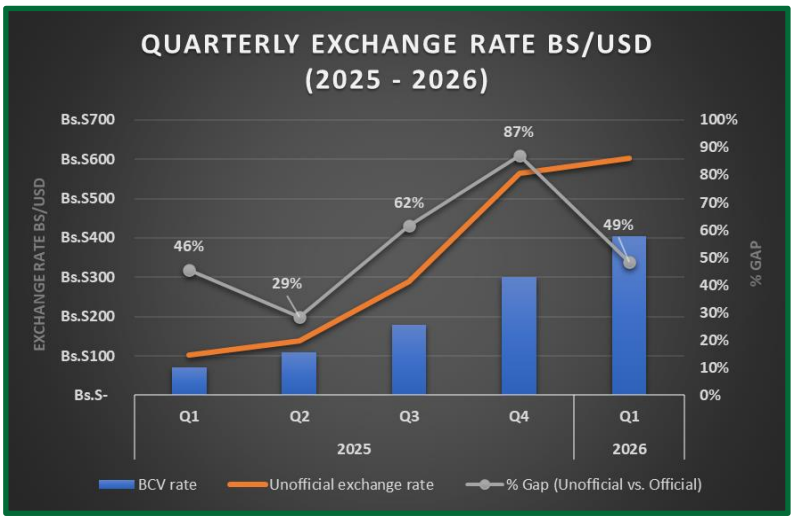
By 2023, the BCV adopted a progressive injection of cash dollars into the foreign exchange market to meet the demand for foreign currency and, as these stipulate the price of goods and services, contain inflation. In parallel, the Large Financial Transactions Tax (IGTF in spanish) was implemented for payments in foreign currency, in order to maintain the traceability of the bolivar and prevent total dollarization. However, starting in 2024[39], the real market demand for foreign currency exceeded the BCV's monetary injections.



Source: Own elaboration, data from Banco Central de Venezuela.

[36] https://frrodriguez.web.wesleyan.edu/docs/Books/Venezuela_Anatomy_of_a_Collapse.pdf
[37] Which, for the purposes of this report, we will refer to hereafter as "bolivar".
[38] https://petroleosdeamerica.com/VENEZUELA/ARCHIVOS/Gaceta_Oficial_07_09_18_num_Extr_6405.pdf
[39] https://observatoriodefinanzas.com/, dollarization index.

Hence, after a gradual devaluation, when the unsatisfied demand for foreign currency exceeded its supply in 2025[40], the demand shifted to the unofficial market, which widened the exchange rate gap. The exchange rate gap—which, in other words, is the reflection of the foreign exchange supply deficit at the official rate—accelerates the currency devaluation by the Central Bank, in order to close the arbitrage window and optimize the State's fiscal cash flow, which allows reducing the necessary injection of foreign currency—mostly coming from international reserves—into the exchange market. This dynamic makes it possible to regularize the supply and demand of the foreign exchange market, restoring the price signals necessary for the proper functioning of the economy.



Source: Own elaboration, data from Banco Central de Venezuela and monitordolarve.com[41].

Faced with this reality, the impact is negative on a domestic industry whose production is affected by imports (for the acquisition of raw materials and intermediate goods), as a result of the historical overvaluation of the bolivar and specialization in the hydrocarbon sector, which has increased production costs and makes goods less competitive. The exchange rate gap forces domestic producers who bill at the official rate to decapitalize. While their replacement costs—inputs, spare parts and raw materials, and risk coverage—are implicitly priced at the parallel dollar given the shortage of foreign currency in the official exchange market, their profits are accounted for in bolivars. This situation, according to the economic sector and inflation, worsens in accordance with the business production cycle. The initial real value of the bolivar compared to the real value of the bolivar collected at the end of the cycle is lower than what is necessary to cover replacement costs.

Therefore, the merchant is faced with limited options. If they adjust their prices in bolivars to cover the replacement cost, the nominal price at the official rate skyrockets, exposing them to national regulations or forcing them out of the market. In addition, economic agents, aware of the exchange disparity, are encouraged to make purchases in bolivars as a form of market arbitrage, limiting the access to foreign currency by businesses. Coupled with this, when taxes are paid in

[40] https://www.bcv.org.ve/estadisticas/balance-general-al-31012026, https://www.ucab.edu.ve/investigacion/centros-e-institutos-de-investigacion/iies/informes-de-coyuntura/

[41] https://monitordolarve.com/?fbclid=PAVERFWAQP9z9leHRuA2FlbQIxMABzcnRjBmFwcF9pZA8xMjQwMjQ1NzQyODc0MTQAAad3feHLCSM8GwzY4frZP6gnd9kmbFkTDKJVH-J8pfGf7g4GBrBlOYE-f3CU7Q_aem_j1gX3PRnbjBPUz9FLJUxnw

bolivars on accounting profits that do not reflect economic reality, accounting books generate nominal profits that force the entrepreneur to pay proportionally high taxes (with respect to their real profit), which contributes to the decapitalization of businesses.

Thus, its impact is reflected both in economic terms (decapitalization) and in operational or transactional costs. Companies have to manage a bi-monetary ecosystem, that is, bolivars in national accounts, cash dollars, and dollars in foreign accounts or digital wallets, each with a different value and liquidity in order to reduce the costs generated by the exchange rate differential; along with the administrative cost of reconciling this reality.

Challenges for international capital and repatriation of dividends

However, for international capital, the exchange rate gap raises the country's risk premium regarding the repatriation of dividends. Finding a limited supply of foreign currency, or competing against a large demand for it in the domestic market, earning profits in bolivars limits its convertibility into foreign currency for repatriation due to market illiquidity. Also, companies are exposed to legal compliance risks and the operational difficulties of valuing their assets. Using the official rate would artificially overvalue assets, while using parallel valuation contravenes the accounting regulations of the country of origin[42], thus complicating the financial statements of transnational companies.

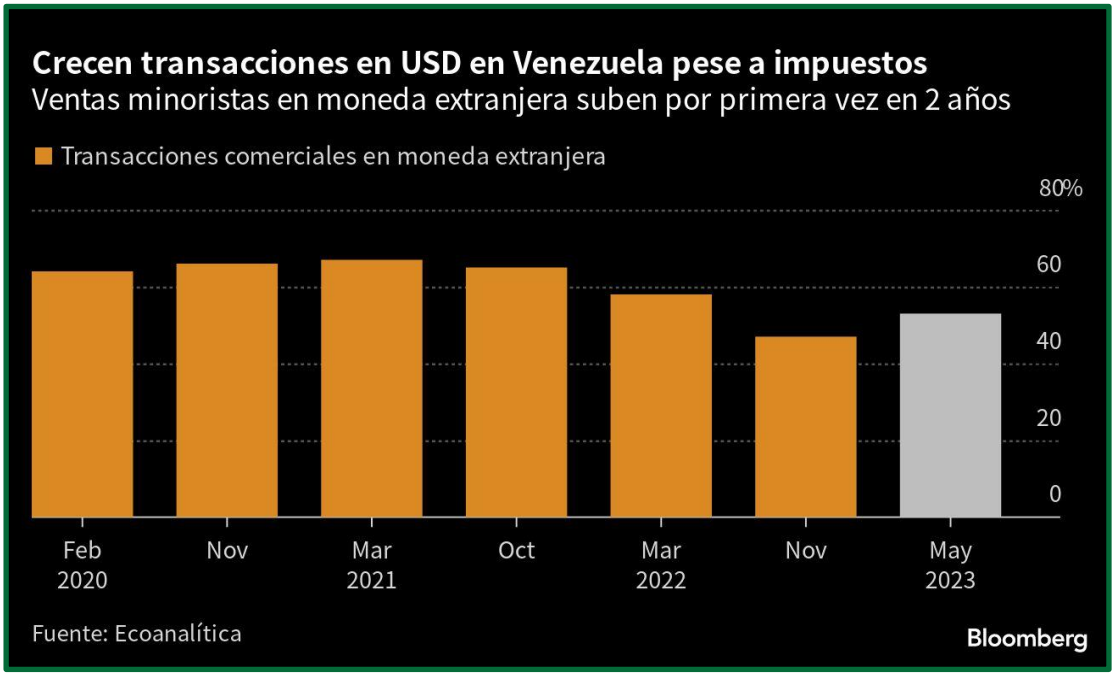
In accordance with the above, the complicated situation of the exchange rate market, characterized by the exchange difference and the lack of capital (due to operational decapitalization), forces economic actors to diversify traditional banking options in search of new forms of settlement. The difficulty of accessing foreign currency in the official market, coupled with the need to safeguard the value of productive operations, drives companies towards more flexible payment management. In this context, the financial structure of businesses ceases to be just an accounting aspect and becomes a strategy, using tools that allow them to overcome both the lack of local liquidity and the isolation from the international banking system.

Understanding the scenario of uncertainty in recent years, carrying out international transactions has become an exercise in financial complexity. This is mainly due to Venezuela's disconnection from the "global network" regarding the payment system with respect to the economic order, backed by the Western Hemisphere and adopted by the rest of the world, where Venezuela is isolated from the SWIFT system, embodying in its image the phenomenon of over-compliance for foreign investors. In this regard, there is a real impact of the restrictions on the BCV and public banking, which turns private banking into the only (and narrow) bridge to the SWIFT system. Nevertheless, despite the existence of this link, international banks fear indirect sanctions from contact with Venezuelan banks, resulting in even transactions to non-sanctioned companies being rejected, subject to meticulous review, or to internal consideration due to the degree of risk exposure.

[42] https://petroleosdeamerica.com/VENEZUELA/ARCHIVOS/Gaceta_Oficial_07_09_18_num_Extr_6405.pdf

It is in this context where there are increases in banking transaction costs, and waiting times affect not only the exchange itself, but also subject organizations to presenting rigorous reports and documents justifying the origin and destination of each movement to ensure transaction transparency. This forces banking entities to work in bureaucratic structures parallel to the global banking network, while having to adhere to its rules and considerations.

However, the private sector has developed mechanisms to ensure operability despite the barriers. In this regard, one of the considered solutions refers to payment triangulation where, through "payment service providers (PSPs)" and accounts in jurisdictions such as Panama, the U.S. or Europe, cash flow has been mobilized outside Venezuelan jurisdiction[43]. Domestically, the country has moved towards digitalization, achieving 98% digital transactions through tools such as: mobile payment (P2P/C2P), bank transfers (VES), biopago, and foreign currency custody accounts that act as an operational value refuge. Some of these allow companies to manage dollars within the national system, although their mobility abroad is restricted, enabling a certain normalization in economic flow and value safeguarding.



Source: Raylí Luján in Bloomberg Línea (2023), based on information from Ecoanalítica[44].

In Venezuela, the integration of crypto assets and stablecoins such as USDT or USDC has been demonstrated as a tool for economic survival in the face of distortions in the local financial system. This practice allows small and medium-sized companies to expedite their international B2B payments, achieving an immediacy given the constant need for market revaluation. It is a model that strictly responds to an operational need within an environment with limited access to global banking, a situation that we hope will become less of an issue as we move forward with our phased implementation following the current circumstances.

[43] https://publications.iadb.org/publications/spanish/document/Fintech-en-America-Latina-y-el-Caribe-un-ecosistema-consolidado-con-potencial-para-aportar-a-la-inclusion-fianciera-regional.pdf
[44] https://www.bloomberglinea.com/2023/06/09/en-venezuela-circulan-us4825-millones-en-efectivo-mientras-aumentan-transacciones-en-divisas/

This ecosystem operates under the supervision of SUNACRIP, which defines these assets as intangible personal property, but their use entails significant tax challenges that limit their appeal as a simple savings alternative. Operations are subject to a robust tax burden that includes additional VAT rates, ranging between 5% and 25%, in addition to the application of the Large Financial Transactions Tax (IGTF), which considerably raises the costs of each movement. Consequently, the Venezuelan model does not present itself as a deregulated route, but as a complex accounting management structure. Companies are forced to balance their cash flows between bolivars, foreign currency, and crypto assets, facing an environment where transactional agility is counterbalanced by strict and costly state tax control. This reality reflects that adoption in the country is a technical response to systemic problems and not a frictionless preference.

Future expectations: towards a return to the financial system

In that perspective, the resolution of these obstacles does not depend solely on technical tools, but on the recovery of trust in institutions, as well as the flexibilization of international sanctions, whose status is on hold following the ongoing economic rearrangement. At present, although a possible reintegration of Banco Central de Venezuela (BCV) into the global system is being discussed, the changing reality and the existing dependence on foreign exchange flow must be taken into account. Meanwhile, as the formal supply of foreign currency stabilizes and cost dispersion is reduced, companies will continue to operate under a traditional hybrid system, influenced by international digital wallets and digital asset exchange, configuring a payment management system with logistical challenges, adaptable solutions, and a uniqueness in replicability worldwide.

As events that contribute to macroeconomic stability occur, such as the decrease in the exchange rate gap—which has decreased by up to 60% in two months—, oil revenues increase due to the world's geopolitical reality, and the gradual insertion of Venezuela into the international financial system without restrictions takes place; the productive apparatus will be boosted. Furthermore, since the population's adoption of different payment methods has taken place, companies will face a favorable scenario to diversify their collection channels and prioritize those methods that optimize their profitability.

PART III
GENERAL AGRICULTURAL CONTEXT

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According to the reconfiguration of the Venezuelan economic landscape during the 2024-2025 period, the agri-food sector had been positioned as one of the key elements for moving towards a post-rentier production model. By the beginning of 2026, an estimated growth of 8.6% had been reported, driven mainly by strategic commodities due to their short cycle and ease of industrialization, such as rice, white corn, and sugarcane[45]. This initial boost positioned the Venezuelan agricultural sector on a path of sustained growth and diversification of its productive offer at the national and international levels. However, the consolidation of this growth is taking place in an environment of political and exchange rate instability, which requires an understanding of value chains and investment in agricultural support.

Principales Rubros Agrícolas Vegetal
ESTIMADO DE PRODUCCION 2023/2024
(En Toneladas Métricas)

Rubros	Consumo deseable Nacional	2022	2023	2024	2025	Crecimiento 23/2024 (%)	Crecimiento 24/2025 (%)	Aautoabastecimiento 2024 (%)
Maiz Blanco	1,100,000	720,000	693000	830,000	790,000	20	-4.8	72%
Maiz Amarillo*	1,500,000	370,000	340,000	580,000	620,000	71	6.9	41%
Arroz Banco*	900,000	464,000	562,000	561,000	750,000	-0	33.7	83%
Sorgo*	1,800,000	3,300	2,500	1,500	1,000	-40	-33.3	0%
Caña de Azucar	8,500,000	2,810,000	3,554,000	4,150,000	5,000,000	17	20.5	59%
Café*	1,800,000	658,000	896,000	920,000	1,200,000	3	30.4	67%
Papa*	400,000	216,000	246,400	210,000	200,000	-15	-4.8	50%
Tomate	300,000	60,000	82,500	80,000	83,000	-3	3.8	28%
Cebolla	200,000	62,000	88,200	75,000	70,000	-15	-6.7	35%
Pimentón	108,000	17,000	21,000	18,000	20,000	-14	11.1	19%
Naranja	150,000	5,600	3,500	3,200	3,000	-9	-6.3	2%
Soya	720,000	13,000	9,000	7,000	7,500	-22	7.1	1%
Frijol*	130,000	77,000	66,000	58,000	50,000	-12	-13.8	38%
Ajonjolí*	1,000	5,200	12,500	9,000	10,000	-28	11.1	n/a

Source: Fedeagro (n.d.), as cited in Banking and Business (2025).

Also, the Venezuelan agricultural industry is characterized by generally low levels of technology (leading to low productivity), with the exception of some crops (rice, corn, or sugarcane); a dual structure marked by land concentration, low investment, and historical dependence on oil subsidies[46]. Thus, a combination of family and traditional agriculture (small and medium-sized subsistence farms) predominates, alongside limited agro-industrial systems that are gradually recovering. These production models were significantly affected by the exchange rate differential experienced between 2024 and 2025, where high replacement costs diminished the capacity for projected production[47]. This scenario could be reversed this year.

From this perspective, India being an agricultural powerhouse (as the world's largest producer of rice or the largest exporter of spices)[48], possesses the financial and operational capacity to expand the productive potential of Venezuelan soil. This could be achieved through the direct export of complex fertilizers or biostimulants, as well as through the export of technology and

[45] https://radiomiraflores.net.ve/sector-agricola-crecio-86-en-2025/
[46] https://www.fao.org/4/ak170s/ak170s00.pdf,
[47] https://fedeagro.org/wp-content/uploads/2025/03/Resultados-2024-WEB.pdf
[48] https://www.reuters.com/world/india/indias-2025-rice-exports-surge-near-record-curbs-lifted-2026-01-10, https://www.commerce.gov.in/about-us/divisions/export-products-division/export-products-agriculture

knowledge of production processes. This would fall within the framework of strengthening bilateral relations, which includes agriculture as a central focus for investment and technological cooperation[49].

Soil Study

A. General Overview

Venezuela boasts exceptional soil diversity. The taxonomic system adopted is the Seventh Approximation of the USDA Soil Taxonomy, under which Venezuela has 9 of the 12 orders recognized worldwide: Entisols, Inceptisols, Vertisols, Mollisols, Ultisols, Oxisols, Aridisols, Histosols, and Alfisols[50]. Large-scale agricultural production in Venezuela is concentrated in the western and central states. The states of the west-central region (Lara, Yaracuy, and Portuguesa) contribute the most to agricultural and livestock activity, accounting for over 60% of the country's total agricultural and livestock land[51].

Portuguesa state is, in particular, the agricultural epicenter of Venezuela. With an area of 15,000 km² and a total of 1,500,000 hectares, of which approximately 800,000 are suitable for agriculture (more than 80% of its territory), Portuguesa is officially recognized as the breadbasket of Venezuela[52]. Its soils produce more than 50% of the national corn production, 65% of the rice, 52% of the sugar cane, 70% of the sunflower, and 95% of the sesame[53].

B. Integrated Regional Matrix

State / Region	Land Order	Main Crop	Water Requirement	Agricultural Limitation
Guárico	Vertisols	Rice, cotton, corn	High (seasonal irrigation)	Contraction/expansion, restricted tillage windows
Portuguese	Alfisols / Inceptisols	Corn, rice, sugarcane, sunflower	Medium-High (supplementary irrigation)	Risk of compaction due to mechanization
Barinas	Entisols / Ultisols	Rice, corn, coffee	Medium (rain + irrigation)	Acidity, low fertility
Apure / Cojedes	Ultisols	Corn, sorghum, livestock	Low-Medium (extensive)	High acidity, low pH, low CEC

[49] https://theindianeye.com/2026/01/31/india-and-venezuela-agree-to-deepen-partnership-across-trade-investment-energy/
[50] https://aprendiendopedologia.wordpress.com/2011/04/07/tipos-de-suelo-en-venezuela/
[51] https://fscluster.org/sites/default/files/documents/hacia_una_caracterizacion_del_actual_que_hacer_agropecuario.pdf
[52] http://www.bav.com.ve/index.php/portuguesa-es-el-granero-de-venezuela/
[53] http://www.psuv.org.ve/temas/noticias/portuguesa-agricultura-venezuela-economia-produccion/

Northern Zulia / Falcón	Dry sols	Onion, tomato, fruit trees	Very High (drip irrigation essential)	Severe water deficit, salinization
Southern Zulia (South of the Lake)	Entisols / Inceptisoes	Plantain, cassava, cocoa	Half	Poor drainage, bad drainage
Aragua / Carabobo	Soft sols	Corn, sugarcane, vegetables	Low-Medium	Compaction by continuous mechanization
Mérida / Táchira	Inceptisols (slopes)	Potatoes, coffee, vegetables	Variable (localized irrigation)	Severe erosion on slope, irregular topography
Lara	Aridisols / Inceptisols	Sisal, onion, cane	High (essential risk)	Aridity, usage restrictions

Source: Own elaboration, based on: INDER[54], IAGUA/ICEX[55], Wordpress[56], OAS[57], SciELO Venezuela[58], APPROVED[59], ancr FAO[60].

Source: Mapbiomes (2026), own configuration[61]. Map that refers to agricultural areas in Venezuela.

54 https://inder.gob.ve/sistemas-de-riego-aliado-fundamental-hacia-la-soberania-agroalimentaria/
55 https://www.iagua.es/noticias/icex-espana-exportacion-e-inversiones/mercado-sistemas-riego-crece-44-venezuela
56 https://aprendiendopedologia.wordpress.com/2011/04/07/tipos-de-suelo-en-venezuela/
57 https://www.oas.org/dsd/publications/unit/oea30s/ch026.htm
58 https://ve.scielo.org/scielo.php?script=sci_arttext&pid=S0002-192X2009000100003
59 https://aprogat.org/estados-agricolas-venezuela/
60 https://openknowledge.fao.org/server/api/core/bitstreams/8cd56fde-1732-4a08-9b94-e9188a72b355/content
61 https://plataforma.mapbiomas.org/coverage/coverage_lclu?t[regionKey]=venezuela&t[ids][]=24-1-1&t[divisionCategoryId]=4&tl[id]=1&tl[themeKey]=coverage&tl[subthemeKey]=coverage_lclu&tl[pixelValues][]=14&tl[legendKey]=default&tl[year]=2024

Technical Description by Soil Order:

Vertisols, characterized by their high fertility and water retention capacity, are less common but essential for cultivating certain grains—especially rice—and are concentrated in large areas of Guárico state, as well as Falcón, Yaracuy, Lara, Barinas, Portuguesa, and Anzoátegui. Ultisols, clayey and acidic soils (low pH) with low fertility, cover large areas of the country, especially in Apure, Guárico, Anzoátegui, Monagas, Zulia, and Cojedes. Aridisols, predominant in arid and semi-arid zones, are distributed in Lara, Zulia, and Falcón, although their abundance is moderate. Alfisols, with a layer of clay accumulation in the subsoil, are fertile and are found in various regions of the country. Mollisols, the most productive agricultural soils in the world, with a surface layer rich in organic matter and high fertility, are specifically located in the states of Aragua and Carabobo, around Lake Valencia, and are the least numerous in the country[62]. Oxisols, they possess the most advanced horizon development of the intertropical regions. These are highly developed soils but of low natural fertility. Its main components (quartz and kaolinite) are resistant to weathering, and they are found mainly in Bolívar and Amazonas[63]. Histosols are coarse soils rich in organic matter but difficult to cultivate, requiring special fertilization. In Venezuela, they are found in deltaic and wetland areas, with low agricultural activity, so their relevance to this study is secondary.

Soils with poor drainage—including the Acuic suborders of Vertisols, Inceptisols, Entisols, Ultisols, and Alfisols—cover approximately 20% of Venezuelan territory, equivalent to 18.2 million hectares. These areas are predominantly used for extensive livestock grazing, rice cultivation, and as protected flora and fauna reserves. The main areas with poorly drained soils are: continental deltaic plains, the Apure plains, the Orinoco Delta, the southern shore of Lake Maracaibo, and Caribbean coastal zones[64].

C. Soil Evaluation and Agronomic Management

Fertility and amendments:

The disparity in fertility between soil types in Venezuela determines agronomic strategies that differ by region:

- **Ultisols (Cojedes, Guárico, Apure, Barinas):** Old tropical soils (Oxisols and Ultisols) are naturally acidic. Soil acidity interferes with the availability of essential plant nutrients and affects microbial activity. In acidic soils, phosphorus, calcium, magnesium, and potassium are often less available. Liming—the application of lime or alkaline materials—is the most effective practice for neutralizing this acidity[65].

- **Mollisols (Aragua, Carabobo):** Mollisols are soils with well-developed horizons. Their surface layer (A horizon) is deep and has a high concentration of organic matter and nutrients, giving them high natural fertility and making them some of the most productive agricultural soils in the world. This high level of available organic matter significantly reduces dependence on

[62] https://www.lifeder.com/tipos-suelos-venezuela/#google_vignette
[63] https://aprendiendopedologia.wordpress.com/tag/oxisoles/
[64] https://ve.scielo.org/scielo.php?script=sci_arttext&pid=S0002-192X2009000100003
[65] https://infoagronomo.net/encalado-de-suelos-acidos/#google_vignette

synthetic chemical fertilizers, giving producers in Aragua and Carabobo a competitive advantage over producers in less fertile soils[66].

Geographic risk zoning:

a) High erosion zones — Andean Region (Mérida / Táchira): Soils with severe erosion problems, which were previously concentrated in the high Andean regions, are now located in the lower parts of the mountain range, especially in the basins of the Chama, Motatán, Uribante, Santo Domingo, Masparro, Boconó, Guanare and Acarigua rivers, and in the central-western region[67]. The intrazonal soils of Venezuela, due to their susceptibility to erosion, are poorly suited for agriculture and require specific protection systems. In Venezuela, these soils are located in the mountainous areas of the Andes and the state of Falcón, constituting a low-productivity natural environment where water is often the main limiting factor[68].

b) Areas of poor drainage — Plains of Guárico and Apure: Areas with poor drainage are located mainly in the south of Lake Maracaibo and in the low-lying floodplains of the states of Barinas, Portuguesa, Cojedes, Guárico and Apure[69].

Long-Term Sustainability: Compaction in Alfisols of Portuguesa

Soil compaction is one of the most common physical degradation processes in highly productive agricultural lands and a major cause of reduced productivity. A scientific study conducted in Venezuela evaluated the susceptibility to compaction in four soil series under agricultural use: Valle Lindo and Valle de Quíbor (Lara), Turén (Portuguesa), and El Patillal (Falcón). The standard Proctor methodology was used to estimate the degree of soil susceptibility to compaction and the moisture contents at which the greatest risks are present[70].

According to the FAO Country Profile of Venezuela, soil compaction problems are occurring in the flat, low-lying, non-floodable areas of the western high plains as a result of incorporating these lands into agricultural development. The use of machinery with power unsuitable for the type of soil —especially in clayey alfisols of Portuguesa— can cause serious damage to the profile structure, with significant losses in productivity[71].

Limitations and global potential

According to the results of the scientific analysis "Desirable Agriculture, a prospect for the year 2000", only approximately 2% of Venezuela's land area has soils suitable for good quality agriculture. Most of the land is restricted for agricultural use by relief (44%), low natural fertility (32%), drainage problems (18%) and aridity (4%)[72].

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[66] https://aprendiendopedologia.wordpress.com/2011/04/07/tipos-de-suelo-en-venezuela/
[67] https://openknowledge.fao.org/server/api/core/bitstreams/8cd56fde-1732-4a08-9b94-e9188a72b355/content
[68] https://edafologiaucvenezuela.blogspot.com/2019/
[69] https://ve.scielo.org/scielo.php?script=sci_arttext&pid=S0378-18442002001200002
[70] https://ve.scielo.org/scielo.php?script=sci_arttext&pid=S1316-33612010000100004
[71] https://openknowledge.fao.org/server/api/core/bitstreams/8cd56fde-1732-4a08-9b94-e9188a72b355/content
[72] http://www.sian.inia.gob.ve/revistas_ci/Agronomia%20Tropical/at2802/arti/comerma_j.htm

D. Technological Insertion in India

The technological gap in Venezuelan agriculture creates a latent demand that current suppliers are not meeting. Leaders of Fedeagro have acknowledged that in competing countries, tractors operate with GPS, weeds are eliminated with computer-monitored laser equipment, and fumigation is carried out with drones, while Venezuela subsists with obsolete equipment and lacks access to these technologies[73]. In that sense, Indian companies have proven expertise – which gives them a competitive advantage – in three directly applicable segments:

- Soil analysis and sensor technology: Indian companies and startups specializing in IoT sensors for monitoring soil moisture, electrical conductivity, and temperature, applicable to the Alfisols of Portuguesa and Vertisols of Guárico[74].
- Agricultural drones: The Indian market for agricultural drones has grown exponentially, with companies like ideaForge and Throttle Aerospace Systems offering direct applications in spraying, soil mapping, and crop monitoring[75].
- Advanced irrigation systems: India is one of the world's leading producers of advanced irrigation systems. Companies like Jain Irrigation Systems are among the global leaders in fertigation and drip irrigation, technologies that are especially in demand in the arid and semi-arid regions of northern Zulia and Falcón[76].

Machinery to be used

Based on the above, it is understood that operational efficiency in Venezuelan agriculture depends on the correct correlation between tractor power, the type of tillage implemented, and the soil's mechanical resistance. This is important because inappropriate mechanization is associated with undesirable results, including soil erosion and compaction, with the consequent decrease in fertility, caused by the use of heavy machinery with repeated passes over the field[77].

AGRICULTURAL SECTOR 2026
Agricultural Mechanization Diagram
Decision Tree · Power-Implement-Soil Correlation

FUNDAMENTAL CONCEPTS DIAGRAM
Base Correlation for Operational Efficiency

[73] https://www.bancaynegocios.com/exclusivo-95-de-los-tractores-acabo-su-vida-util-y-la-maquinaria-agropecuaria-tiene-20-anos-obsoleta/
[74] https://sustainability17.com/how-precision-agriculture-is-revolutionizing-indian-farming-technologies-workflow-benefits-case-studies/
[75] https://pmc.ncbi.nlm.nih.gov/articles/PMC12349003/
[76] https://es.rivulis.com/rivulis-y-jain-irrigations-international-irrigation-business-se-fusionan/
[77] https://eos.com/es/blog/maquinaria-agricola/

INPUT 1	+	INPUT 2	+	INPUT 3	->	RESULT
Tractor Power HP / kW available		**Implement Type** Tillage / Planting		**Soil Resistance** Texture / Moisture		**OPERATIONAL EFFICIENCY** Maximum productivity

Correct Correlation	Inappropriate mechanization	Compacted soil
Preserves soil structure, maximizes fertility, and reduces operational costs per hectare.	Generates compaction, erosion, and loss of fertility due to repeated passes with heavy machinery.	Increases mechanical resistance, limits rooting, and reduces water infiltration.

DECISION TREE · POWER-IMPLEMENT-SOIL CORRELATION BY REGION

Selection of machinery according to edaphic region and soil type

REGION / SOIL	REGION / SOIL	REGION / SOIL	REGION / SOIL	REGION / SOIL
Llanos Centrales Vertisols · Expansive	**HEAVY**	Severe compaction due to expansive clays 2:1; seasonal cracking	Rigid shank ripper 5 shank + Heavy disc plow (9-11 discs)	**160–220 HP**
Cojedes / Guarico Ultisols · Acidic	**HEAVY**	High acidity + hardened layer (fragipan); low natural fertility	Chisel ripper + Double-action disc harrows	**130–180 HP**
Portuguesa / Zulia Light Soils · Cereals	**HEAVY**	Wind and water erosion due to intensive tillage in medium-textured soils	Direct coarse grain planter + Chisel plow (conservation tillage)	**120–160 HP**
Aragua / Carabobo Mollisols · Sugarcane	**MEDIUM**	Surface compaction by wet harvesters; loss of organic matter	Low-weight sugarcane harvester + 3-shank subsoiler	**100–140 HP**
Sur del Lago Entisols / Inceptisols	**MEDIUM**	Poor drainage + seasonal water saturation; risk of waterlogging	Agricultural trencher + Laser leveler + Tracked tractor (flotation)	**100–130 HP**

Lara / Falcon Aridisols · Semiarid	**LIGHT**	Advanced desertification + surface crusting; water scarcity	Conservation cultivator + Integrated drip irrigation system	**50–80 HP**
Andes Slope Inceptisols	**LIGHT**	High slope (\>15%) + sheet erosion; slope instability in tillage	Hillside micro-tractor + Rotary hoe / Improved animal-drawn cultivator	**25–50 HP**

SPECIAL NODE · MOTORIZATION ALTERNATIVES

TECHNOLOGICAL INNOVATION AND MOTORIZATION OPTIONS 2026 Special Node · Solutions for high operational restriction contexts			
Dual Diesel-Electric Engines **Llanos · Portuguesa** Hybrid systems that combine high-torque diesel engines with electric assistance to reduce consumption by up to 30% in deep tillage. 140-180 HP equiv. · Vertisols / Ultisols · -30% fuel	**Agrovoltaic Solar Pumping** **Lara · Falcón · Andes** Photovoltaic systems for irrigation in arid and semi-arid zones, eliminating dependence on fossil fuels in remote areas. 3-15 kWp panels · Aridisols · ROI < 3 years	**Tracked Traction** **South of the Lake · Andes** Rubber track tractors for saturated soils and slopes with a gradient of >20%, minimizing ground pressure (<0.6 kg/cm2). 60-120 HP · <0.6 kg/cm2 pressure · Inceptisols / Entisols	**Precision Agriculture** **All regions** GNSS systems and soil resistance sensors (digital penetrometer) to adjust the working depth in real-time. GPS RTK ±2 cm · IoT Sensors · -25% machinery passes

Source: Own elaboration. Edaphological correlations based on the FAO/USDA soil classification for the productive regions of Venezuela. HP indicated as guiding values according to average humidity conditions. Motorization alternatives incorporate technological trends from the global agricultural market 2025–2026.

In the plains states like Guárico and Barinas, where heavy clay soils (Vertisols) predominate, the required machinery must have high traction capacity. The use of tractors with power exceeding 120 HP, equipped with moldboard plows or large-diameter disc plows, is recommended[78]. In these soils, the moldboard plow is especially effective. Its use facilitates the incorporation of plant remains and improves aeration, as it is able to turn over a greater amount of soil. For this type of soil, it is essential to avoid the use of heavy wheeled machinery if the ground is wet[79].

[78] https://rockzoneamericas.com/posts/how-to-excavate-clay-soil-helpful-tips-for-tough-jobs#:~:text=Cuando%20las%20herramientas%20manuales%20b%C3%A1sicas,en%20los%20terrenos%20m%C3%A1s%20dif%C3%ADciles.

[79] https://blog.equipzilla.com/como-elegir-la-maquinaria-adecuada-para-tu-obra-segun-el-tipo-de-terreno/

To address the deep compaction characteristic of the Ultisols of Cojedes and Guárico, it is essential to use subsoilers or chisel plows. This work must be carried out with dry soil, allowing the hardened layers to break up to allow the passage of roots and water, without altering the soil profile.Also, understanding that Ultisols are naturally acidic and low in bases (Ca, Mg, K), the use of lime spreaders is recommended to distribute the lime evenly and thus neutralize the soil pH. In turn, the application of fertilizer spreaders is preferred for the use of fertilizers and organic matter that will help maintain productivity. It is important to highlight that, to ensure effective decompaction, the use of subsoilers with high power is recommended, requiring a minimum of 25 to 30 HP per tiller[80].

In the Portuguesa and Zulia regions, shallower tillage focused on soil conservation is recommended. For ideal preparation of cereals such as corn and sorghum, rotavators (rotary tillers) are very effective, as they break up and mix the soil optimally.all at once. In this segment, the norm is medium-sized tractors (80 to 110 HP), as they achieve an ideal balance between productivity and operating cost. On the other hand, in sandy or loose loam (marl) soils, the use of lighter tractors is recommended. This helps prevent sinking and excessive compaction of the topsoil layer[81].

In the states of Aragua and Carabobo, where Mollisols predominate—the country's most naturally fertile soils due to their high concentration of organic matter—the required machinery is primarily geared towards mechanized harvesting and seedbed preparation. The predominant crop is sugarcane, for which specialized harvesters are used to chop the stalks and continuously deposit them into a trailer. The sugarcane harvester chops and deposits the cane into a trailer truck, and when this one is full, another is immediately placed in its place without interrupting the work, given that the Mollisols in this region are soils with good structure but susceptible to compaction from mechanization cycles. For continuous operation, it is recommended to alternate implements and monitor tire pressure, prioritizing medium-power tractors[82]. In turn, sugarcane production in Carabobo and Aragua depends critically on the availability of operational machinery: for theharvestIn 2024-2025, the state of Carabobo estimated to mobilize approximately 140,000[83] tons of sugarcane, with tractors that the producers themselves acknowledge as obsolete and that should be replaced, although they lack the financial resources to do so[84]. Therefore, the need to adopt technology (which could be foreign) will be crucial to achieving the growth potential.

[80] https://content.ces.ncsu.edu/managing-agricultural-machinery-to-limit-soil-compaction-in-north-carolina#:~:text=Los%20ultisoles%20presentan%20una%20baja,frecuencia%20en%20la%20llanura%20costera.
[81] https://insights.made-in-china.com/es/How-to-Choose-The-Right-Tillage-Machine-According-to-Soil-Type_QTAtlGMvWnIE.html
[82] https://www.scielo.org.mx/scielo.php?pid=S0187-57792012000100001&script=sci_arttext and https://commercial.bridgestone.com/es-us/resource-center/articles/how-can-you-reduce-soil-compaction#
[83] https://noticiasvenevision.com/noticias/economia/inicia-la-zafra-de-cana-de-azucar-en-el-estado-carabobo
[84] https://cronica.uno/fedeagro-produccion-agricola-requiere-mas-de-1000-millones-para-su-recuperacion/

OPERATIONAL EFFICIENCY
Power correlation · Implement · Soil

■ Heavy mechanization (Plains / Ultisols)	■ Medium mechanization (cereals / cane)	■ Light mechanization (Andes / arid / wetland)

Heavy and medium mechanization zones

Llanos Vertisols	**Cojedes / Guárico** Ultisols	**Portuguesa / Zulia** Light soils · cereals	**Aragua / Carabobo** Mollisols · sugarcane
Compaction Critical problem	**Acidity / Aluminum toxicity** Critical problem	**Poor drainage** Critical Problem	**Cyclic compaction** Critical Problem
Subsoiler Recommended implement	**Chisel plow** + previous whitewash	**Direct seeder** + axial harvester	**Sugarcane harvester** Continuous download
180 – 240 HP Crawler tractors	**130 – 180 HP** 4WD Traction	**100 – 140 HP** Standard traction	**120 – 160 HP** Low-pressure tires

Light Mechanization Zones

South of the Lake Entisols · Inceptisols	**Lara / Falcón** Aridisols	**Andes** Inceptisoles de ladera
Flooding / waterlogging Critical problem	**Water / wind erosion** Critical problem	**Pending / erosion** Critical problem
Amphibious harvester Floating platform	**Micro-irrigation** + minimum tillage	**Tiller / motor mower** Terraces + strips
80 – 120 HP Wide tracks / tires	**50 – 80 HP** Compact tractors	**15 – 50 HP** Articulated Teams

MOTORIZATION ALTERNATIVES Technological innovation for the Venezuelan context		
Dual diesel / CNG engine Reduce fuel cost · Take advantage of domestic gas	**Solar photovoltaic pumping** Irrigation in arid areas · Without electric grid	**Tracked traction** Lower ground pressure · Plains and South of the Lake

Source: Own elaboration, 2026. Based on cross-referenced data from specialized sources in the area.

In the southern part of Lake Maracaibo (Zulia state), where the soils are Entisols and Inceptisols with poor drainage, the dominant crop is plantain, followed by cassava, oil palm, and cacao. Agricultural cooperatives in the southern subregion of Lake Maracaibo report that plantains account for 76% of associated producers and 51.5% of the total hectares under cultivation, followed by oil palm with 45.2% of the cultivated area, at least based on scientific studies from a decade ago[85]. The semi-permanent nature of these crops—unlike short-cycle cereals—requires different machinery: priority is given to maintaining internal farm roads (paths between plots), transporting bunches of grapes, and controlling drainage. Medium-horsepower tractors with ditch maintenance implements and leveling harrows are the most suitable for this context, avoiding the use of heavy equipment on wet soils that exacerbate existing waterlogging problems[86].

The fuel dependence of this machinery is also a critical factor in the region: 90% of the machinery in the south of Lake Maracaibo was paralyzed due to a lack of diesel, directly affecting the harvest of plantains, corn, cassava, and rice[87]. This precedent underscores the relevance of evaluating motorization alternatives with less dependence on fossil fuels, such as dual-fuel tractors or solar pumping systems for drainage work; motorization alternatives that can be covered by India.

In Lara state and the arid region of Falcón, where Aridisols predominate, the main requirement is not for tillage but for water infrastructure. However, for soil preparation prior to planting vegetables, onions, and fruit trees under irrigation, light to medium-sized tractors equipped with disc harrows are recommended to break up the surface crust characteristic of these dry soils, along with precision seeders adapted for row planting with localized irrigation[88].

On the other hand, agriculture in the states of Mérida and Táchira requires a fundamentally different approach. In these areas, the use of heavy machinery is not feasible, either technically or economically, due to the steep slopes characteristic of the Andean inceptisols. In this region, demand is concentrated on 6.6 HP to 12 HP tillers and gasoline-powered cultivators. These machines are ideal for tilling on slopes and in small spaces. Furthermore, they offer the advantage of being compatible with various accessories, such as small moldboard plows and furrowers, thus facilitating the planting of vegetables and potatoes. Another application that has generated interest is track traction in mini-tractors. This solution is considered ideal for transporting materials on difficult terrain, where standard tires fail to maintain adequate traction.

[85] https://www.redalyc.org/pdf/622/62242950004.pdf
[86] https://fedepalma.org/wp-content/uploads/2013/11/pdfwebguiabuenaspracticasagricolas.pdf
[87] https://talcualdigital.com/mas-del-70-de-la-produccion-de-platano-en-el-zulia-peligra-por-falta-de-gasoil/
[88] https://svmachineryindia.com/es/best-tractors-for-small-and-medium-farms-in-latin-america/

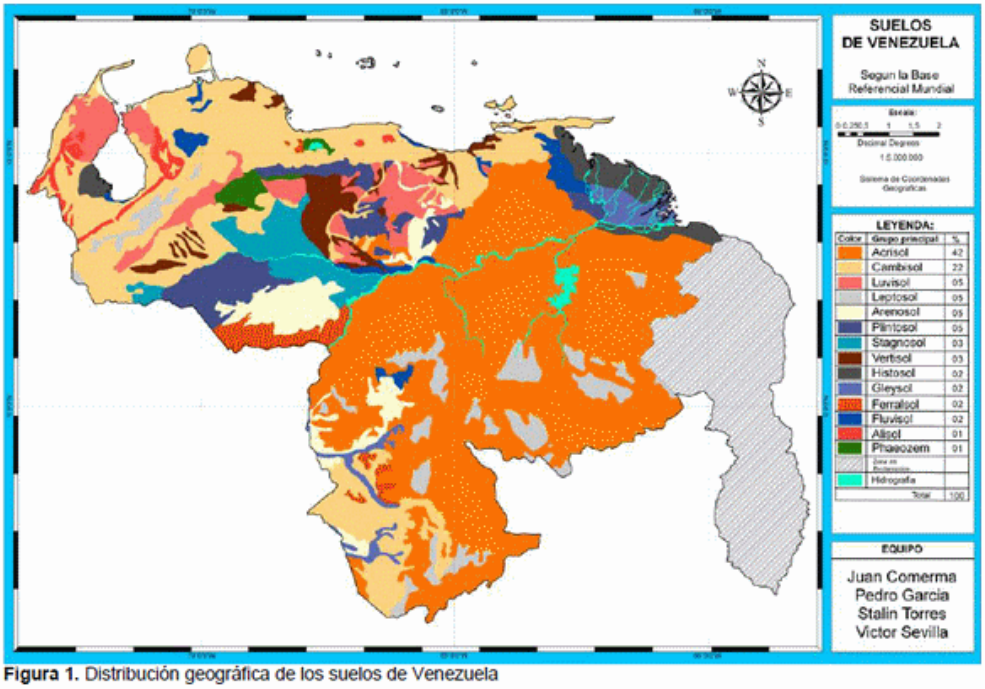

Figura 1. Distribución geográfica de los suelos de Venezuela

Source: Comerma, García and Torres (2013)[89].

RESILIENCE AND NEW TECHNOLOGIES MATRIX

Traditional Mechanization vs. Adaptive / Sustainable Mechanization

Agricultural Sector Venezuela · Closing of technical proposal

■ Traditional/high-power mechanization ■ Adaptive/sustainable mechanization ■ Limitation/Risk ■ Technological innovation

DIMENSION	⚙ TRADITIONAL MECHANIZATION Conventional focus · High power	🌱 ADAPTIVE MECHANIZATION Sustainable approach · Appropriate technology
Areas of application	▸ Llanos · Cojedes · Guárico ▸ Portuguesa · Zulia ▸ Large flat extensions ▸ Vertisols and Ultisols	▸ South of the Lake · Lara · Falcón ▸ Andes (Mérida · Táchira) ▸ Hillside, arid, wetland ▸ Inceptisols · Aridisols · Entisols
Machinery principal	▸ Tractors 130 – 240 HP ▸ Subsoilers · Chisel plows ▸ Axial harvesters ▸ Precision seed drills	▸ Power tillers 6.6 – 12 HP ▸ Mini-crawlers ▸ Amphibious harvesters ▸ Assisted manual seeders
Source of energy	▸ Imported Diesel ▸ High foreign currency dependence ▸ Consumption: 15 – 25 L/h ▸ High operating cost	▸ Diesel / CNG (dual fuel engine) ▸ Solar photovoltaic energy ▸ Gasoline (power tillers) ▸ Consumption: 1 – 5 L/h

[89] https://www.engormix.com/agricultura/miscellaneous/los-suelos-venezuela-segun_a31198/

Problem critical addressed	▸ Deep compaction ▸ Acidity / toxic aluminum ▸ Poor drainage ▸ Continuous sugarcane harvesting	▸ Extreme slope > 30% ▸ Seasonal flooding ▸ Water and wind erosion ▸ Road isolation on the hillside
Innovation technology	▸ GPS and autopilot ▸ Humidity sensors ▸ Dosing systems ▸ Fleet telemetry	▸ Crawler traction (mini) ▸ Solar pumping · smart irrigation ▸ Modular accessories ▸ Drones for monitoring
Risk / limitation	▸ Obsolescence of the fleet ▸ Lack of spare parts ▸ High indebtedness ▸ Dependence on imports	▸ Slow adoption curve ▸ Rural technical training ▸ Solar initial investment ▸ Specialized maintenance
Viability economic	▸ Profitable > 100 ha ▸ Requires external credit ▸ ROI: 3 – 5 years ▸ High scale required	▸ Profitable from 1 – 5 ha ▸ Microcredit / cooperatives ▸ ROI: 1 – 2 years (solar) ▸ Low scale, high coverage
Policy / legal framework	▸ Importation of heavy machinery ▸ CADIVI / SENIAT · foreign currency ▸ State agricultural credit ▸ Large agricult	▸ Single Window (SAREN) ▸ Renewable energy incentives ▸ Anti-Blockade Law (supplies) ▸ Cooperatives and small prod.

INNOVATION NODE · MOTORIZATION ALTERNATIVES

Cross-cutting technologies for the resilience of the Venezuelan agricultural sector

Dual diesel / CNG engine	**Solar photovoltaic pumping**	**Tracked traction (mini)**
◆ Adapts existing tractors ◆ Leverages national gas network ◆ Reduces cost/ha by up to 40% ◆ Applicable: Llanos · Portuguesa	◆ Standalone irrigation without an electrical grid ◆ Ideal: Lara · Falcón · Andes ◆ Can be financed with a microloan ◆ Estimated ROI: 18 – 24 months	◆ Mini-tractors 15 – 50 HP ◆ Mérida · Táchira · South of the Lake ◆ Ground pressure < 0.3 kg/cm² ◆ Compatible with standard accessories

STRATEGIC CONCLUSION

The transition towards an adaptive mechanization model does not replace conventional mechanization: it complements it. The flat, high-production areas (Llanos, Portuguesa, Zulia) will continue to require high-power equipment, but the competitiveness of the sector as a whole will depend on the capacity to integrate low-cost, high-resilience, and territory-appropriate solutions in hillside, arid, and wetland regions. The combination of dual engines, solar pumping, and track traction represents the most viable technological roadmap for the current Venezuelan context.

Source: Own elaboration, 2026.

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PART IV
COMPLEMENTARY INDUSTRIES

PART IV
COMPLEMENTARY INDUSTRIES

Structural gap between the supply and demand of agrochemicals

Agricultural production is directly linked to the access and efficiency of agrochemicals in the market. In Venezuela, the agrochemical market in 2025 presented a duality in its trade balance. On the one hand, there were deficits in the import of complex inputs—necessary for essential crops such as cereals, rice, sugar, oils and fats—; but, on the other hand, surpluses were observed in basic raw materials. Despite this mixed picture, it is estimated that the sector contributed to agricultural GDP growth of between 5% and 6%[90].

In terms of imports, there is an external dependence to cover the gaps in domestic production with respect to fertilizers, being Colombia is the main strategic supplier with $20.1 million in 2024, followed by markets such as Spain and the United States; however, in contrast to imports, exports of nitrogen fertilizers were significant, which have been directed mostly to Brazil, reaching 212 million dollars[91]. In line with new trends in regenerative agriculture, the country must import specialty products such as biofertilizers and biostimulants, supplied by companies from Russia, China, and Brazil. Regarding the latter, domestic demand is segmented according to the planting cycles of the main crops in the western and central axis. This demand is concentrated on nitrogen fertilizers (urea), phosphates and potassium, elements considered critical and irreplaceable for the development of short cycle crops, such as corn and rice in the plain's region. This highlights the input shortage, showing that although the country exports a large quantity of products, it needs to import specialized agrochemicals to maintain land productivity.

Understanding that the approximate annual production figures are 300,000 tons of ammonia and between 0.8 and 1 million tons of urea (with an installed production capacity of almost 3 million tons per year)[92]. Preliminarily, the demand for this fertilizer, estimated to be between 330,000 and 350,000 metric tons per year (according to Asociación Venezolana de la Industria Química y Petroquímica or ASOQUIM), is being met, as is the demand for ammonia, which is not significant[93]. In this regard, while the demand for base fertilizers for crops like rice and corn is theoretically met, the structural dependence on complex formulations such as herbicides, fungicides, and generic phosphates, which must be imported, remains. India has production facilities that are international benchmarks for complex fertilizers (DAP, NPK, NP/NPK, P&K, among others), due to its domestic demand and historical experience in the sector. Therefore, the surplus production of these fertilizers could be adopted by the Venezuelan agribusiness sector, potentially displacing Colombia, Venezuela's current main exporter of complex fertilizers, due to cost efficiency and economies of scale. However, logistical costs must be considered to determine its viability.

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[90] https://www.bancaynegocios.com/exclusivo-pib-agricola-termina-2025-con-crecimiento-de-entre-5-y-6-porciento-pero-2026-luce-incierto/
[91] https://oec.world/es/profile/bilateral-product/fertilizers/reporter/ven
[92] https://www.bancaynegocios.com/argus-venezuela-apunta-a-reactivar-exportaciones-de-urea/
[93] https://www.notiprimicia.com/asoquim-produccion-de-fertilizantes-en-venezuela-depende-del-suministro-de-gas-mas-que-de-las-licencias-la-ofac/ and https://bitacoraeconomica.com/produccion-de-fertilizantes-en-venezuela-depende-del-suministro-de-gas-mas-que-de-las-licencias/

AGROCHEMICAL POWER BALANCE · VENEZUELA 2025

Structural deficit in complex formulations vs. surplus in nitrogenous compounds · India Opportunity

$212 M	$20.1 M	3 M ton	0.8–1 M
Nitrogen exports · destination Brazil	Imports from Colombia (2024)	Installed urea capacity (potential)	Actual urea production (active gap)

COMMERCIAL FLOW DIAGRAM · SANKEY SCHEME

IMPORTS
Complex formulations · deficit

Colombia: $20.1 M · NPK · DAP · phosphates
Spain: Biostimulants · fungicides
U.S.A.: Specialized agrochemicals
China: Generic herbicides · urea
Russia / Brazil: Biofertilizers · biostimulants

→

VENEZUELA
Agrochemical Transformation Node

INTERNAL PRODUCTION
- ◆ Ammonia: ~300,000 ton/year
- ◆ Urea: 0.8 – 1 M ton (actual prod.)
- ◆ Installed Cap.: ~3 M ton/year
- ◆ Domestic Urea Demand: 330–350 K ton

⚠CRITICAL GAP
- ‣ Herbicides · fungicides: import dependence
- ‣ Complex NPK: no local production
- ‣ Generic phosphates: structural deficit

→

EXPORTS
Nitrogenous · surplus

Brazil (main destination)
$212 million · urea and ammonia

Other regional markets
Basic nitrogenous fertilizers

SECTOR GROWTH
Agricultural GDP: +5% to +6% (2025)

GAP ANALYSIS · CAPACITY VS. ACTUAL PRODUCTION

CAPACITY GAP · UREA PRODUCTION
Installed capacity ~3,000,000 tons vs. actual production 0.8–1,000,000 tons · Domestic demand: 330–350 K tons

Installed capacity ~3 000 000 tons/year	**3 000 000 ton**
Actual production 0.8 – 1 M ton/year	**~900 000 ton**
Internal demand 330 – 350 K tons/year	**~340 000 ton**

STRATEGIC OPPORTUNITY · INDIA'S ROLE Displacement of Colombia as the main supplier of complex formulations · NPK · DAP		
CURRENT DEFICIT Colombia as a dominant supplier	**INDIA ADVANTAGE** World benchmark in complex fertilizers	**POTENTIAL DISPLACEMENT** Cost efficiency + productive scale
▸ Complex NPK: 100% imported ▸ DAP (diammonium phosphate): critical deficit ▸ Colombia Cost: high vs. Asian scale ▸ Regional logistics dependency ▸ Lack of supplier diversification	◆ DAP, NPK, NP/NPK, P&K: own plant ◆ Economies of scale due to internal demand ◆ Historical experience in the sector ◆ Exportable surplus to emerging markets ◆ Competitive costs vs. Colombia ◆ Indian Embassy active in Caracas	✓ Replace $20.1M. annually from Colombia ✓ NPK and DAP at lower CIF cost Venezuela ✓ Diversification of strategic suppliers ✓ Bilateral alliance India–Venezuela ✓ Key variable: maritime logistics feasibility ✓ Potential savings: 15–30% per ton

Source: Own elaboration, 2026.

For effective consideration, the majority of agricultural production must be taken into account actual, and therefore, the demand for fertilizers aligns with the main planting cycles in key regions. Regarding the states of Portuguesa and Guárico, they remain leaders in the production of white and yellow corn, with record plantings planned for 2025—347,000 hectares between both types of corn[94]— which corresponds to the main cycle between the start in May and the harvest in November. On the other hand, with regard to rice, with Portuguesa and Guárico as the central axis of production, the country reached production on approximately 140,000 hectares in 2025, aspiring to a yield of 683,000 tons—which would cover 76% of national demand[95]—, with the crucial cycle for yield, with sowing taking place in November/December and the corresponding harvest in the first quarter of the following year.

Therefore, when we understand that Venezuela's potential for producing simple agrochemicals could not only be sufficient but that it is also capable of exporting its surplus production (especially urea), the opportunity for Indian investors lies both in reactivating the industry's capacity and in supplying the shortage of complex fertilizers. Furthermore, given the seasonally high demand for fertilizers and agrochemicals, Indian producers could fill the gaps in the Venezuelan agrochemical and fertilizer industry during these periods with generic fertilizers, addressing the shortages experienced by the domestic industry.

94 https://www.saren.gob.ve/plan-de-siembra-de-maiz-y-de-arroz-2025-logra-una-superficie-de-mas-de-347-mil-hectareas-sembradas/#:~:text=Inicio-,Plan%20de%20Siembra%20de%20ma%C3%ADz%20y%20de%20arroz%202025:%20Logra,de%20347%20mil%20hect%C3%A1reas%20sembradas&text=El%20ministro%20del%20Poder%20Popular,sembradas%20en%20la%20Agropecuaria%20Chaguarama

95 https://albertonews.com/nacionales/sector-privado-espera-producir-683-mil-toneladas-de-arroz-y-cubrir-la-mayor-parte-de-la-demanda-nacional/

Investment in fixed capital and irrigation infrastructure

The modernization of Venezuelan agriculture necessarily involves the rehabilitation of its water infrastructure. With 50 million hectares suitable for agriculture, the country possesses sufficient freshwater resources to triple its current production if efficient irrigation and drainage systems are developed. Between 2019 and 2022, the irrigation systems market grew by 44%, reflecting accumulated private investment in replacing equipment that had reached the end of its useful life[96]. However, large-scale systems, such as the Río Guárico system, exhibit suboptimal efficiencies. Despite its considerable storage capacity of 1.84 billion m³, the system experiences recurring failures, mainly due to excessive water consumption per hectare and insufficient maintenance of secondary canals[97]. Therefore, the investment opportunity in this sector is concentrated in:

- **Precision irrigation technologies**: the transition from flood irrigation to drip and micro-sprinkler irrigation, especially in fruit trees and vegetables, to optimize water and energy consumption.
- **Central midfielder renewal:** Although there are approximately 300 sprinkler pivots in the country, most of them with more than two decades of operation, they require technological replacement with low-pressure models and greater energy efficiency.
- **Digital water management:**Implementation of smart sensors and data-driven agriculture to schedule irrigation shifts based on actual soil moisture and weather forecasts.

WATER MODERNIZATION ROADMAP · VENEZUELA

Technological transition in irrigation infrastructure

KEY FACT: 50 M suitable ha · Potential to TRIPLE production with efficient water management

50 M ha Suitable area for agriculture	**3×** Potential for increase in production	**+44%** Irrigation Market Growth 2019–2022	**~300** Existing pivots (>20 years of use)	**1.84 Mm³** Guárico River Capacity (underutilized)

[96] https://www.iagua.es/noticias/icex-espana-exportacion-e-inversiones/mercado-sistemas-riego-crece-44-venezuela
[97] https://www.google.com/url?sa=E&q=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DzHcUi6c-NZk

TECHNOLOGICAL TRANSITION DIAGRAM · IRRIGATION INFRASTRUCTURE

OBSOLETE STATUS Current infrastructure · water inefficiency	TRANSITION ZONE Required Investment · 2025–2028 Opportunity	MODERN STATE Digital agriculture · maximum efficiency
Flood irrigation ▸ Water efficiency: 30–45% ▸ Loss due to runoff and percolation ▸ Excess consumption per hectare ▸ Long-term soil degradation ▸ No dose or schedule control	→ **Canal rehabilitation** ▸ Sealing of secondary channels ▸ Automated gates ▸ Flow measurement by sector ▸ Estimated investment: medium scale ▸ Diagnostic and mapping phase	→ **Drip and micro-sprinkling** ▸ Water efficiency: 85–95% ▸ Integrated fertigation ▸ Ideal: fruit trees and vegetables ▸ Significant energy savings ▸ ROI: 2–4 seasons
Pivots +20 years ▸ ~300 operational units in Venezuela ▸ High operating pressure ▸ High energy consumption ▸ Frequent corrective maintenance ▸ Scarce spare parts	→ **Technological replacement** ▸ India–Venezuela Bilateral Financing ▸ Energy Efficiency Assessment ▸ Hybrid Models (Electric + CNG) ▸ Batch Substitution Plan ▸ Technical Training for Operators	→ **Low-pressure pivots** ▸ Energy consumption -40% ▸ Improved uniform coverage ▸ Compatible with IoT sensors ▸ Useful life: +15 additional years ▸ Integration with digital platform
Empirical irrigation management ▸ Without soil moisture monitoring ▸ Fixed shifts without a climatic base ▸ Decisions based on farmer's experience ▸ Guárico River System: suboptimal efficiency ▸ No traceability of water consumption	→ **Instrumentation and connectivity** ▸ Installation of humidity sensors (IoT) ▸ Field weather stations ▸ Data management platform ▸ Pilot: priority watershed ▸ Alliance with technology providers	→ **Data-driven agriculture** ▸ Irrigation shifts managed by AI and real-time weather data ▸ Early warnings of water stress ▸ Prescription maps by zone ▸ Integration with drones and satellite ▸ Reduction of post-harvest losses

CRITICAL INVESTMENT OPPORTUNITIES Río Guárico System · National Infrastructure · Pivot Modernization · Digital Technology	
GUÁRICO RIVER SYSTEM · CASE STUDY 1,840,000,000 m^3 storage capacity ◆ Recurring failure: excessive consumption per hectare ◆ Insufficient maintenance in secondary channels ◆ Operational efficiency below potential ◆ Investment in rehabilitation = high social return ◆ Anchor project for national demonstration ◆ Possible alliance with Indian technical cooperation	**POTENTIAL TO TRIPLE PRODUCTION** 50 million hectares suitable · available water · accessible technology ✓ 50,000,000 ha with identified agricultural aptitude ✓ Sufficient water resources for expansion ✓ Current gap: inefficiency in water use ✓ Irrigation technology: available and financeable ✓ Irrigation market growth +44% (2019–2022) ✓ Opportunity window: replacement of expired equipment **GOAL: 1× → 3× production with efficient water management**

IMPLEMENTATION SCHEDULE			
PHASE 1 Diagnosis and Prioritization	**PHASE 2** Rehabilitation and Pilot	**PHASE 3** Escalation and Digital	**PHASE 4** Consolidation and 3x
◆ Water infrastructure audit ◆ Mapping of 300 operational pivots ◆ Evaluation of the Guárico River system ◆ Identification of critical basins	◆ Sealing prioritized secondary channels ◆ Drip pilot project: 500 ha fruit/vegetable crops ◆ Installation of IoT humidity sensors ◆ Start of pivot replacement, batch 1	◆ Expansion of micro-sprinkling to cereals ◆ Operative data-driven platform ◆ Low-pressure replacement: 100 pivots ◆ Network of meteorological stations	◆ Guárico River System rehabilitated ◆ 200+ pivots modernized ◆ National digital water management ◆ Goal: triple agricultural production

Source: Own elaboration, 2026.

Investment in machinery and equipment

The Venezuelan agri-food sector is experiencing a recent reactivation, with a notable boost in essential crops such as corn and rice. Despite reporting a growth of 8.6%[98] in the Gross Domestic Product (GDP) for agriculture during 2025, driven by comparative advantages in short-cycle items, this expansion is seriously limited. The main obstacle is structural: the technical obsolescence and technological backwardness of its agricultural support infrastructure significantly restricts the sector's installed capacity. According to Fedeagro, the country's fleet of agricultural machinery and equipment has exceeded its useful life, making a large-scale renewal essential[99]. Although the

[98] https://radiomiraflores.net.ve/sector-agricola-crecio-86-en-2025/
[99] https://www.iagua.es/noticias/icex-espana-exportacion-e-inversiones/mercado-sistemas-riego-crece-44-venezuela

situation arises. This presents a structural challenge to the sector's productivity, while also being seen as an opportunity for foreign direct investment and trade.

Venezuela does not produce its own irrigation systems or heavy machinery in significant quantities, resulting in total dependence on imports. However, the 44% growth surge in the irrigation systems market demonstrates how technological substitution (in this case, the importation of polypropylene pipes and fittings) generates growth. It should be noted that the market for supplies and equipment is dominated by products of Spanish, American, and Chinese origin, which enjoy a strong reputation and market position due to their resistance to Venezuela's tropical climate. As previously mentioned, investment in the agricultural sector, particularly regarding machinery, cannot be approached uniformly; the success of the operation depends on studies of the country's economic geography, as well as soil studies for each state. Therefore, it is recommended that investment focus on two key areas:

1. **Heavy traction on the plains:** In states like Guárico, Barinas and Cojedes, where clayey and heavy soils predominate (vertisols andultisols), the mechanical resistance of the soil requires investment in high-horsepower tractors equipped with moldboard plows or subsoilers. This type of machinery is necessary due to the deep compaction that typically occurs in this soil during the dry season.

2. **Micromechanization in the Andean region:** For the states of Mérida and Táchira, the presence of slopes and young Inceptisols makes the use of heavy machinery technically and financially unfeasible due to the high risk of erosion. For efficiency, the most optimal solution would be the importation and investment in motorized cultivators, tillers, and mini-tractors with tracked traction, which maintain grip on steep slopes.

Regarding investment in the irrigation sector, Venezuela has sufficient freshwater resources to double its current production under a water management investment scheme. This creates opportunities for an agricultural transition based on precision irrigation.

PART V
LEGAL SITUATION AND LOGISTICAL BARRIERS

PART V
LEGAL SITUATION AND LOGISTICAL BARRIERS

The importation of chemical inputs to Venezuela requires strict logistical planning, which must be adjusted to a highly sensitive digital regulatory framework. With the entry into force of the Gaceta Oficial Extraordinaria 6,952, the former Legal Regime 13 (RL13)[100] has been replaced by the "Sanitary Registration Certificate", the processing of which is mandatory through Comité de Comercio Exterior (COMEX, reactivated in 2025 under Decree No. 5,105). This certification is essential for the importation of fertilizers, herbicides, and chemical precursors, since it allows for its rapid nationalization through automated controls.

It is crucial to understand that without the validation of this certificate (the RL13), the nationalization of the merchandise is blocked, which immediately generates significant expenses for delay and storage. Furthermore, any discrepancy or documentary error between the customs declaration and the current records leads to the instant blocking of the cargo in port. Given port security regulations, these errors result in considerably higher costs. A delay of just a few days can be enough to completely eliminate the profit margin of an entire import operation. Furthermore, the product's effectiveness is at risk: the stagnation of cargo in port, due to likely adverse weather conditions, can degrade the active ingredients of herbicides and fungicides.

The export process begins with the mandatory registration of the company in the COMEX system, which requires a legal representative in Venezuela and the subsequent creation of a "Company" type account within the system; in the specific case of agrochemicals, it is also mandatory to associate a registered Sponsoring Pharmacist for sanitary control reasons. The company must upload legible documents in PDF format to the system, including the apostilled Certificates of Free Sale (CFS), Safety Data Sheets, and analysis protocols from laboratories located in India.Once validated, it generates an order for the physical delivery of samples for analysis at the Instituto Nacional de Higiene "Rafael Rangel" and thus issue a “certificate of health registration”.

FLOWCHART · IMPORT PROCESS TO VENEZUELA

Agricultural inputs and agrochemicals · COMEX regulatory framework · Official Gazette 6.952 · Estimated time: 45–90 days

45–90 days Total processing time	**7 steps** Sequential obligatory stages	**RL13 → CSR** New COMEX Health Certificate	**⚠ 2 risks** Port blockage · Adm. silence	**Decree 5.105** COMEX reactivated 2025

[100] https://inseroca.com/importacion-de-agroquimicos/

FLOWCHART · STEP-BY-STEP PROCESS

STEP 1
Registration in COMEX

- Decree No. 5.105 · reactivated 2025
- Create an "Company" type account
- Requires legal representative in Venezuela
- COMEX system digital platform

STEP 2
Sponsoring Pharmaceutical Link

- Mandatory for agrochemicals
- Pharmaceutical registered with MPPS
- Sanitary person responsible for the import
- Signs registration documents

STEP 3
Document Upload to the System

- Apostilled CFS (Certificates of Free Sale)
- Safety Data Sheets (SDS)
- India laboratory analysis protocols
- Legible PDF files

STEP 4
COMEX Validation + Sample Order

- Review by health authority
- Generates physical sample delivery order
- Directions to the Rafael Rangel Institute (INHRR)
- Without validation: process blocked

STEP 5
Analysis at Rafael Rangel Institute

- Physical delivery of samples to INHRR
- Analysis of active ingredients
- Verification of safety and composition
- Variable time depending on institutional workload

STEP 6
Issuance of Sanitary Certificate (CSR)

- Replaces the old RL13
- Official Gazette Extraordinary 6.952
- Sanitary Registration Certificate
- Authorization for Nationalization

⚠ NEGATIVE ADMINISTRATIVE SILENCE
CRITICAL RISK

- ✕ If COMEX does not respond within the deadline: automatic denial
- ✕ Complete restart of the required process
- ✕ Loss of investment in documentation
- ✕ No formal mechanism for expedited appeal
- ✕ Goods in transit without a valid destination

		✓ RESULT · NATIONALIZED CARGO	⚠ BLOCKAGE AT PORT DUE TO DOCUMENT ERROR *CRITICAL RISK*
		✓ Sanitary Registration Certificate (SRC) issued and valid ✓ Merchandise released and delivered to the importer in Venezuela ✓ Registration in COMEX databases for future expedited imports ✓ Total process: 45–90 days from initial registration in COMEX	✕Discrepancy declaration vs. COMEX records ✕ Immediate blocking of cargo at port ✕Cumulative demurrage and storage costs ✕Days of delay = elimination of margin ✕Degradation of herbicides/fungicides due to heat ✕ Applied port security regulations

■ Regulatory steps COMEX	■ Stages of approval and issuance	⚠ Critical Risks	⏱ Estimated total time: 45–90 business days

MANDATORY DOCUMENTATION · IMPORT CHECKLIST All documents must be uploaded to COMEX in legible PDF format before the start of the process.		
LEGAL DOCUMENTS	**TECHNICAL DOCUMENTS**	**PHYSICAL SAMPLES**
☐ Apostilled Certificate of Free Sale (CFS) ☐ Notarized powers of attorney of the legal representative ☐ RIF / mercantile registry Venezuela ☐ Sponsoring Pharmacist Credentials ☐ Importer license before SAREN	☐ Safety Data Sheet (SDS) · Spanish language ☐ Laboratory analysis protocol (India) ☐ Chemical composition of the product ☐ Label and leaflet in Spanish ☐ Sanitary registration country of origin	☐ Physical product samples (INHRR) ☐ Quantity according to Rafael Rangel instructions ☐ Certified packaging for samples ☐ Shipping guide and chain of custody ☐ Reception report signed by INHRR

Source: Own elaboration, 2026.

The process involves a processing time of 45 to 90 days without observations, with a possible temporary waiver of 30 days for critical loads not guaranteed. Costs consist of public fees and

technical regency fees estimated between $1,500 and $3,500 USD per initial product. A crucial aspect for 2026 is the principle of "Negative Administrative Silence" (considered under Ley Orgánica de Procedimientos Administrativos), which means that if the application contains errors and no response is received within the legal deadline, it is automatically considered rejected, preventing the product from being loaded at the port.

Before the container leaves its place of origin, it is crucial to carry out a “Preliminary Technical Audit”[101]. This audit is a fundamental logistical step that aims to verify the correct tariff classification and validity of the product. Likewise, compliance with the deadlines for temporary exemptions (such as those established in decrees 5.196 and 5.197) must be monitored, which grant a margin of 30 days for certain import procedures.

In this regard, to mitigate these obstacles, the Ley de Fomento de las Exportaciones No Petroleras, enacted in 2024, established the Single Window for Foreign Trade (VUCE in Spanish). This digital system centralizes the management of all export permits and, consequently, streamlines procedures related to inputs used in export-oriented production[102]. The regulations state that no authority may require export permits that cannot be processed through the VUCE (art. 14)[103]. In this way, the State will implement an exclusive technological platform, integrated into the VUCE system, to manage operations carried out within the Special Economic Zones.

Additionally, and the national Executive has unified export rates through the Protocolo Unificado para las Exportaciones No Petroleras, Postales y Actividades Conexas in 2025 (Decree No. 5,191), with the aim of preventing improper or discretionary charges by authorities at the regional or municipal level[104].

Another important incentive comes from the establishment of the Special Economic Zones (SEZ) regime, designed to mitigate the impact of tariff barriers. As mentioned, these zones facilitate the import of essential inputs, raw materials, and machinery for productive projects through the "Temporary Admission for Inward Processing" mechanism (Admisión Temporal para Perfeccionamiento Activo in Spanish), which entails exempt customs. In this way, Special Economic Zones (SEZs) offer benefits such as import tax refunds (draw back) and the full or partial refund of Value Added Tax (VAT) and Income Tax (ISLR), applicable for periods of up to ten years.

Main financial barriers and market risks

The renewal of agricultural machinery faces a crucial obstacle: the funding deficit. Despite the existence of the Banco Agrícola de Venezuela (BAV), linked to Ministerio de Agricultura y Tierras, its impact on the sector is minimal. This situation is evidenced by the frequent exclusion of BAV from the aggregated reports of the national banking sector. Paradoxically, the agricultural sector showed a growth of 8.6% in 2025 (driven by items such as corn and coffee). However, this dynamism is not the result of credit support from BAV, but has been based mainly on the producers' own resources

[101] https://inseroca.com/importacion-de-agroquimicos/
[102] https://www.hklaw.com/-/media/files/insights/publications/2024/08/venezuelapublisheslawpromotiones.pdf?rev=-1&hash=9317C74E6D197636C5511836165DF64E
[103] https://www.grantthornton.com.ve/globalassets/1.-member-firms/venezuela/2024/goe-6.824.pdf
[104] https://www.globovision.com/economia/48978/presidente-maduro-firmo-el-decreto-de-protocolo-unificado-para-las-exportaciones-no-petroleras-y

or on the pre-sale of crops to the private agro-industry. The BAV has lost its function as the main engine of credit, limiting itself to the management of specific government programs (such as the "14 Engines" or the "7T").

Therefore, in order to achieve the modernization of capital, the financial barriers that prevail in the Venezuelan market must be explained. The high legal reserve requirement, set by the State at 73% in 2022[105], severely restricts the liquidity of the national banking system. With this percentage, financial institutions lack the necessary leeway to grant long-term loans, which are often required for the acquisition of heavy machinery. Added to this is currency instability and inflation. The market operates with a marked "exchange rate gap" (the disparity between the official and parallel exchange rates) which has remained in a range of 20% to 27%[106] [107]. This distortion has serious consequences: on the one hand, it significantly increases the cost of imports of capital goods and spare parts; on the other hand, it raises transaction costs throughout the entire value chain. Furthermore, it creates an environment of great uncertainty that negatively impacts profitability and hinders long-term planning for farmers. The business environment is harmed by two key factors: geopolitical risk and excessive compliance (overcompliance) of international banking with the sanctions regime that generates a rejection or total blockage of any payment that has a link with Venezuela. This significantly complicates cross-border financial transactions and, consequently, import trade.

However, from the perspective of international trade, the credit and technological gap in Venezuela creates a window of opportunity for foreign direct investment, particularly for emerging powers like India. By 2024, trade between India and Venezuela reached $2.3 billion, demonstrating an effort to diversify geoeconomic partnerships of the country[108]. Recently, this was seen in bilateral agreements to strengthen cooperation by facilitating purchases of medicines and other items such as energy, agriculture, science and technology, mining, the automotive sector, and tourism[109]. Although historically Indian capital has concentrated in energy and communications areas in Venezuela, the agro-industrial sector is presented as a platform for India's expansion. Indian companies demonstrate consolidated global leadership in low-cost technological innovation and regenerative agriculture. They excel in creating analytical platforms that use smart sensors, designed for small farmers, as well as in manufacturing advanced agrochemicals, such as nanofertilizers powered by the Indian Council of Agricultural Research (ICAR)[110]. They have experience in the installation of solar microgrids for irrigation systems. This technology is essential in Venezuelan areas with poor electricity service.

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[105] https://www.bancaynegocios.com/en-vigencia-encaje-legal-de-73-bcv-aplica-tasa-anual-de-322-a-saldos-no-vendidos-de-intervencion-cambiaria-a-bancos-con-deficit/

[106] https://www.seco.admin.ch/dam/seco/en/dokumente/Aussenwirtschaft/Wirtschaftsbeziehungen/L%C3%A4nderinformationen/Lateinamerika/wirtschaftsbericht_venezuela.pdf.download.pdf/Wirtschaftsbericht%20_Venezuela_2025%20extern.pdf

[107] https://acading.org.ve/wp-content/uploads/2025/03/Balance-de-la-economia-venezolana-2024-y-perspectivas-2025.-Alejandro-Gutierrez.pdf

[108] https://www.seco.admin.ch/dam/seco/en/dokumente/Aussenwirtschaft/Wirtschaftsbeziehungen/L%C3%A4nderinformationen/Lateinamerika/wirtschaftsbericht_venezuela.pdf.download.pdf/Wirtschaftsbericht%20_Venezuela_2025%20extern.pdf

[109] https://mpps.gob.ve/venezuela-y-la-india-suscriben-memorando-de-entendimiento-para-fortalecer-cooperacion-binacional-en-medicamentos/

[110] https://www.fii.gob.ve/innovaciones-tecnologicas-que-estan-transformando-la-agricultura-mundial/

AGRO-INDUSTRIAL SYNERGY MATRIX

Challenges of Venezuela | Indian Technology | Expected Impact · 2026

	VENEZUELA CHALLENGE	INDIA TECHNOLOGY SOLUTION	EXPECTED IMPACT
01	**Lack of Energy for Irrigation** Rural areas without stable access to the national electricity grid.	**Solar Microgrids for Irrigation** *Installation and operation by Indian companies specializing in distributed generation.*	**Agricultural operational continuity** Independence from the national grid; guaranteed 24/7 supply for irrigation systems.
02	**Degraded and Poor Soils** Low natural fertility after years of productive contraction and land abandonment.	**Nano Fertilizers and ICAR Innovation** *Development driven by the Indian Council of Agricultural Research (ICAR); high-yield, low-cost per hectare technology.*	**Recovery of agricultural yield** High sustainable productivity at an accessible cost; reduction of dependence on imported agrochemicals.
03	**Small-Scale Production** Fragmentation of small farmers without access to technology or precision data.	**Smart Sensors for Small Farmers** *Low-cost analytical platforms, designed for emerging economies; success history in rural Indian markets.*	**Data-driven decision making** Optimization of the use of inputs, water, and labor; scalability towards a regional agri-industry hub.

Source: Own elaboration, 2026.

PART VI
GENERAL CONSIDERATIONS

PART VI
GENERAL CONSIDERATIONS

Venezuela is consolidating a high-potential agro-strategic profile within the context of its commitment to economic diversification, with agricultural sector growth estimated at 8.6% by 2025. This growth is driven by short-cycle crops (corn, rice, and sugarcane) that facilitate rapid capital turnover and accelerated investment recovery in the face of political and exchange rate instability. This dynamic, concentrated in the "breadbasket" of Portuguesa (more than 50% of national corn production, 65% of rice, and 52% of sugarcane) and complemented by the fertile Vertisols of Guárico and the Alfisols/Inceptisols of the western plains, opens up concrete investment opportunities for the Republic of India. These opportunities align with India's global leadership as the world's fourth-largest producer and third-largest exporter of agrochemicals, and its expertise in low-cost technologies and regenerative agriculture.

Short-cycle crops in Portuguesa and Guárico are emerging as the most viable entry point in the short term: they require complex fertilizers (DAP, NPK, NP/NPK) and selective herbicides/fungicides (pendimethalin, metolachlor, mancozeb, tebuconazole) for Vertisols and Alfisols, where local production covers urea and basic ammonia but has structural deficits in highly complex formulations. It is in this area that India can efficiently displace Colombia (currently the main supplier with USD 20.1 million in 2024) by offering generic products that are 20-40% lower cost, adapted to COMEX registrations and seasonal cycles (May-November planting for corn; November-December for rice). Companies like Coromandel (NPK and bio-inputs) or UPL (crop protection) offer exportable scale and compliance with international standards, generating rapid capital turnover thanks to the short cycle of these sectors —a key advantage in scenarios of exchange rate uncertainty.

In parallel, the technological gap in irrigation, mechanization, and sensor technology constitutes a second priority area. Technified irrigation systems (Jain Irrigation), agricultural drones (ideaForge, Throttle Aerospace), and IoT sensors for monitoring moisture and compaction in Alfisols of Portuguesa and Ultisols of Cojedes/Guárico allow for tripling water efficiency across 50 million suitable hectares, mitigating the risks of salinization (Aridisols of Zulia-Falcón) and erosion (Andean region). Machinery adapted by soil type —tractors >120 HP with moldboard plows for vertisols, 25-30 HP/tipper subsoilers for ultisols, 6.6-12 HP power tillers for Andean inceptisols and specialized harvesters for Aragua-Carabobo mollisols— solves the obsolescence of the current fleet and the dependence on diesel, with alternatives of dual engine or solar microgrids that India dominates.

India's distinct competitive advantages lie in three key areas: (i) the supply of complex agrochemicals and regenerative biostimulants at competitive costs; (ii) precision irrigation technologies that address the country's low level of technological development; and (iii) experience in infrastructure projects under Special Economic Zones (SEZs) and the VUCE, facilitating temporary admission, drawback, and VAT/ISLR refunds. Therefore, the recent regulatory unification (Sanitary Registration Certificate through COMEX, Decree No. 5,191, and the 2024 Ley de Fomento de Exportaciones No Petroleras) reduces logistical and financial barriers.

Since, in general, the Venezuelan agricultural sector is characterized by a precarious industrialization oriented towards short-cycle production, foreign investment could benefit from the rapid return of capital on its investments—due to the high potential, unused capacity and scarce competition—because of the nature of the production cycles.

Finally, Venezuela's agri-food sector is at a regulatory, operational, and geopolitical turning point unprecedented in the last two decades. The convergence of sustained growth in strategic sectors, digital legislative reform (VUCE and ZEE), the easing of secondary sanctions, and global demand for food and green technologies presents a limited window of opportunity from 2026 to 2028. In this scenario, the Republic of India possesses the technical, financial, and diplomatic capabilities to position itself as a preferred strategic partner and, in the immediate term, achieve a complementary integration of high mutual value within Venezuela's agro-industrial chain, generating rapid returns and diversifying its presence beyond energy and mining.