

MARKET STUDY ON 3 INDUSTRIAL SECTORS OFFERING INVESTMENT OPPORTUNITIES IN SENEGAL FOR FINNISH COMPANIES



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GENERAL INTRODUCTION

In the perspective of strengthening the network of Finnish embassies in the world, Senegal was chosen to host the Embassy of Finland in Dakar. Indeed, Dakar, representing the diplomatic center of West Africa, was an obvious option for the site of the new embassy.

Finland intends to diversify and develop its ties with African nations in line with the objectives of its Africa policy, approved in March 2021. Its activities started in the Senegalese capital in the summer of 2021 and will accelerate the strengthening of its diplomatic presence on the continent.

The Finnish mission in Dakar will have the objective of covering many countries in this region, including the Sahel region, whose security problems are of concern to all European Union countries.

According to Foreign Minister Pekka Haavisto, "The new embassy in Dakar is Finland's first embassy in French-speaking West Africa, and it will be an essential component of our mission network. Senegal is a key partner and stabilizing force in the region for Finland and the European Union.

Today, this new embassy will open the doors of access to the "Team Finland" market for Finnish companies in this region, where there are many opportunities to develop trade and collaborate more closely.

Finland's decision comes in a context marked by the Covid 19 pandemic, which has had an unprecedented impact on the global economy.

The Covid-19 pandemic is a brutal health shock on a global scale with an impact on all economies, through various channels such as international trade, migrant remittances, tourism, air transport and public finances. It has also led to the closure of borders and restrictions on transport, resulting in a slowdown or even a halt to activities in certain sectors. This situation has led to a revision of growth projections, which now predict a recession in the world economy in 2020.

Growth is expected to fall from 2.9% in 2019 to -4.4% in 2020 (IMF, October 2020), a larger decline than the financial crisis experienced between 2008 and 2009, based on the optimistic assumption that the pandemic will diminish in the second half of this year.

In Sub-Saharan Africa, economic growth has fallen from 3.2 % in 2019 to -3 % in 2020. This represents a decline of 6.3 percentage points (IMF, 2020) resulting, in part, from the difficulties faced by vulnerable firms and households. This constitutes a premiere in several decades.

In Senegal, after a period of sustained growth averaging 6% over the last six (6) years (2014-2019), the pandemic has come as a major blow to the national economy. The spread of the virus not only threatens human lives, it also disrupts economic activities, affecting vital sectors such as tourism, catering, fishing, trade, education and transportation. This situation has led to a slowdown in growth of -0.7% in 2020, compared to 5.3% in 2019.

The response to the crisis has been to restructure budgets, tighten the domestic financial market, reduce investment and ease international financial commitments.

In order to contain the harmful impacts of the corona virus pandemic, the Government of Senegal has, in an inclusive manner, set up an Economic and Social Resilience Program (ESRP), for very short-term actions, with a response fund called "Force Covid-19" amounting to 1,000 billion CFA francs, or 7% of GDP, in order to alleviate the most affected households and businesses directly affected by the shock.

As this pandemic was coming to an end, the conflict between Russia and Ukraine jeopardized any chance of seeing a more real mitigation of the impact of COVID 19 on the socio-economic situation of our countries.

Today, less than 90 days after the beginning of this conflict, inflation has taken off again and the countries of sub-Saharan Africa are at risk of experiencing difficult times, in particular the installation of a food crisis of the most formidable kind because of their dependence on the export of cereals, fertilizers and urea's for agriculture.

To address this situation according to Covid 19 and the immediate and brutal repercussions of the conflict between Russia and Ukraine, the Government of Senegal, in partnership with the World Bank and the IMF, has developed a structural reform program for equitable and resilient growth. This is essentially based on resolving the main challenges to human capital development, fiscal sustainability, active participation of the private sector, and a strong inclusion of women in the Senegalese Economy.

This program should be able to provide a positive stimulus to the government's drive towards greater debt and tax revenue management capacity by, for example, improving VAT processing procedures and eliminating inefficient tax exemptions. These measures are intended to improve transparency, increase private sector cash flow, and promote job creation.

The program also aims to strengthen the institutional framework for inclusive access to finance for micro, small and medium-sized companies and to improve competition in the energy, telecommunications, digital economy, etc. sectors....

In addition, within the framework of the PAP2A, Senegal is committed to developing and enhancing all sectors of our economy through a true endogenous development supported by a strong national private sector widely open to foreign investment.

To this end, the government has placed industrialization at the heart of the PAP2A as the main gas pedal of the process of structural transformation of the economy and the creation of new wealth and jobs.

This new trend should make private investments more attractive for industrial production geared to the needs of WAEMU, ECOWAS and the European, American and Asian markets. We have chosen, among many other sectors, the following industries whose particularity is characterized by their innovative and job-creating character and essentially in the agriculture and fisheries sectors, taking into account the concerns related to sustainable development.

These 3 sectors are:

- Clean technologies (circular economy)
- Essential oils
- Agro-industries & packaging

To this study, we have attached an interview of Mrs. Khadija A. BA, General Manager of DER MOND Group - Oil and Gas, who talks about her experience and her vision of the prospects of the Oil and Gas sector in Senegal.

I.

ENERGY AND CIRCULAR ECONOMY

SUMMARY

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I . INTRODUCTION AND BACKGROUND

In the perspective of strengthening the network of Finnish embassies across the world, Senegal was chosen as the location for the new Finnish Embassy. Indeed, Dakar, as the diplomatic center of West Africa, was a logical choice for the site of the new embassy.

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Finland's decision comes in a context marked by the Covid 19 pandemic, which has had an unprecedented impact on the global economy.

Covid-19 pandemic has been a brutal health shock on a global scale with an impact on all economies, such as international trade, migrant remittances, tourism, air transport and of course, public finances.

Covid 19 has also led to the closure of borders and restrictions on transport, resulting in a slowdown or even a halt to activities in certain sectors. This situation has led to a revision of growth projections, which now predict a recession in the world economy.

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In Sub-Saharan Africa, economic growth has fallen from 3.2 % in 2019 to -3 % in 2020. This represents a decline of 6.3 percentage points (IMF, 2020) resulting, in part, from the difficulties faced by vulnerable firms and households. This will be for the first time in several decades.

In Senegal, after a period of sustained growth averaging 6% over six (6) years (2014-2019), the pandemic has come as a major blow to the national economy. The spread of the virus has cost human lives, as well as disrupting economic activities, affecting vital sectors such as tourism, catering, fishing, trade, education, and transportation. This situation led to a slowdown in growth of -0.7% in 2020, compared to 5.3% in 2019. The response to the crisis has been to restructure budgets, tighten the domestic financial market, reduce investment, and ease international financial commitments.

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Today, 6 months after the beginning of this conflict, inflation has taken off again and the countries of sub-Saharan Africa are again experiencing difficult times, in particular the installation of a food crisis of the most formidable kind because of their dependence on the export of cereals, fertilizers, and urea's for agriculture.

To address this situation caused by Covid 19 and the immediate and brutal repercussions of the conflict between Russia and Ukraine, the Government of Senegal, in partnership with the World Bank and the IMF, has developed a structural reform program for equitable and resilient growth. This is essentially based on resolving the main challenges to human capital development, fiscal sustainability, active participation of the private sector, and a strong inclusion of women in the Senegalese Economy.

This program should be able to provide a positive stimulus to the government's drive towards greater debt and tax revenue management capacity by, for example, improving VAT processing procedures and eliminating inefficient tax exemptions. These measures are intended to improve transparency, increase private sector cash flow, and promote job creation.

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To this end, the government has placed industrialization at the heart of the PAP2A as the main lever of the process of structural transformation of the economy and the creation of new wealth and jobs. This new trend should make private investments more attractive for industrial production geared to the needs of WAEMU, ECOWAS and the European, American, and Asian markets. We have chosen, among many other sectors, the following industries whose particularity is characterized by their innovative and job-creating character and particularly in the agriculture and fisheries sectors, taking into account the concerns related to sustainable development.

These 3 sectors are:

- Technologies propres (économie circulaire)
- Huiles essentielles
- Agro-industries & emballages

We have attached to this study an interview with Mrs. Khadija A. BA, General Manager of DER MOND Group - Oil and Gas, who shares her experience and her vision of the Oil and Gas sector prospects in Senegal.

2. SECTORAL ANALYSIS

In Senegal, agriculture, fishing, forestry, water resources, energy and waste management have been identified as priority sectors for the green economy.

As far as mitigation and adaptation are concerned, the sectors that have been identified as priorities for activities to control climate impacts change are agriculture, fisheries, forestry, health, waste management, energy, and industry. Among these sectors, some have been identified as significant contributors to national greenhouse gas emissions.

In addition, it should be noted that energy, urban and rural waste recovery, aquaculture, sustainable agriculture, and forestry are the most promising green job niches.

2.1. ENERGY

The Energy Sector is a major support to economy development and to the reduction of social and territorial inequalities. Senegal has adopted an economic and social development strategy called the Senegal Emerging Plan (SEP). This strategy, which targets economic emergence by 2035, is the reference point for economic and social policy in the medium and long term, and energy is one of its main pillars. The SEP naturally places the energy sector among the «Emergence foundations» aimed to ensure broad and reliable access to cheap energy by 2035. The boost to the integrated electricity plan involves, among other things, electricity production diversification sources to rebalance the energy mix with the choice of developing production based on coal, gas, hydroelectric, solar and wind power.

The country's strategy has been set out in the Energy Sector Development Policy Letter (LPDSE 2019-2023) and has the following main objectives:

- To ensure a secure supply of sufficient and quality energy to the country.
- Develop access to electricity at a lower cost with quality and continuity of service.
- Strengthen people's access to modern cooking energy.
- Strengthen governance, regulation, financing, and monitoring-evaluation of the sector.

The flagship project for the revival of electricity of the SEP whose main objectives are to:

- provide electricity in sufficient quantity (more than 1500 MW of available installed capacity), reliably and at a competitive cost (between 60 and 80 FCFA/kWh.).

This has allowed the implementation of many power generation projects while developing the energy mix with notably coal, hydroelectricity, wind, and solar energy.

These projects have led to a decrease in the production deficit and reduced the undistributed energy from 44.9 GWh in 2014 to 19.6 GWh in 2018, thus making it possible to achieve the challenge of the availability of energy in sufficient quantities with the commissioning of new capacities and the rehabilitation of existing groups. Over the period 2013-2018, SENELEC has commissioned 343.9 MW of new capacity, increasing the installed capacity from around 800 MW in 2013 to 1,141 MW in 2018.

The development of production has been achieved with a more diversified mix energy mix. Thus, it is worth noting the arrival in the Interconnected Network of 143 MW of solar photovoltaic capacities.

A notable decrease in production cost was recorded with the variable cost of production falling from 85.5 FCFA/kWh in 2013 to 53.9 FCFA/kWh in 2018, thanks to a drop in the petroleum products prices and the new investments made.

As part of its energy policy implementation, the Government of Senegal has developed a strategy based on the following main axes:

Guaranteeing energy security and increasing access to energy for all.

Development of a mix energy policy combining thermal, hydroelectric, coal, gas and renewable energies and making the most of all regional and sub-regional interconnection possibilities.

Continuing and accelerating liberalization by encouraging independent production.

Improving the sector competitiveness, in order to make energy accessible at the best prices.

The sector development plan adopted is designed to improve the supply of electricity and reduce production costs. Overall, the new development plan is to produce electricity of satisfactory quality and in sufficient quantity through major investments in the energy sector. Senegal has significant hydroelectric potential and local resources to replace imported oil products. However, the electricity sub-sector remains 80% dependent on petroleum products, due to the technological characteristics of its production facilities, which translates into very high production costs, particularly in the event of a spike in world oil prices.

This situation has caused disruptions in the supply of electricity, with negative impacts on productive activities, but also on social supply at a domestic level leading to riots over constant power outages in June 2011.

To ensure that the country is fully integrated and sustainable, the development of a major transmission network is essential. In the short and medium term, connections are being made as part of the densification of the Senegalese system and interconnections with the sub-region (OMVS, OMVG, and WAPP). In addition, the distribution network will be extended and optimized to reach more urban and rural areas. Rapid access to electricity for all and everywhere is an important challenge.

Rural electrification rate target is 75% by 2022.

The implementation of this strategy will be achieved mainly through the densification and extension of very high, high, and medium voltage electrical networks and the development of off-grid projects for non-inter-connected areas (mini networks, individual systems,).

In addition, in view of the State's to practice accessible and fair prices, a sustainable strategy to harmonize electricity tariffs will be put in place for the benefit of all populations.

To achieve the objective of improving the country's energy independence and to ensure universal access, it is relevant to develop the national potential in renewable energy. In addition, the option chosen is to encourage self-production from renewable energy.

Accordingly, priority projects for the renovation and development of the electrical transmission/distribution networks have been identified to deal with the many incidents that have occurred in the distribution networks and with the extension needs.

Various sectorial opportunities exist in the Senegalese energy sector. These include the following projects:

- 225 KV Mbour-Fatick-Kaolack line to secure the evacuation of the 104 MW power plant of Kahone and to develop the medium voltage network of Kaolack and Fatick cities.
- 225 Kv Sendou- Kounoune line to secure the evacuation of coal-fired power plants.
- 225 Kv Kounoune-Patte d'Oie line to secure the supply to Dakar.
- 225 Kv Kaolack-Tambacounda-Sambangalou line for the supply of mining areas and interconnection with neighboring countries in the framework of the OMVG.
- 225 Kv Tamba-Kolda-Ziguinchor line to supply the southern regions of Senegal and reduce costs by shutting down secondary power plants.
- 225 Kv Kayes-Tambacounda line to reinforce the interconnection within the framework of the OMVS.
- 225 Kv Nouakchott-Tobène line to secure energy imports from Mauritania and anticipate the inter-connection with North Africa.
- Reinforcement of 90 kV lines.
- Creation of new 90/30 Kv and 225/30 Kv substations

2.1.1. HYDROCARBONS

The main difficulty is the existence of a single refining company (the SAR) and the weakness of storage capacity. However, oil and gas discoveries have opened up prospects that call for anticipatory measures.

2.1.2. DOMESTIC FUELS

In terms of final consumption, Senegalese households use 1,735,219 tons of fuelwood, 482,248 tons of charcoal and 108,001 tons of butane gas for cooking. This means that wood resources remain the main sources of energy in the country.

However, in the Dakar region, butane gas has largely replaced firewood and charcoal in cooking (86%). In contrast, in rural areas, firewood and charcoal are largely dominant (92%), which results in heavy stress on the vegetation cover.

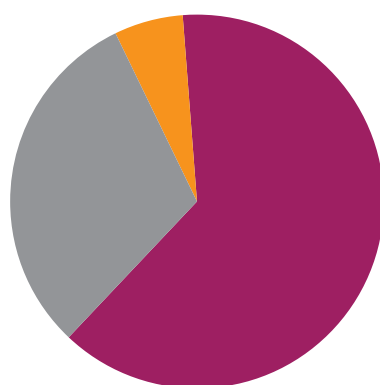
To mitigate this trend, important measures are being taken, including the dissemination of improved stoves that provide energy savings of 30-45%, the use of biodigesters that provide biogas, and the use of biochar made from parasitic biomass (Typha) or waste.

In total, the energy sub-sector accounted for 2.4% of GDP over the entire period from 2014 to 2018. The sector has been very dynamic in recent years to meet the high demand for electricity in connection with the growth of house building and industrial development.

2.1.3. SIGNIFICANT CONSUMPTION ANNUAL INCREASE

Globally, electricity sales are increasing every year. They went from 2055.6 million kWh in 2010 to 3319.1 million kWh in 2018, an average annual increase of 6%. They mainly concern (64%) low voltage usage representing domestic consumption.

■ ■ ELECTRICITY SALES IN 2018



63%	■	HIGH VOLTAGE
31%	■	MEDIUM VOLTAGE
6%	■	LOW VOLTAGE

2.1.4. ENERGY EFFICIENCY AS A STRATEGIC OPTION

Despite significant efforts to improve supply in urban areas, the sector still faces a major challenge in terms of universal access to electricity.

In this context the government has opted for the development of energy efficiency, associated with a diversified and balanced energy mix that leaves a significant role for renewable energies to satisfy a growing demand. This strategic choice gives an absolute priority to the preservation of the environment and the reduction of external energy dependence.

An economic dynamism is to be expected, under the impulse of the big projects of the Senegal Emergence Plan, notably the new city of Diamniadio as well as the development of the mining sector (gold, zircon, iron, and phosphate) and for the oil and gas exploitation projects from 2022.

2.1.5. ECONOMIC-ENVIRONMENTAL ISSUE

The concern is the prevalence of thermally produced energy in the power mix.

The concern is economic and environmental. Indeed, thermal energy represented in 2019, 81% of the total installed capacity, which increases both the production cost, and the greenhouse gas emissions.

To address this situation, it is expected that by 2025 there will be a greater rate of independence in commercial energy, excluding biomass of 15% brought about through renewable energy and biofuels contribution.

Under the National Action Plan for Renewable Energy, it is planned to increase the share of renewable energy in the electricity mix from 10% in 2010 to 23% in 2030.

Also, the share of bioethanol in gasoline consumption should increase to 10% in 2030 while the share of bio diesel in the consumption of diesel and DDO (Distillated Diesel Oil) is projected at 7%.

However, coal is still required and SENELEC's production plan includes the installation of two coal-fired power plants, one at Sendou by CES1 with a capacity of 115 MW and the other by Africa Energy with a capacity of 90 MW. This program will result in a total of 205 MW of coal being injected into the grid, which accentuates the environmental and health problems associated with the level of pollution and therefore GHG emissions from coal.

2.1.6. OIL AND GAS

Significant discoveries of oil and gas deposits have been made recently in the Senegalese sedimentary basin, putting the country on track to be able to export oil products by 2020. Currently, seventeen oil and gas blocks are allocated, 09 offshore and 08 onshore blocks. Drilling and exploitation of about 156 wells have started. The estimates of potentialities made so far are very significant. The available gas reserves, placing Senegal in 7th place worldwide.

As for oil, Rufisque and Sangomar blocks off the coast are estimated at between 400 million and 3 billion barrels.

Gas will allow the implementation of the "Gas-to-power" strategy; this gas will replace fuel oil and the creation of new production capacities running on gas from 2022-2023. The positive impacts will be the availability of a competitive and low-polluting energy as well as universal access to electricity as early as 2025, in line with the vision of the President.

The oil reserves discovered in recent years in Senegal are estimated at three billion barrels and about 450 billion cubic meters for gas. The significant gas reserves are shared with Mauritania. These discoveries augur well for the country's energy production, financial income generation and job creation. Better still, the large gas reserves will reduce the dependence of the electricity network on fuel oil and reduce greenhouse gas emissions, thanks to the dual power plants already available.

Senegal is on its way to becoming a major oil and natural gas producer by the beginning of the next decade. Sangomar oil field and the Tortue-Teranga natural gas field have revealed large-scale deposits. Production is expected to begin between 2021 and 2023. Several other fields have strong potential. If forecasts hold, Senegal will produce about 140,000 barrels per day from Sangomar oil field and more than 28 million cubic meters of gas per year from Tortue-Teranga natural gas field. When Senegal reaches its peak production, it will be the 40th-largest oil producer and the 20th-largest gas producer in the world. Although these resources are not large compared other countries, they should be an important engine of economic growth for Senegal.

Budget revenue forecasts that will be generated from Senegal's oil resources are not publicly available. This is hardly surprising given the uncertainty surrounding gas prices and production costs, including pipelines and other related infrastructure. However, countries such as Ghana, Cameroon, and Chad, which have comparable resource potential, have earned between US\$1 billion and US\$1.6 billion per year in oil and gas revenues in recent years. As Senegal's annual budgetary revenues in 2015 and 2016 averaged over US\$3 billion, revenues from natural resource development could, in theory, be significant for the government. If Senegal were to become dependent on oil, foreign capital influx related to oil and gas production could cause serious macroeconomic problems.

Si le Sénégal venait à dépendre du pétrole, l'afflux de capitaux étrangers lié à la production du pétrole et du gaz pourrait causer de sérieux problèmes macroéconomiques.

2.2. RENEWABLE ENERGIES

In terms of renewable energy resources, Senegal is well endowed and there is a wealth of potential:

Solar potential	With an average annual specific net production of 1650 kWh/kWp/year (theoretical annual production from photovoltaic systems, normalized by peak kW) and an average daily global irradiation energy of 5.43 kWh /m ² /day. The exploitation of this deposit has been done so far through two sub-sectors: the photovoltaic solar subsector and the thermal solar subsector;
Wind power potential	Interesting on the entire 50 km wide coastal strip from Dakar to Saint-Louis where average wind speeds at 50 m are between 5.7 and 6 m/s
Potential and biomass	Significant estimated at 331.3 million m ³
Hydroelectric potential	Studies carried out in the mid-1980s show that Senegal's own hydroelectric resources are not very significant. The relatively flat terrain of the country does not allow for the development of this form of energy, with the exception of the eastern zone, near Kédougou. However, it should be noted that Senegal shares with its neighbors within the framework of the OMVS and OMVG a potential estimated at nearly 1,400 MW that has not been exploited to date (260MW);
Geothermal energy potential	Senegalese soils do not have a high geothermal value and there have been no attempts to exploit low-energy geothermal energy, given that other renewable energy sources are more suitable for exploitation;
Tidal energy potential	Stemming from the water movements created by the tides, caused by the combined effect of the gravitational forces of the Moon and the Sun. In Senegal, despite a long coastal fringe of 500 km, there has been no attempt or project to exploit this potential.

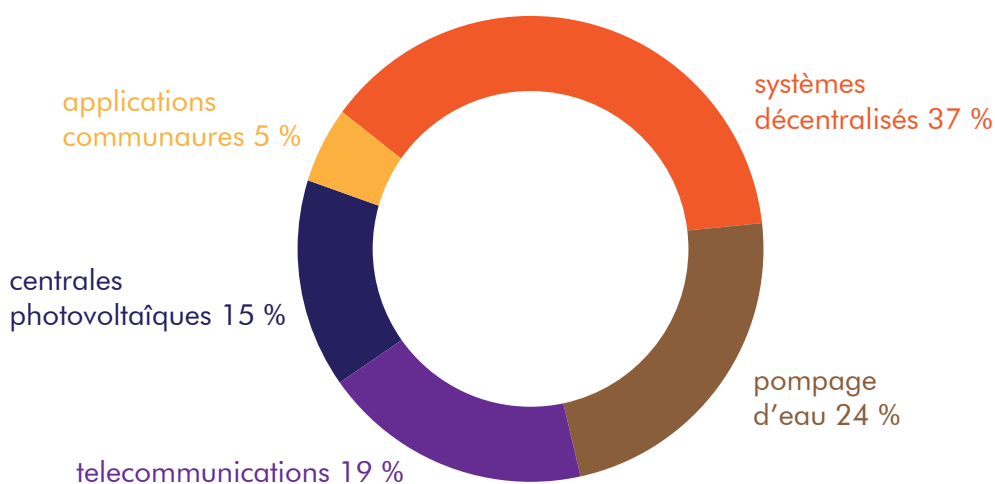
2.2.1. L'INDUSTRIE SOLAIRE

Sunshine of 3000H/year
Global irradiation of 5,8 KWH/M2 /day
Total installed power in 2010
2.5MWCi

■ DIFFERENT FIELDS OF APPLICATIONS

2.2.2. WIND ENERGY SECTOR

Taïba Ndiaye is a new step in the energy march towards an emerging Senegal." With these words, President Macky Sall inaugurated the wind farm located 90 km north of Dakar in late February 2020. The largest wind farm in West Africa, it reached its full capacity (158.7 MW) in May of that year, ahead of schedule. Developed by the company Lekela Power, the site provides 15% of the national electricity production, supplying nearly 2 million of the country's 15 million inhabitants. Wind potential on the coastal fringe between Dakar and Saint-Louis and on a width of 50KM, where the average annual wind speed at 10M height is on average 4M / Second. New measurements carried out between 30 M and 40 M have revealed the existence of wind speeds of more than 6 M/S.



2.2.3 BIOMASS SECTOR

In 2018, biomass accounted for more than 62% of energy supplies in the WAEMU region. It has declined significantly in proportion compared to 2010 (69%), which is explained by the increase in imports of other forms of energy into the space, particularly petroleum products (about 31% of supplies in 2018, compared to 24% in 2010). In Senegal, important reserves of forest formations in the East and South of the country. Interesting prospects for biofuel production.

Agricultural by-products (about 3.3 million tons of agricultural dry matter) and agro-industrial by-products (rice husk, biogas, peanut shells, cotton stalks,) Plant species (Jatropha, typha, sunflower, cotton, castor, sweet sorghum,)

■ PROVEN PROSPECTS FOR BIOGAS PRODUCTION

- Animal waste with an estimated potential of 32,000 tons of dry matter per day.
- Industrial waste from slaughterhouses could reach 95,000 m³ or 53 toes for solid waste and 125,000 m³ or 70 toes for liquid waste.
- Household waste whose theoretical production in biogas per year for urban areas is estimated at 41.4 million m³ corresponding to 23 000 toes.
- Discharges of human origin (faeces and urine)
- In the food industry, the quantity of biomass-energy available can be estimated at 130 000 tons.

2.2.4. HYDROELECTRIC SECTOR

Despite being a Sahelian country, Senegal has relatively large water resources. Surface water resources are constituted by four rivers: the Senegal River in the north (1,700 km long), the Saloum River (250 km) in the center, the Gambia River (1,130 km) in the center and the Casamance River (300 km) in the south. Lakes and rivers complete the hydrological regime.

Construction of the large Dama and Manantali dams, which Senegal shares with Mali and Mauritania through the Organization for the Development of the Senegal River (OMVS), contributes to water resources control and, consequently, to agriculture development, livestock, navigation, and the supply of drinking water and energy for the population.

In addition to surface water, Senegal is composed of 90% of sedimentary terrain containing water tables and about 10% of granitic or metamorphic terrain also constituting fracture aquifers.

The water challenge is a major development issue for Senegal. This issue is becoming more serious in a context of climate change where projections predict extreme water-related events (drought, flooding, and rainfall deficits).

The sensitivity of water resources is due to several parameters, including rainfall variability, anthropic pressure, evapotranspiration, salinization, pollution, and proliferation of invasive aquatic plants and the lowering of the water table.

Indeed, the installation of dams and hydro-agricultural developments have created a risk of alkalinization through changes in the hydro-chemical level, of eutrophication of certain bodies of water such as Lake Guiers, threatened by pesticide pollution and their invasion by aquatic vegetation, and of compaction and salinization of the soil through chemical pollution resulting from products used in agriculture.

Senegal must therefore manage its water resources more efficiently in order to sustain not only the various economic services that depend on them (irrigation, energy production,), but also the livelihoods and well-being of the people, especially the poorest, who are also especially vulnerable to the degradation of these resources.

•FOR LARGE-SCALE HYDRAULICS

Existence of several sites with an estimated potential of nearly 1,400 MW on the Senegal and Gambia rivers and their tributaries.

•FOR SMALL HYDRAULIC SYSTEMS

Senegal has localized exploitable sites, mainly in the Kédougou region.

■ RENEWABLE ENERGY BENEFITS

- Relatively quick to set up.
- Closer to the demand (thus reducing losses and distribution costs).
- Less demanding in terms of investment programs, which are more in line with the financial capabilities of local and regional entrepreneurs and financial institutions.
- Less polluting than traditional energy
- More reliable economically .
- Reduce reliance on imported fossil fuels.
- Create economic and social added value at the local level.

■ MAIN GUIDELINES

- Promote Renewable Energies by.
- Implementation of a legislative and regulatory framework favorable to their development.
- Large-scale distribution of equipment for the production of clean energy.
- Establishment of a market conducive to the promotion of renewable energies.
- Supporting research and development for technologies at the experimental stage.
- Encouraging the private sector to invest in the field of renewable energy.
- Increase the share of electricity from renewable sources to reach a rate of 20% of the installed capacity by 2017.

2.3. WASTE MANAGEMENT

Waste materials are composed of solid waste, domestic and commercial wastewater, industrial wastewater, and human waste.

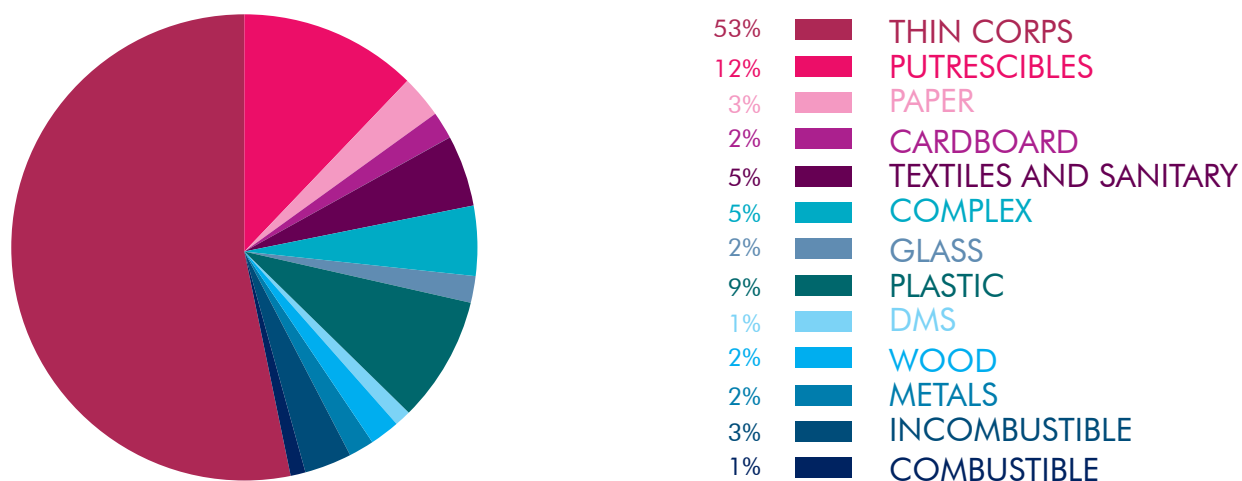
Associated with the rapid urbanization (the urbanization rate, which is constantly increasing, reached 45.2% in 2013), the production of household waste is estimated at nearly 7,000 tons per day (6,882.8 tons to be precise).

In 2016, the Solid Waste Management Coordination Unit (UCG) conducted a study that shows that globally, the annual production of the household and similar waste is estimated at 172.09 kg/inhabitants, more than half of which is made up of fine elements, i.e., with a diameter of less than 20 mm.

They are made up of elements that cannot be sorted and are therefore impossible to recover, which creates problems for their post-collection management.

2.3.1. HOUSEHOLD WASTE COLLECTION ISSUES

Putrescible waste, composed of food waste, represents 12% of household waste. Its impact on the environment is limited as it is rapidly biodegradable.



2.3.2. PLASTIC WASTE

They represent 9% of total household waste. The collection of this waste raises problems, especially thin plastic bags that easily volatilize and end up in dumps, trees and in the open air.

The Law No. 2015-09 of May 04, 2015, on the prohibition of production, import, possession, distribution, use of plastic bags of low micron nage and rational management of plastic waste has regulated the use of plastic bags. In fact, it prohibits any bag having, in its upper part, a cut in the form of a strap (strap bag) made from a polyethylene film and whose sheet thickness is less than 30 microns.

This law also specifies in its article 4 that: "plastic bags with a thickness greater than or equal to 30 microns must comply with technical standards concerning the manufacture, composition of materials, labeling and ecotoxicity set by a decree issued on the proposal of the minister in charge of the environment. Compliance with this provision should ensure that only bags that are biodegradable or oxo-biodegradable are placed on the market.

The management of plastic waste is also governed by this bill, in particular in article 6, which places the responsibility on the operators of the sector: "the operators of the plastic sector are obliged to offer households and other users a system for collecting or taking back plastic waste with a view to its recovery, recycling or elimination."

In total, approximately 24.4% of household waste is recyclable. It consists of paper, cardboard, plastic, glass, textiles, wood and metals.

As regards liquid waste, the urban sanitation system is still weak. Only 13% of households have a sewer connection. If we add the 46% who use pits (options with a negative impact on groundwater in the medium and long-term), we see that 41% of households have no wastewater disposal system.

Overall, the wastewater treatment rate was 49.5% in 2013, which is a major challenge given the negative health and environmental impacts of untreated wastewater. The rate of water treatment is lower, at 36.5%. Untreated water contains heavy metals, particularly lead in the groundwater near the Mbeubeus landfill, as well as mercury, which is very present in Kédougou's waterways due to the use of this product in traditional gold panning.

The management of household waste, plastic waste, industrial waste, computer waste, and biomedical waste poses enormous problems in Senegal because of their increasing volume, but also because of the technical skills needed to manage certain categories of waste, particularly hazardous waste.

In addition, waste management affects other sectors, both positively and negatively.

Indeed, a failure in waste management contributes to the degradation of the environment and natural resources, affects the living environment and can be the cause of serious public health problems (hazardous waste). In the field of livestock, for example, the proliferation of plastic waste (especially bags) is a real threat to livestock.

However, the waste sector offers green job opportunities through the recovery of methane (CH₄) from waste treatment units (solid and liquid) and through the recycling and reuse of used items.

3. SECTORAL CHALLENGES

Under UNEP's definition of the green economy, which includes human well-being and social equity, as well as the reduction of environmental risks and ecological scarcities, these factors need to be measured more comprehensively. A number of indicators already exist that cover these areas. These include, but are not limited to, the Millennium Development Goal (MDG) indicators, the set of sustainable development indicators, the Human Development Index (HDI), biophysical capacity, ecological footprints, measures of greenhouse gas (GHG) emissions, indicators of ambient air and water pollution, measure of natural capital stocks, and indicators of natural resource and energy productivity.

Thus, in addition to the greening objectives derived from the above sectorial analysis, the objectives targeted in the NDC's major intervention axes listed in the following table can also be considered as greening options.

The implementation of these actions will achieve the mission reduction levels summarized in the following table:

TABLE 1 LEVEL OF REDUCTION PROVIDED FOR THE NPA

SECTOR	REDUCTION LEVEL IN UNCONDITIONAL 2030	REDUCTION LEVEL IN CONDITIONAL 2030
ENERGY	6%	31%
WASTE	13%	31%
INDUSTRY	0%	10%
AGRICULTURE	0,19%	0,63%

SOURCE

CPDN 2015
COMPILING THESE GHG EMISSION REDUCTION LEVELS PROVIDES AN UNCONDITIONAL AND CONDITIONAL COMMITMENT FROM SENEGAL OF 5% AND 21% RESPECTIVELY COMPARED TO 2010.

4. SECTORIAL PERSPECTIVES

4.1. ENERGY

TABLE 2 KEY CHALLENGES AND INDICATORS FOR THE ENERGY SECTOR

KEY CHALLENGES	Indicators (Measurement unit)	Latest value (year)	Remarks
<p>STRONG DEPENDENCE OF THE GENERATION OF ELECTRICITY TO FOSSIL FUELS</p> <p>REGULAR SUPPLY OF ENERGY</p> <p>FAIBLE MAITRISE DES TECHNOLOGIES D'ÉNERGÉTIQUE</p> <p>LOW CONTROL OF ENERGY EFFICIENCY TECHNOLOGIES</p>	<p>Oil bill in Senegal in billions</p> <p>Ratio of revenues from export products dedicated to energy supply</p> <p>Percentage of non-clean energy (thermal and/or coal) in total electricity production</p> <p>Proportion of renewable energies in the total production</p> <p>CO2 emission</p> <p>Proportion of population with access to electricity</p> <p>Rate of performance in MDG7</p>	<p>In 2017, 856 billion CFA francs, i.e., 60% of export revenues and 10% of GDP</p> <p>57% in 2013</p>	<p>The government is planning to increase renewable energy (solar and wind) to 20% of the total installed capacity. However, plans to install coal-fired power plants in Senou (9,158 MW) and by Africa Energy (90 MW) are expected to increase pollution and GHG emissions. Clean energy projects risk being side-lined with the discovery of oil and gas deposits.</p>
<p>ACCESS TO RURAL ELECTRIFICATION REMAINS LOW AND IS PROGRESSING SLOWLY</p>	<p>Access rates to rural electrification</p>	<p>Year 2022 Rural electrification rate is 54% versus 33.6% in 2016</p>	<p>Rates are low due to dealer investment delays</p>

4.1. WASTE MANAGEMENT

TABLE 3 KEY CHALLENGES AND INDICATORS FOR THE WASTE SECTOR

KEY CHALLENGES	INDICATORS (MEASUREMENT UNIT)	LATEST VALUE (YEAR)	REMARKS
Failure in waste management fighting against the proliferation of illegal dumping	Number of dumpsites eradicated Number of NRPs created (see UCG) Rate of solid waste recycling/recovery	Year 2021 The number of 1934 dumpsites according to UCG Year 2021, 143 deposits Installed 5443 agents trained	Information collected in the 2021 Activity Report However, with some plastic recycling initiatives
Weakness of the urban liquid sanitation system	Rates of access to the sewage network of Wastewater treatment see with ONAS rate of water depollution	Year 2019 in rural areas from 38.7% to 42.3% over the same period.	Dans le cadre du programme d assainissement de l'ONAS il est attendu un taux de 70% A L horizon 2022
Weak technical skills for hazardous waste management	Number of actors with capacity for hazardous waste management	NC	NC
Degradation of the environment by illegal dumping due to irregular collection and treatment of waste	treatment rate Rate of performance in MDG11		

4.3. WATER RESOURCES MANAGEMENT

TABLE 4 MAJOR CHALLENGES AND INDICATORS FOR THE WATER RESOURCES SECTOR

KEY CHALLENGES	INDICATORS (MEASUREMENT UNIT)	LATEST VALUE (YEAR)	REMARKS
Water scarcity for agricultural and social needs, mainly in rural areas, industrial	Water needs coverage rate		
Low water productivity in the agricultural sector	Water productivity in agriculture		
Weakness of the irrigated surfaces	Irrigated surfaces		
General drop in water tables, drying up of continental rivers and other flooding and salinization of fresh water and land crops in maritime areas			

4. SECTORAL PERSPECTIVES

4.1 ENERGY

4.1.1 OIL AND GAS EXPLOITATION

A. HISTORY

Signs of bitumen found in limestone in 1917 and indications of gas and oil found in water well in 1932 near Dakar are the first known references of hydrocarbons in Senegal.

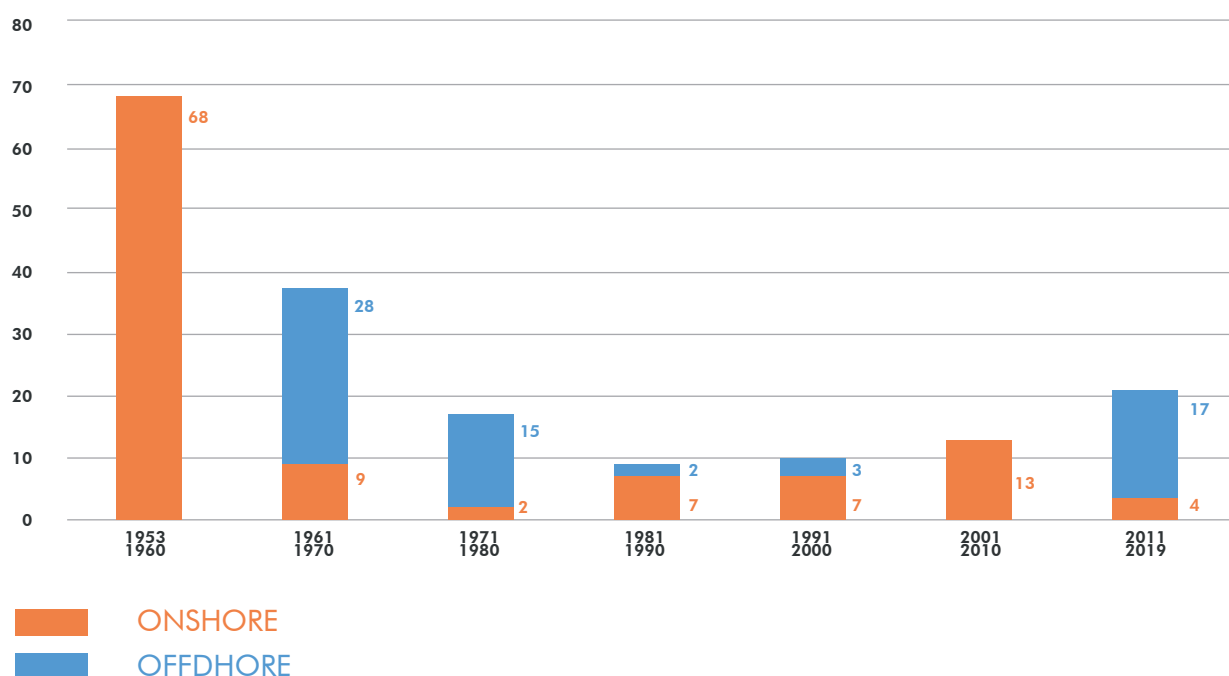
The first real investigations began in 1952 under the aegis of the Office of Petroleum Research (BRP).

Between 1952 and 1977, 122 exploration wells were drilled onshore by the African Petroleum Company (SAP) and the Total West Africa Petroleum Company (COPETAO).

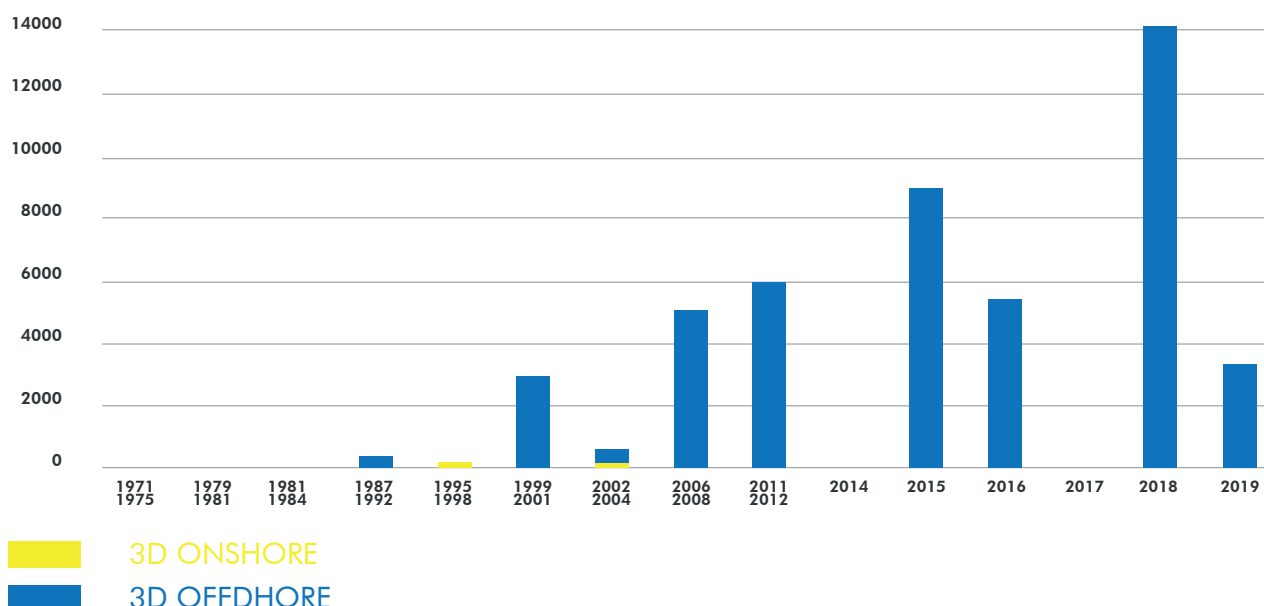
Following a period of inactivity, there was a revival of exploration activities between 1966 and 1979 with 29 exploration wells drilled by the companies COPETAO, ESSO and TOTAL TEXAS GULF, mainly offshore.

The second petroleum crisis in 1979 led to a new decline in activities and, in order to launch one more time research in Senegal, the State decided to create the Petroleum Company of Senegal, "PETROSEN", in 1981. Since then, 53 wells for exploration, evaluation and production have been drilled both offshore and onshore (Source PETROSEN, 2019).

The most recent blocks are in the Gadiaga/Sadiaratou area where natural gas has been produced from 1997 to date, as well as in the deep offshore Sangomar, deep offshore Saint Louis and deep offshore Cayar blocks where PETROSEN and its partners have discovered oil and natural gas between 2014 and 2018.



In terms of seismic surveys, nearly 61,000 square kilometers of 2D seismic have been acquired between 1971 and 2018, 89% of which is offshore



B. INSTITUTIONAL, LEGAL AND REGULATORY FRAMEWORK

The Ministry of Petroleum and Energy is responsible for implementing the country's hydrocarbon supply policy as well as the policy related to the research and exploitation of liquid and gas hydrocarbons. To this end, they oversee all upstream and downstream activities in the hydrocarbon sub-sector.

Department of Hydrocarbons (DH) is the body of the Ministry in charge of the development, adoption, implementation, and monitoring of strategies related to the sector of raw hydrocarbons. This department is in charge of keeping the territorial data updated in terms of hydrocarbon exploration and of developing the petroleum potential of Senegalese sedimentary basins that have not been explored.

Petroleum Company of Senegal (PETROSEN) is a public limited company with a capital holding (99% owned by the State; 1% by the National Recovery Company), created in May 1981. The company is placed under the technical supervision of the Ministry of Energy and Development of Renewable Energies and its purpose is to be an instrument for the implementation of Senegal's oil policy.

The company was restructured in January 2020. PETROSEN SA was converted into a holding company called HOLDING SOCIETES DES PETROLES DU SENEGAL, abbreviated PETROSEN HOLDING SA, with two subsidiaries: PETROSEN Exploration & Production SA (PETROSEN E&P.SA) and PETROSEN Trading & Services SA (PETROSEN T&S.SA)

The Letter of Energy Development Policy (LPDSE) 2019-2023 dated October 2019, has as its vision: « to have a sustainable, quality energy, respectful of the environment and foundation of the emergence of the country, with the overall objective of strengthening access for all to energy in sufficient quality and quantity at a lower cost and sustainable.»

Supply of petroleum products to the national market, which represents the supply of the national market in crude oil and refined hydrocarbons, is governed by Law No. 98-31 of 14 April 1998 and its various decrees of application. This supply includes all activities related to the downstream subsector of hydrocarbons: importing, refining, transporting, storing, and distributing these products.

Since the discovery of oil and gas in 2014, various reforms of the law governing the oil sector has been carried out. Among these reforms, the Constitution in 2016 enshrined the ownership of the national natural resources to the Senegalese People [1], as well as their reasoned exploitation. A new Petroleum Code and a law on local content have also been adopted.

In 2019, Senegal adopted Law No. 2019-03 of 01 February 2019 regarding the petroleum code and Law No. 2019-04 of 24 January 2019 regarding local content in the hydrocarbon sector.

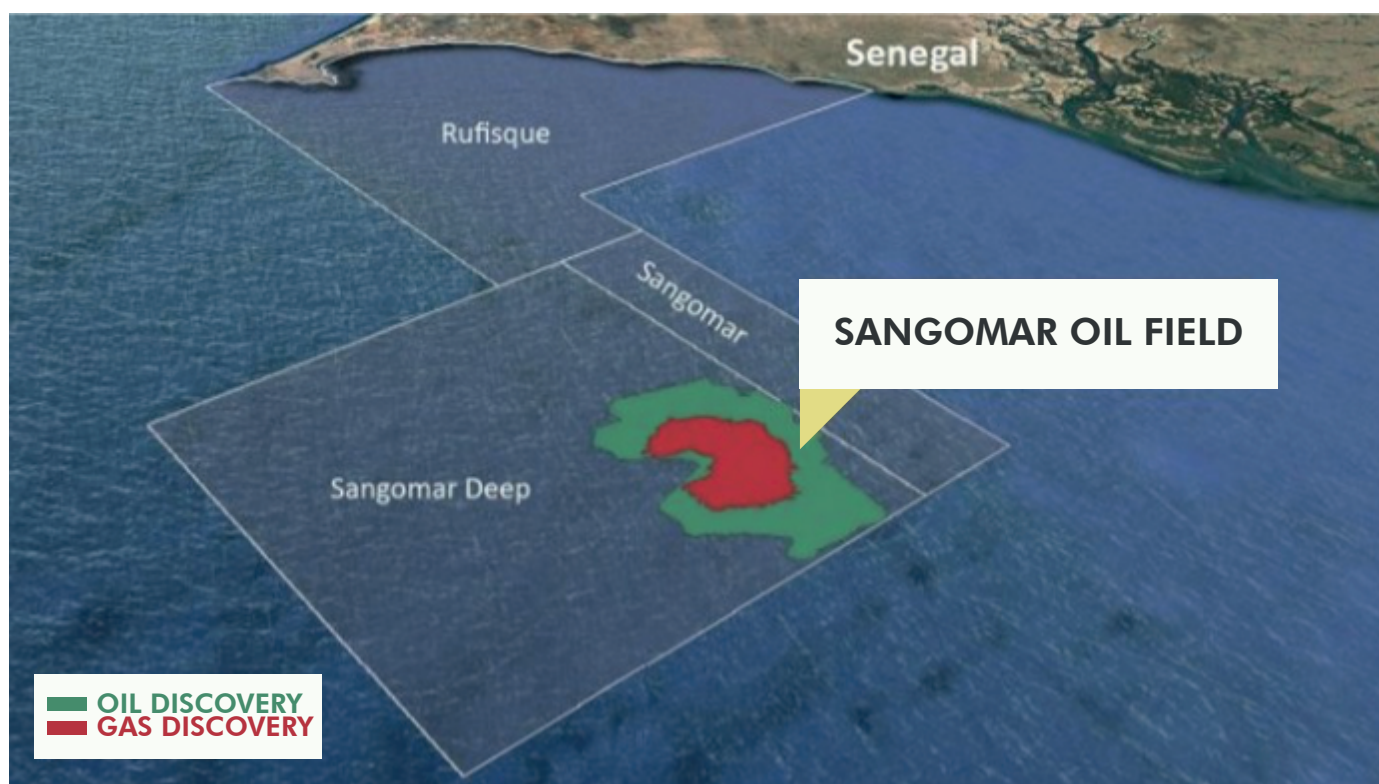
The draft decree setting the terms of application of the new Petroleum Code was adopted by the Council of Ministers on September 16, 2020 and signed on October 27, 2020 (Decree 2020-2061 setting the terms of application of the Petroleum Code 2019).

The hydrocarbon sector was also governed in 2021 mainly by:

- Law n°98-05 of January 8, 1998, on the Petroleum Code.
- Implementing decree (n°98-810 of October 6, 1998).
- Law n° 2012-31 of December 31, 2012, on the General Tax Code.
- Law n°2012-32 of December 31, 2012, amending various legislative provisions relating to tax regimes.

Sangomar deposit (ex SNE) was discovered in 2014 with the drilling of the SNE-1 well. The partnership of CAIRN Energy, CONOCCOPHILIPS, FAR Limited and PETROSEN undertook, between the end of 2015 and 2018, the evaluation of this deposit with the drilling of 8 wells. The recoverable reserves are estimated at nearly 630 million barrels of oil. The deposit also contains associated and non-associated natural gas with reserves of about 4 TCF (113 billion Nm³).

Sangomar deposit will be developed in several phases. The first phase, for which the Final Investment Decision was taken on January 9, 2020, will involve the drilling of 23 production wells, water, and gas injections. Oil production will start in early 2023 via an FPSO with a maximum daily production capacity of 100,000 barrels.



■ GRAND TORTUE/AHMEYIN (GTA)

In January 2016, Kosmos Energy announced “a significant gas discovery” off the Senegalese coast. In its press release, the American firm said they have “discovered 101 meters of gas in two reservoirs of excellent quality” on the Guembeul-1 well. This drilling is located at a depth of 2.7 kilometers, in the southern part of the Ahmeyim permit (ex-Tortue West) straddling Senegal and Mauritania.

Kosmos has a 60% interest in the Saint-Louis Offshore Profond and Cayar Offshore Profond blocks, alongside Timis Corporation Limited (30%) and PETROSEN (10%).

In May 2016, Kosmos announced a discovery of 1400 billion cubic meters of natural gas reserves in the Teranga-1 well and 5 ancillary wells drilled in the Cayar Offshore Profond block, located approximately 65 kilometers northwest of Dakar, and nearly 100 kilometers south of Gueumbeul 1 in the St. Louis Offshore Profond block.

In December 2016, Kosmos announced in a press release that a memorandum of understanding with BP had been reached. Under the terms of the agreement BP will have a 32.49% interest in the contracts for the Saint-Louis Offshore Profond and Cayar Offshore Profond blocks off the coast of Senegal. Under the terms of the agreement, Kosmos will receive a fixed amount of US\$916 million in consideration.

In April 2017, BP agreed to increase its investment in Senegal by acquiring the entire 30% minority interest in two Senegalese offshore blocks: Saint-Louis Profond and Cayar Profond. Upon completion of the agreements, which are subject to government approval, BP holds an approximate 60% interest in the Senegalese blocks. Its partners Kosmos and Société des pétroles du Sénégal (PETROSEN) hold 30% and 10% respectively. Transfers of the 30% of Kosmos and the 30% of Timis Corporation to BP were approved respectively by Order No. 3020 of 22 February 2017 and Order No. 14912 of 12 August 2017 of the Minister in charge of hydrocarbons.

SOURCE

KOSMOS ENERGY, PRESS RELEASE, DECEMBER 19, 2016
PROJET GRAND TORTUE/AHMEYIN (GTA)

PARTNERSHIP :
PETROSEN, KEISL, BPSIL, SMHPM, BPMIL, and KEM

Grand Tortue/Ahmeyin (GTA) natural gas deposit was discovered in 2015 with the drilling of the Tortue-1 (Ahmeyin-1) well in Mauritania and the Guembeul-1 well in Senegal. The deposit contains about 20 TCF of natural gas or 530 billion Nm³.



4.1.2 RENEWABLE ENERGIES: A MAJOR ASSET FOR THE MIX ENERGY

Taiba Ndiaye wind farm located 90 kilometres north of Dakar launches a new step in the energy march for an emerging Senegal. The largest wind farm in West Africa with a full capacity of (158.7 MW) was developed by Lekela Power. The site will provide 15% of the country's electricity production, supplying nearly 2 million of the country's 16 million inhabitants.



Above all, it increases renewable energy share to 22% of Senegal's energy mix, which aims to reach 30% by 2025.

Taiba N'Diaye also illustrates Senegal's desire to become a spearhead of clean and accessible energy in the sub-region, particularly through its gas resources.

A. PRODUCTION CAPACITY INCREASE

In recent years, thanks to the increase in production capacity, the installed capacity has more than doubled in six years, from 500 MW in 2012 to 1,141 MW in 2018. As a result, the repeated load shedding (Power cuts) of the 2010s, which penalized populations and businesses, has become very rare. « The number of hours of blackouts per year has dropped from 900 in 2011 to 66 in 2016 and 72 in 2017 » emphasizes a former SENELEC executive. At the same time, the focus has shifted to clean energy.

When Senegal signed the power purchase agreements for the first renewable energy power plants in 2013, the developers were asked to match the price of per kWh (65 CFA francs - 10-euro cents) of the coal-fired power plants then under construction. At the time, no one believed it was possible, and it earned scorn. Three years later, the country's first solar power plant (Senergy 2 in Bokhol) was commissioned, followed in 2017, 2018 and 2019 in Santhiou Mekhe near Thies, ten Mérima in the town of Mérima Dakhar and Sakal in the Louga area, until the start-up of Taiba Ndiaye wind farm late last year.

B. THE IMPORTANT ROLE OF PRIVATE INVESTMENT IN THE ENERGY MARKET

Today, several factors can explain this progress. The most significant being the political will.

This has enabled the country to have a national company in operation that has built up solid experience in negotiating contracts," says an industry insider. Not to mention the effect on the responsiveness of key infrastructure managers, such as ports and roads. Also, the country's political stability, its good economic performance (with annual growth above 6% since 2014) and the improvement in the business climate (more than 45 places gained in the Doing Business ranking since 2013).

This context has encouraged the private sector to invest massively, and it has become a major player. By 2020, independent power producers (IPPs) are expected to provide 56% of the country's electricity production, compared to 34% for SENELEC, with the balance coming from the West African Power Pool (WAPP).

Senegal thus, differs from its neighbours, such as Mauritania, where production is entirely public, and is closer to Ivory Coast, Ghana, and Nigeria, which have liberalized this sector.

The space given to the private sector has allowed the government to focus on other infrastructure projects

while achieving rapid delivery of energy projects. In addition, the bidding process combined with the action of donors - including the World Bank through the Scaling Solar initiative - and the reduction in the cost of renewable energy has driven down tariffs. French companies Engie and Meridiam have won the construction of two solar power plants (in Kabone and Kael) with the cheapest electricity in West Africa, less than 4 cents per kWh.

C. ENERGY SOVEREIGNTY AT STAKE

The good performance however is mitigated, as many of the contracts, concluded by mutual agreement, are less advantageous. For some, the fact that most of the electricity production is managed by the private sector raises a question of sovereignty. Especially since the main players are all foreign:



INAUGURATION BY MACKY SALL OF THE WIND POWER PLANT OF TAÏBA NDIAYE FEBRUARY 24, 2020.

For many observers, the main flaw in the Senegalese model is its dependence on oil imports. Despite efforts to develop renewable energy, most of the electricity production is still provided by thermal power plants that run on oil, even though this proportion dropped by one fifth between 2017 and 2020, from 83% to 67%. This difficulty particularly affects SENELEC, whose fleet is mainly fuelled by this fossil resource. Unlike Ivory Coast, Ghana, and Nigeria, which are already producers of 'black gold', Senegal must obtain fuel oil from abroad, which puts a strain on the finances of the State and SENELEC.

Senegal has low refining and storage capacity because there is only one operator in this sector, with the SAR increasing the cost of supply.

This explains the still high production costs resulting in electricity tariffs that are among the most expensive in West Africa: 21 cents per kWh compared to 15 cents per kWh in Ghana and 9 cents per kWh in Ivory Coast and Nigeria on average in the fourth quarter of 2019.

A weakness confirmed by Senegal's ranking in the World Bank's RISE index, which evaluates countries energy performance according to three criteria (access, efficiency and share of renewable). In 2017, Senegal had a score of 39/100, above the average in sub-Saharan Africa (35) but below the performance of Togo (41) or Ivory Coast (55).

D. GAS TO POWER " THE OTHER STRATEGY

Gas resources discovery and the adoption of the "Gas to Power" strategy will change the situation in the coming years. By converting its polluting power plants to gas and continuing to develop renewable projects, Senegal intends to both lower electricity prices and green its energy production.

"This model should enable a competitive average cost in the sub-region between 2025 and 2030 while maintaining a good quality of service"s predicts Ahmadou Said Ba, who points out that Senegal should also join Ivory Coast as a leading supplier of the WAPP interconnected network.

To succeed, the country must also continue its efforts on several levels: increase its electricity production capacity by 40 to 50 MW per year to meet the growth in demand; complete the electrification of the country, which is currently at 65%; continue the renovation of the network begun in 2016 to limit losses; and keep up the pace on renewable energy to meet the target of 30% by 2025.

4.1.3. WASTE MANAGEMENT NATIONAL PROGRAM ORGANIZATION AND IMPLEMENTATION

La Mise en place de la SONAGED : Une Opportunit   pour les entreprises finlandaises

Oil & Gas discovery in Senegal has led to profound changes in all sectors and especially in the environmental sector and therefore in our study related to the waste management sector.

To anticipate the environmental problems, the state of Senegal has organized the sector to take into account waste in its globality by including those related to oil and gas and has created SONAGED (national company of waste management)

The State of Senegal holds the initial capital of SONAGED at 100%. In terms of socio-economic benefits, SONAGED"s activities will lead to the creation of more than 17,000 jobs after five years and the treatment of 2.5 million tons of waste per year. Also, 200 billion CFA francs will be needed to ensure the operation of the company and to meet the expenses with the collection service providers (concessionaires), suppliers, among others, at the level of the 557 territorial communities concerned.

The aim is to ensure a triple perspective of professionalization of the sector, job creation and waste recovery development industry to build a & Senegal with zero waste territories.

A. STRATEGIC DIRECTION



MBEUBEUSS LANDFILL SITE, AN ECOLOGICAL TIME BOMB

The strategic direction within SONAGED is based on the following main points :

- Transition towards circular economy.
- Cleanliness Culture Establishment.
- Waste management services strengthening.
- New waste management services creation.
- Management of the treatment infrastructure carried out by the State (PGD-SU).
- Waste recovery industry development.

To support the development of SONAGED, the State of Senegal has set up a support structure, PROMOGED, World Bank and the Spanish

Agency for International Development Cooperation, also known as AECID, helped the Senegalese government decide on a project. This project is part of Phase 2 of the National Waste Management Program, or PNGD.

The objective of PROMOGED is to:

Support inter-communal cooperation among the beneficiary communes and the waste management chain that can be improved. In addition, integrated waste management can be promoted through these efforts. Waste recovery must consider its socio-economic aspects.

The sector should consider reforming the financial, regulatory, and institutional frameworks.

It is crucial to involve the private sector in integrated sustainable management systems in the appropriate context.

PROJECT TO UPGRADE THE MBEUBEUSS LANDFILL



The Mbeubeuss landfill will eventually be absorbed into the surrounding environment as waste management strives to reduce its volume.

A new approach to household waste treatment is being developed.

It involves the gradual reconstruction of the Mbeubeuss landfill with sorting and composting systems. The objective of this plan is to provide a place for the burial and treatment of solid waste, which can then be resorbed by the land.

To restore the site, during the clean-up phase of the work, non-recyclable waste is stored in an environment that is completely safe for people and the environment.

5. INTERVIEW

KHADIJAH A. BA

DERMOND GROUP.

is undoubtedly these last years, in the very closed oil and gas industry, In less than five years, the Senegalese energy The steps to win the bet: to constitute a reference group in the field African hydrocarbons, but not only.

Your company is more and more famous, but not you. who are you? can you briefly describe your personal journey, how did you integrate The world of oil?

I started my studies and my professional par- courses in Montreal. I got my bachelor's degree there French Economic and Social Sciences. only one person, mine the kadimba brothers who kept telling me Talk about this mysterious hy- hydrocarbons. i read them every month Newsletter, i remember him so much I couldn't wait to ask him questions this department. The day his article was published Hydrocarbons are part of it for me Elements that guide my selection. Then in the meantime, I choose to do my Internship at BP in Calgary, from the moment I really found my passion Petroleum industry. After Li Xue graduated from Pôle Universitaire Paris Sorbonne in Abu Dhabi, I started my MBA

Full-time course from 9am Nine Months 5pm - Technip Abu Dhabi", one of the world's leading project. I go to class in the evening. Then, during the preparation of my master program. I am in the middle of "Schlumberger" East SA", almost two and a half years. This is a rare opportunity to enrich my practical knowledge and to acquire new skills. In addition, I have a chance to be exposed to the United Kingdom, France and the United States Cain, belongs to this sector of great wealth. living in Abu Dhabi and have a lot of experience In the oil and gas industry, I Knowing that it is time to realize my dreams and founded his own company in 2015 Der Mond Group and Mond Oil and Gas Company.

Why did you start Der Mond Oil & Gas rather than pursue such a promising career in a large company A multinational in the field?

What is your motivation?

The oil and gas industry has shaped the world we live in let us. Become a player in this industry will be faced with the following challenges current geopolitics, which allows Better understand the world, but the world is changing, I understand It's time to respond in- the game of tomorrow. com is coming Young talent is needed, especially The place of women in this industry, However, which is considered very masculinity and development that will be needed some Western countries because The latest discoveries in this field, Confirm that I made the right choice. can rise naturally.

You run a relatively young company but which aspires to be one of the references in its sector in Africa, what actions do you intend to take to achieve this ambition?

When we think of reference in this sector, we should not think in terms of size. Creating a new Exxon or Total is not our ambition, and in any case, I don't think it is possible today.

We want to become a benchmark through our actions with our employees, our partners, the host countries and their populations and the implementation of Der Mond Academy clearly demonstrates that we are moving in this direction.

Senegal, your country, will very soon join the very closed circle of oil producing countries. As a major player in the sector, what should the country do to take full advantage of this manna

What my country is doing to support these discoveries is truly unique.

unique. I would like to take this opportunity to thank our government for this,

The only goal is to ensure that these developments benefit the entire

population. To do this, we had to go and see how things are done elsewhere. Drawing inspiration from the and put in place the rules to avoid the negative.

Oil discoveries are a blessing for Senegal, let's not make them a curse.

let's not make it a curse.

I am convinced that our country is politically mature enough to support the success of these developments.

Your company is in a sector that generates a lot of profit, is corporate social responsibility one of your priorities?

If yes, what are the actions carried out in this sense?

Der Mond Group is fully aware of its responsibility in the social development of the countries in which we operate. The launch of the Academy is a perfect example.

Namely, to ensure firstly, that my fellow citizens are able to apply for the jobs that this new oil industry will surely generate.

We are also discussing with the competent authorities to identify other needs, other projects.

How do you see the future of Der Mond Oil & Gas?

Do you plan to open subsidiaries in other sectors of activity?

Do you have plans to open branches in other African countries?

Der Mond Group will develop on its strong points in the Middle East, in Pacific, Africa, Senegal of course but also the sub-region where we are already present. However, I firmly believe that Senegal has the vocation to become an energy hub for the region. Der Mond Oil & Gas is a division and I would say the heart of Der Mond Group, which also does business in metals and precious stones, as well as luxury pearls. We have added Der Mond Real Estate to invest in real estate and most recently, as I mentioned, in training and consulting with Der Mond Academy. All this would not have been possible without the support of my family, whom I would like to thank.

I would also like to thank my board of directors, my advisors and mentors as well as the council of 5 wise men for their guidance and unfailing support over the years. They have always believed in me and my abilities and as they often say as they often say: "it is absolutely necessary to channel this energy of Khadijah in the right in the right direction". I would like to take this opportunity to pay them a big tribute.

Interview by A.C. Diallo

6. CONCLUSIONS AND RECOMMENDATIONS

I - SUSTAINABLE ENERGY AND ENERGY EFFICIENCY

In terms of strengthening renewable energies, opportunities are open for the installation by 2030 of a cumulative installed capacity of 235 MW in solar, 150 MW in wind and 314 MW in hydroelectricity.

With regard to energy efficiency, targeted energy audits can lead to energy savings estimated at 627.028 GWh.

II - SUSTAINABLE WASTE MANAGEMENT:

Real opportunities in terms of waste recovery exist in the following segments :

- Recovery and flaring of methane from landfills
- Energy recovery from landfill methane
- Recovery of sludge from wastewater treatment plants
- Recovery and energetic valorization of methane from wastewater treatment plants
- Recovery and energetic valorization of waste oils.
- Recovery and recycling of plastic waste, tires and glass
- Creation of a private training and certification center for clean technologies and energy efficiency technologies.

II.

ESSENTIAL OILS

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I . INTRODUCTION & JUSTIFICATION

For centuries, entire civilizations have used essential oils for cosmetics, medical or religious purposes. Today, these oils are still widely used and play an important role in international trade.

In this context, we have noted an exponential growth supported by the extent and diversity of the sectors of use of these oils.

In West Africa, the extraction of essential oils has experienced significant development in some countries with a huge success in Ghana, Benin and Togo.

In Senegal there is a strong demand for essential oils, mainly mint, citronella and citrus.

However, the supply of such products comes essentially from imports, the cost of which is estimated at several hundred million CFA francs.

This is why the government of Senegal, in its strategy to diversify agricultural activity towards high-value-added products, is encouraging the production and processing of biomass with a high essential oil content.

Thanks to sufficient availability of water and land, Senegal offers the possibility to plan and realize a sufficient production of biomass whose oils are the most demanded on the world market. These are Lemongrass, Mint, Eucalyptus, Lemon, Desert Date Palm, Vetiver, Basil, etc.

2. AREAS OF APPLICATION

Essential oils are used as raw materials for various sectors of the economy. Their use has increased considerably in recent years due to strong industrial demand and consumer interest, especially for organic products.

The cosmetics, soap and perfume industry represents 60% of the total demand for natural substances. They are used as basic raw materials in the manufacture of perfumes and other cosmetic products, often in small quantities at high prices.

In the food industry, they are used to enhance the taste of food and preservation thanks to the antimicrobial and antioxidant effects of some of their constituents which replace chemical or synthetic preservatives that are harmful to health.

According to the World Health Organization (WHO), 80% of the world's population relies on traditional medicines to meet their primary health care needs:

Essential oils are a very effective therapeutic tool that can be used to expand the scope of conventional medical treatments.

In this regard, it should be noted that the world market for traditional herbal medicines is estimated at 60,000 million US dollars.

Essential oils, thanks to their anti-infectious, analgesic, anti-inflammatory, sedative, antimicrobial, antispasmodic and antioxidant properties, are used in different pathologies (digestive, infectious, ...) and its antioxidant activity allows to fight against oxidative stress.

They also present insecticidal activities at the base of production of Biopesticides largely advantageous compared to the phytosanitary products harmful to human health and the environment. They are used in the formulation of cleaning and degreasing products, for example, d-limonene used for 50 years as a flavoring is increasingly used in recent years as a cleaner and degreaser. It is found in mechanical maintenance, the manufacture of metal products, cleaning, aircraft fuselage and the cleaning of printed circuit modules.

3. THE GLOBAL MARKET

The global Essential Oils (EO) market is experiencing a clear evolution estimated in 2018 at 7.51 billion dollars. Its annual growth of 9% expected until 2026 should allow it to reach 15 Billion dollars at the end of this year (see table below).

REPORT COVERAGE	DETAILS
BASE YEAR:	2018
2018 MARKET SIZE:	7.51 BILLION (USD)
FORECAST PERIOD:	2019 TO 2026
FORECAST PERIOD 2019 TO 2026 CAGR:	9%
2026 VALUE PROJECTION:	15 BILLION (USD)
HISTORICAL DATA FOR:	2015 TO 2018
SEGMENTS COVERED:	PRODUCT AND APPLICATION
GROWTH DRIVERS:	<ul style="list-style-type: none">• North America: Expansion of the aromatherapy market which is likely to have a positive influence on the demand for essential oils• Europe: Growth in cosmetics manufacturing due to increased exports is likely to drive the application of essential oils in this sector• Asia-Pacific: The growth of the health sector in the region is leading to an increasing use of new ingredients in medicines which may promote the demand for essential oils
TRAPS AND CHALLENGES:	<ul style="list-style-type: none">• Health problems caused by essential oils• Specified storage and transportation conditions leading to supply problems and additional costs

SOURCE

GLOBAL INSIGHT

3.1. OUTLETS FOR ESSENTIAL OILS (EO)

Distribution in value by market segments in 2015 (see table) source: Quimdis

2.2.1 TOP 10 ESSENTIAL OILS (EO) PRODUCTION WORLDWIDE IN 2019

Le marché mondial des Huiles essentielles (HE) connaît une nette évolution estimée en 2018 à 7,51 milliards de dollars. Sa progression annuelle de 9 % prévue jusqu'en 2026 devrait lui permettre d'atteindre 15 Milliards de dollars à la fin de cette année (voir tableau ci-après).

ESSENTIAL OIL	2019 PRODUCTION ESTIMATE	2019 VALUE ESTIMATE
ORANGE	49 000 T	294 M€
MINT ARVENSIS	42 000 T	840 M€
LEMON	9 000 T	225 M€
EUCALYPTUS	4 000 T	88 M€
PEPPERMINT	3 500 T	112 M€
LEMONGRASS	3 000 T	81 M€
CLOVE	2 500 T	52 M€
SWEET MINT	2 000 T	58 M€
CEDAR	2 000 T	
LAVANDIN	1 700 T	42 M€
PATCHOULI	1 400 T	69 M€

SOURCE

FRANCE AGRIMER

3.2.2 LISTE NON EXHAUSTIVE DES PRODUCTIONS D'HUILES ESSENTIELLES

EO	2019 PRODUCTIONS ESTIMATE IN T	PRODUCING COUNTRIES
TEA TREE	400	AUSTRALIA
LEMONGRASS	350	INDIA, CHINA, GUATEMALA
TANGERINE	350	BRAZIL, SPAIN, MEXICO
ROSEMARY	200	SPAIN, TUNISIA, MOROCCO
CEYLON CINNAMON	200	USA, SRI LANKA, CHINA
VETIVER	200	HAITI, INDONESIA, CHINA, INDIA, FRANCE (REUNION), BRAZIL
CORIANDER	150	RUSSIA, EGYPT, POLAND, ROMANIA
CINNAMON LEAVES	150	SRI LANKA, SEYCHELLES, INDIA
MANDARIN	100	ARGENTINA, ITALY
BERGAMOT	100	ITALY, IVORY COAST, GUINEA
PALMAROSA	80	INDIA, BRAZIL, PARAGUAY
CAJEPUT	80	VIETNAM, INDONÉSIE
SANDALWOOD	45	INDE, INDONÉSIE, AUSTRALIE
LAVENDER ASPIC	20	SPAIN, FRANCE
ROMAN CHAMOMILE	12	MOROCCO, EGYPT, BELGIUM, ITALY, FRANCE
NEROLI	4	SPAIN, PARAGUAY, TUNISIA
ROSE HE	4	BULGARIA, TURKEY, INDIA, CHINA

SOURCE

FRANCE AGRIMER BASED ON EXPERT SURVEYS

3.2.3 INTERNATIONAL TRADE

■ GLOBAL VALUE OF TRADE IN 2019: €4.2 BILLION

VALEURS DES EXPORTATIONS 2019

INDIA	770M€
USA	609 M€
FRANCE	377 M€
CHINA	288 M€
ARGENTINA	193M€
BRAZIL	184 M€
ITALIA	157 M€
GERMANY	149M€
UNITED KINGDOM	145 M€
NETHERLANDS	142 M€

75 % OF THE VALUE OF TOTAL EXPORTS

■ GLOBAL VALUE OF TRADE IN 2019: €4.2 BILLION

VALEURS DES IMPORTATIONS 2019

USA	848 M€
INDIA	569 M€
FRANCE	354 M€
GERMANY	301 M€
CHINA	213 M€
NETHERLANDS	211 M€
UNITED KINGDOM	199 M€
JAPAN	174 M€
IRELAND	165 M€
SINGAPOUR	131 M€

75 % OF THE VALUE OF TOTAL IMPORTS

SOURCE

TDM

3.3. FAIR TRADE NICHES

The current functioning of the world economy suffers from increasingly flagrant imbalances that particularly affect producers of tropical agricultural products, victims of agro-industrial policies based essentially on yields and profit. Prices and purchase conditions are imposed on them without negotiation and most often; these purchase prices do not even cover production costs. Thus, according to the Food and Agriculture Organization of the United Nations, 800 million of the 840 million people suffering from hunger in 2005 are farmers.

The current organization of trade is often:

- Without the knowledge of the producer and the consumer: the producer does not know the destination of his product; the consumer is unaware of its real profitability;
At the expense of the producer and the consumer: the most powerful intermediaries (major brands, industrial groups, financial organizations, large distributors, central purchasing agencies) impose their rules, their prices, and even their products, on producers and consumers alike.

In light of this, the objective of fair trade is to allow producers and consumers to live their dignity and autonomy, by regaining control and meaning of their actions. Fair trade was born in 1968 at the 2nd United Nations conference on development, at the end of which small coffee producers in Chiapas faced with falling world prices, demanded fair trade. Benefiting from it:

- Directly, more than 1,500,000 producers in 60 countries in Asia, Africa and Latin America,
- Indirectly, more than 5 million people.

Fair trade is reaching an increasingly wide audience and many initiatives are emerging: new channels, diversification of the products concerned and development of distribution networks.

3.3.1. SIGNIFICANCE OF THE DEMAND FOR FAIR TRADE PRODUCTS

According to the UNDP, the fair trade turnover represented 700 million to 1 billion dollars in 2003, or about 0.1% of European trade and 0.01% of world trade.

The Swiss market is the leader in the consumption of fair trade products and has grown from 10 € per year in 2002 to 18 € in 2005. The followers are, in order of importance: the Dutch market, the British market where sales of fair trade coffee reached nearly 50 million pounds in 2004, or 71.7 million Euros, the Austrian market where, due to a significant media coverage, organic fair trade coffee represents 70% of this market and finally France with the consumption of 1.20 € in 2005.

3.3.2. DISTRIBUTION CHANNELS

Nearly 3,000 organizations in 20 European countries are involved in the promotion and development of fair trade as their main activity.

The products and services are marketed through three channels :

- specialized stores, otherwise known as "world stores" (about 3,200 points of sale)
- mass distribution (more than 43,000 large and medium-sized stores, including more than 10,000 in France).
- E-commerce, which is now becoming increasingly important...

In the United States, fair trade outlets are also developing in a significant way, with 400 stores opened, particularly through the TEN THOUSAND VILLAGES brand, which has 300 stores. This association, which is also present in Canada and is a member of IFAT, has succeeded in making its stores more dynamic by rationalizing its product lines and professionalizing its employees.

In Canada, there are also major fair trade organizations. Many coffee roasters and suppliers have re-grouped in an association to share their products. Among them: Alternative Grounds, Equal Exchange, Equiterre or La Siembra. This practice has spread to other sectors such as the textile industry with the Ethical Trading Action Group.

THE ECOWAS-UEMOA MARKET FOR ESSENTIAL OILS

In West Africa, there is a certain paradox in the essential oils market, as much as the richness of the flora should allow the production of essential oils, the user industries of these countries import most of their needs, which are a minimal part of the world demand for essential oils.

To meet local demand, Senegal, Togo, Ghana and Benin import almost all their essential oils from Europe, Asia and North America. In the sub-region, the volume of imports is modest. The uses are in the food, cosmetics and pharmaceutical sectors.

For Togo, Benin and Ghana, the needs for Citronella Essence in 1996 were estimated at 240 tons/year. The following tables provide information on the aggregate values of imports of essential oils, perfumes and flavors in WAEMU and ECOWAS countries.

¹ Plateforme pour le commerce équitable, www.commerceequitable.org et AlterecoPWC conseil. Etude mondiale sur le commerce équitable.

TABLE 1 ESSENTIAL OIL IMPORTS IN THE WAEMU ZONE BETWEEN 2001 AND 2005

WAEMU	2001	2002	2003	2004	2005
			VALEURS IMPORTATIONS HUILES ESSENTIELLES, PARFUMS ET AROMES EN FCFA		
SENEGAL	33'742'427	46'112'580	42'456'061	48'228'466	63'893'787
IVORY COAST		124'285'000	150'525'000	UEMOA	
BURKINA FASO	3'735'000	1'010'000	1'630'000	1'605'000	
MALI	15'885'000				
NIGER					
BENIN	2'835'000	2'580'000	1'905'000	1'070'000	295'000
TOGO	8'970'000	12'170'000	16'845'000	16'035'000	5'630'000

TABLEAU 2 ESSENTIAL OIL IMPORTS IN OTHER ECOWAS COUNTRIES BETWEEN 2001 AND 2005

OTHER ECOWAS COUNTRIES	2001	2002	2003	2004	2005
			VALEURS IMPORTATIONS HUILES ESSENTIELLES, PARFUMS ET AROMES EN FCFA		
SENEGAL	33'742'427	46'112'580	42'456'061	48'228'466	63'893'787
NIGERIA	285'560'000	294'480'000	291'750'000		
CAP VERT	610'000	2'600'000	4'560'000	5'310'000	
SIERRA LEONE		570'000			
LIBERIA					
GHANA	68'100'000	125'850'000	120'950'000	128'535'000	
GAMBIE	410'000	405'000	1'095'000	350'000	230'000

The most significant import markets in the West African region are, in order of importance, Nigeria, Ivory Coast and Senegal, with an average value of CFAF 400 million per year.

Mauritania's demand

Mauritania imports modest quantities of essential oils. For 2004, agri-food statistics show a value of CFAF 15,475,000, representing 0.8% of total imports in the sector.

It seems that this sub-sector, along with the hygiene and beauty sector, is the main consumer of essential oils. There is no locally produced cosmetic products, except for a few basic products such as petroleum jelly. Although no study on the consumption and distribution of cosmetics and hygiene products in Mauritania is available, the growing number of institutes, beauty salons, and hair salons indicates that this market is growing. There is no statistical data on the number of people working in this sector or on the annual value of cosmetics and hygiene products imported into Mauritania.

The Mauritanian market is largely supplied by products imported from the Gulf and Asia, but European branded products are also available.

Perfumes and cosmetics are among the most popular foreign consumer goods in Mauritania. This is an important and promising market in both the formal and informal sectors.

The following categories of distributors can be distinguished :

- The wholesale distributors generally import from Asia and the Gulf countries, which have a large storage capacity and supply retailers on a continuous basis. These products are often counterfeit, but thanks to their prices, they are within the reach of the majority of the population; this is why we find them in "every corner" of the country. * The importers are the exclusive representatives of the brands that have their own distribution network and usually market their products through supermarkets, grocery stores and pharmacies.

- Individual distributors and traders: This is the most developed model in Mauritania at this time. It is far from being negligible. The products are marketed in small non-specialized stores run by women; for example, beauty salons and hairdressing salons...

Pharmacies sell brand name hair and body products. Large retailers are private supermarkets. The informal sector covers virtually all sectors of activity and plays an important role in the country's economy. It meets the demand of consumers with low purchasing power.

The production and import of cosmetic products are free in Mauritania provided that customs duties and import taxes are paid. All imported goods must be subject to a Preliminary Import Declaration (PID).

Customs statistics on the import of essential oils are as follows:

TABLEAU 3 VALUE OF ESSENTIAL OIL IMPORTS INTO SENEGAL BETWEEN 2000 AND 2007

YEAR	FCFA VALUE	WEIGHT IN KG
2000	47'529'249	13'224
2001	33'742'427	9'732
2002	46'112'580	11'298
2003	42'456'061	15'631
2004	48'228'466	35'681
2005	63'893'787	50'422
2006	55'587'452	19'158
2007	47'493'031	23'117

Customs statistics show that citronella and mint essential oils constitute the vast majority of Senegal's imports

Estimation FAO, 2004, www.fao.org

Source : ubifrance.fr

TABLEAU 4 SENEGALESE IMPORTS OF CITRONELLA AND MINT ESSENTIAL OILS BETWEEN 2002 AND 2005

YEAR	2000	2003	2005
CITRONELLA		QTY IN KG	
	8.035	6.322	1.308
MINT		QTY IN KG	
	13.954	5.365	2.273

TABLEAU 5 THE MAIN COUNTRIES SUPPLYING SENEGAL WITH ESSENTIAL OILS

2007 TOTAL IMPORTS	VALUE	WEIGHT	% VALUE
TOTAL SAUDI ARABIA	2'127'206	1'740	4.48%
TOTAL CHINA	15'879'826	7'552	33.44%
TOTAL IVORY COAST	1'396'389	1'619	2.94%
TOTAL UNITED ARAB EMIRATS	1'587'510	5'054	3.34%
TOTAL USA	132'706	159	0.28%
TOTAL FRANCE	23'609'276	5'164	49.71%
TOTAL HONG KONG	913'338	958	1.92%
TOTAL LIBANON	325'000	100	0.68%
TOTAL MAROCCO	1'521'780	771	3.20%
TOTAL	47'493'031	23'117	100.00%

TABLEAU 6 IMPORT SHARE OF USER SECTORS IN ESSENTIAL OIL IMPORTS TO SENEGAL IN 2006

SECTEURS	VALUE	WEIGHT	%
FOOD			
COSMETICS / BEAUTY	9'881'454	2'310	18%
TRADE / INFORMAL	12'249'835	13'339	23%
DRUGS	2'007'801	200	4%
PHARMACY	29'971'264	2'217	55%
TOTAL	54'110'354	18'066	100%

TABLEAU 7 IMPORT SHARE OF USER SECTORS IN ESSENTIAL OIL IMPORTS TO SENEGAL IN 2007

SECTEURS	VALUE	WEIGHT	%
FOOD	38'029	1	1.0%
COSMETICS/ BEAUTY	9'335'834	2'980	20%
TRADE /INFORMAL	17'478'782	18'584	37%
DRUGS	2'464'287	230	5%
PHARMACY	16'788'469	767	38%
TOTAL	46'105'401	22'562	100%

Les pharmacies vendent des produits de marque pour le corps et les cheveux. Les gros détaillants sont des supermarchés privés. Le secteur informel couvre pratiquement tous les secteurs d'activités et joue un rôle important dans l'économie du pays. Il répond à la demande des consommateurs à faible pouvoir d'achat. La production et l'importation des produits de cosmétique sont libres en Mauritanie pourvu que l'on se soit acquitté des droits de douanes et des taxes à l'importation. Toutes les marchandises importées doivent faire l'objet d'une Déclaration Préalable d'Importation (DPI).

Les statistiques douanières montrent que les huiles essentielles de citronnelle et de menthes représentent la grande majorité des importations du Sénégal.

The **pharmaceutical sector** is the largest buyer of essential oils in Senegal and includes industries that manufacture derivative products and wholesalers that sell them as they are. The latter are in the majority in terms of value purchased. Their main customers are the beauty and aromatherapy sectors (health institutes, households) but also the residual demand from the pharmaceutical industries.

The pharmaceutical industries in Senegal manufacture products under license. Their essential oil imports are generally rectified or fractionated essences.

The quantities of oils purchased per reference are very modest. For example, the largest buyer in the industrial pharmaceutical sector does not exceed 50 kg of essential oils per year for the most common products and 20 kg for specific products such as essential oil of niaouli.

The **pharmaceutical distribution sector** buys products packaged in small formats and resells them mainly to retailers whose final customers are in the aromatherapy and beauty care sectors.

The **trade sector** includes all independent traders in the so-called informal sector or all companies distributing consumer goods. The main clients of this sector are :

- Artisanal manufacturers of incense and scented candles: as a result, most of the imports for this sector come from the United Arab Emirates, Saudi Arabia or China.
- Beauty salons (body care and massages) which are developing at a rapid pace.
- The cosmetics and perfumery sector is ranked third in relative value on the market of importers of essential oils in Senegal. These are perfume and cosmetic industries but also beauty and body care institutes.

There are six perfume manufacturers in Senegal who sell products under their own brands that are adapted to the local market. They supply 90% of the local market. They are: PARFUMERIE GANDOUR, SIPARCO, UNIPARCO, SYBEL COSMETICS, SIVOP SE, SECOS INDUSTRIE. Local productions compete directly with each other, as they are aimed at the "entry-level" segment, which represents a large customer base. The sector's turnover is in the order of 3 to 5 billion CFA francs for some companies.

The raw materials are imported from Europe, mainly relatively small quantities of essential oils (France and Germany), as well as glass packaging. Most of the raw materials of the sector are flavored bases and synthetic products imported from France.

The sector has seen many new participants, mainly small artisanal businesses that have started to export ethnic products. One of the leaders is the MAISON DU KARITÉ, which stands out for the sale of essential oils and other shea-based products. The company has also set up a small essential oil extraction unit and sells its products on the national market through 3 stores and on the international market through the fair trade network.

The care and beauty institutes use essential oils mainly for massages or other beauty treatments.

The **food sector**, like the pharmaceutical sector, some food industries use essential oils as inputs. However, most of them import either processed products, i.e. non-pure essential oils (rectified or fractionated) or already prepared flavors like the beverage industry. The potential segments for pure essential oils remain those of pastry and confectionery. The quantities used here are also minimal.

5. RECOMMENDATIONS AND CONCLUSION

This study shows that the essential oil production sector is growing rapidly. This is mainly due to strong global demand, the considerable increase in users who are abandoning chemical or synthetic products in favor of natural products and also to the new high-performance and sustainable technologies used in the extraction of essential oils.

In Senegal, the management of the different value chains of the identified products can generate upstream the creation of thousands of agricultural jobs in a sector in birth. Not to mention those that will come from the industrial valorization of the generated biomass as well as from commercial distribution systems.

This new activity will also give rise to a new relationship between research and development, industry and agriculture for the composition of essential oils, cultivation techniques and the choice of equipment for extraction and industrial production.

Thus, this new approach to inclusive and innovative industrial development that integrates the use of appropriate technologies, empirical knowledge of the agricultural world, and scientific and technical research will be an important lever for the generation of models of good practice useful for the economic development of Senegal.

To this must be added the existence of favorable conditions such as:

- Availability of sufficient arable land for the production of the necessary biomass
- Availability of sufficient water resources
- Availability of abundant and cheap labor
- Existence of natural plants with high added value and not valorized to date
- An institutional, financial and intellectual support system conducive to the development of this sector (agropolis, investment funds, regional universities and agricultural research centers, tax and customs incentives, etc.)

To conclude, we must remember that Senegal offers the necessary opportunities for the development of the innovative industrial sector of essential oils driven by a booming global demand solvent and high value added.

The involvement of the Finnish private sector in the choice of effective, efficient, clean and sustainable technologies such as those using supercritical fluids, ultrasound, microwaves, solar and biomass, can position Senegal within a reasonable time on a segment of the world market of essential oils that brings new wealth and massive and sustainable employment (vetiver, basil, desert date palm, moringa olifeira, etc.)

III.

AGRO-INDUSTRIES IN SENEGAL, POTENTIAL PARTNERSHIP WITH FINLAND

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I . INTRODUCTION

Figure 1 below shows the geographical position of Senegal: a privileged position that makes it the gateway to West Africa.



1. SOME MAJOR TRENDS IN SENEGAL

Surface area : 197 161 km² ;

- Arable land: 3.8 million ha (20% of the country's surface), 2.5 million ha sown in average per year;
- Climate: Soudano-Sahelian allowing three growing seasons (wintering; dry counter-season; river counter-rainy season).
- Rainfall: North about 300 mm / year; Center about 600-800 mm / year; South - East about 1200 mm / year;
- Water resources: 35 billion m³ (Surface water: 31 billion m³ Groundwater: 4 billion m³);
- Irrigation potential: 350,000 ha of which only 130,000 ha are developed;
- Population: 16,705,608 inhabitants (54.82% live in rural areas and 2/3 are under 25 years old) according to ANSD data, 2020.
- Major crops: Most of the area is dominated by rainfed crops (millet, sorghum, maize, groundnuts, cotton), accounting for 96% of the area planted. Irrigated areas account for only 4%. The country's main crops are cereals (millet, sorghum, maize and rice), cash crops (groundnuts and cotton) and the horticultural sector (market gardening, fruit trees). Available local production fell from 120 kg/capita in 1988 to 80 kg/capita in 2006.
- Type of agriculture: Family farming (about 90% of family farms), Agro-business / Industrial agriculture (National and International Investments).

Agriculture and fishing play a major role in the Senegalese economy. The country's most important resources are fishing, tourism and, in the agricultural sector, the production of peanuts (the country's main cash crop). The agricultural sector, which is essentially seasonal and rainfed, employs almost 70% of the population but contributes only 13.7% of GDP (ANSD, 2013). In 2018, the real GDP growth rate is estimated at 6.7% compared to 7.1% in 2017. Indeed, growth in 2018 was driven by the primary (+7.9%), secondary (+6.7%) and tertiary (+6.3%) sectors; (DPEE, 2018). The major feature of Senegal's climate is the great spatial variability of rainfall, which varies on average between more than 1,000 mm in the south and less than 300 mm in the

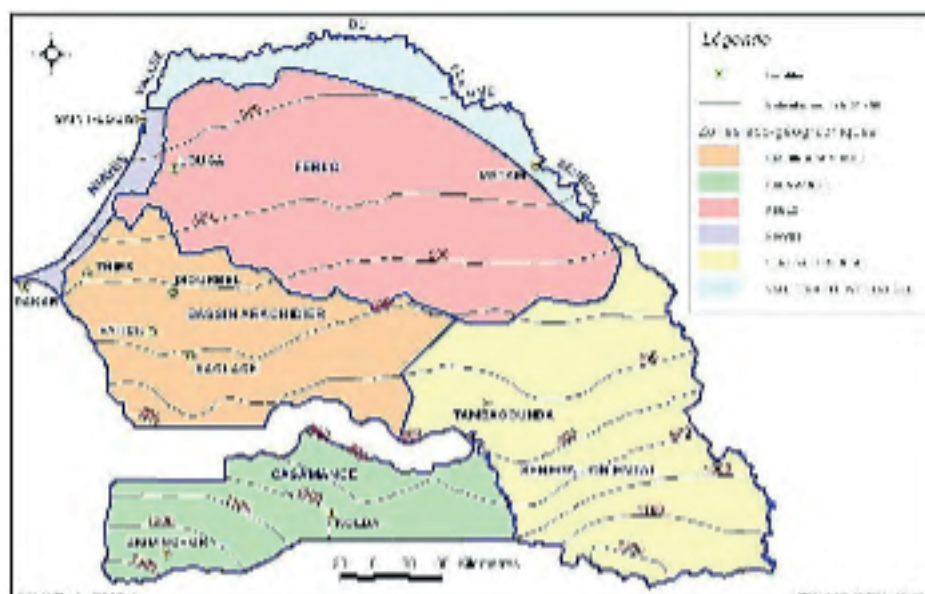
north. The spatial distribution of rainfall allows the country to be divided into two major climatic regions on either side of the 500 mm isohyets (see Figure 1). Recent climatic changes in Senegal are reflected in:

- A decrease of about 30% in rainfall;
- An increase in temperature of about 0.9°C;
- Increasing aridification of the northern part;
- A strong trend towards aridity in the central regions and
- A more or less strong tendency towards semi-aridity in the southern regions.

Crop yields appear to be very sensitive to changes in both rainfall and temperature. Climate change will have a negative impact on soil quality indicators such as carbon, which determines fertility. The consequences are a decrease in crop yields.

Agricultural imports represent 1/3 of total imports, while agricultural exports barely reach 1/5 of total exports. Food imports increased steadily over the period 2001-2007 with an average growth rate of 12.1% over the period. The most imported food products are rice (30.8%), wheat (9.3%), milk (7.1%), soybean oil and its fractions (6.8%), and the most exported agricultural products are fresh and frozen fish (27.6%), mollusks (16.2%), peanut oil and its fractions (12.0%), and shellfish (11.7%).

FIGURE 2 ZONES ÉCO-GÉOGRAPHIQUES DU SÉNÉGAL (CSE, 2011)



2. AGRICULTURAL POLICIES

The Senegalese government has decided to place agriculture at the heart of economic and social development through the Emerging Senegalese Plan (PSE), and to rely on this important lever in its desire to accelerate the pace of growth in order to achieve macroeconomic and emergence objectives by 2035. Thus, the Ministry of Agriculture and Rural Equipment (MAER) has developed and implemented, since 2014, the Senegalese Agriculture Acceleration Program (PRACAS) and the Sectoral Policy Letter for the Development of Agriculture (LPSDA) 2019-2023. These strategic frameworks are operationalized through projects and programs included in the program budget documents of the WAEMU's harmonized public financial management framework in force since the 2020 budget year.

To support the development of the agricultural sector, the State and its technical and financial partners inject an average of \$159 billion per year, 51% of which comes from internal resources. Through the combined efforts of the State and its partners, food security for rural households has improved significantly thanks to the increase in family farming production and household income.

Today, these gains are likely to be compromised by external shocks, including the Covid-19 pandemic and the war in Ukraine, which pose a real threat to productive and economic activity in the world in general and in Senegal in particular, thus accentuating the vulnerability of women and young people in the rural world.

Despite the increase in production of the main crops, Senegal must turn to external sources to meet its overall food needs, particularly for rice, corn, onions, potatoes, wheat, etc. One of the impacts of Covid-19 is the certainty of a global agricultural underproduction or prioritization by the main food exporting countries, resulting in an unprecedented deficit in basic foodstuffs for importing countries, as evidenced by studies conducted by the UN body in charge of agriculture and food (FAO).

In order to contain the negative impacts of the corona virus pandemic, to boost socio-economic activities and to keep the country on the path of emergence initially adopted, the Government of Senegal has taken the option of implementing the Economic and Social Resilience Program (ESRP) and adjusting the Priority Action Plan (PAP) of phase 2 of the PES into an Adjusted and Accelerated Priority Action Plan (PAP2A).

In this context, the development of agricultural sectors will be based on sustainable and environmentally friendly agriculture, in order to strengthen the resilience of vulnerable communities through the implementation of measures to reduce the precariousness of agricultural activities. This involves the implementation of structuring investments that reduce the dependence of agriculture on climatic hazards in accordance with the national resilience strategy under preparation. This will make it possible to break the isolation of production areas. Also, the markets will have to be revitalized through their physical and commercial functioning.

The program is based on improving access to markets for agricultural products. The very strong constraint of access to rural areas will be taken into account with the repair and construction of production tracks and the creation of access roads.

The main measures planned are as follows:

- Support for the management of the quality of agricultural products (for consumption and export) and the monitoring of the environmental impact of phytosanitary treatments;
- Rehabilitation and creation of production tracks;
- The creation and rehabilitation of access roads;
- The construction of storage, processing, packaging and conservation infrastructures for products targeting the domestic and export markets;
- The promotion of the enhancement of local products and their labeling;
- The widespread adoption of a marketing strategy based on a value chain approach using contractualization;
- The improvement of artisanal processing of agricultural products by supporting women's groups in particular, in conjunction with the Ministries in charge of women, SMEs and trade.
- Facilitating contractualization between Producers' Organizations and industrialists, semi-industrialists and traders.

- The establishment of links with agro poles for the marketing and development of agricultural products.
- The construction and rehabilitation of rural roads
- The construction and rehabilitation of storage warehouses with natural ventilation (onions)
- Construction and rehabilitation of warehouses (seccos);
- Construction of new storage warehouses for paddy;
- Construction of new warehouses specifically dedicated to phytosanitary products.

In addition, Senegal highlights the opportunities of the agricultural sector for increased industrialization with the creation of agro-industrial parks that target regions with high potential for economic transformation of agriculture, development of SMEs and job creation.

In Senegal, there have been industrial estates in the different regions for several years, and more recently, special economic zones (SEZ), which are areas where economic activities can be carried out and which are intended to offer a set of infrastructures and services that provide companies with the best possible conditions for carrying out their activities.

Companies, including SEZ promoters/developers, can benefit from an incentive package that entitles them to tax and customs exemptions. As provided for in Law No. 2017-07 of January 06, 2017, on the incentive package applicable in SEZs and Decree No. 2017-1174 implementing Law No. 2017-07 of January 06, 2017, the exempted companies will benefit over a 25-year re-renewable period :

- The right of admission free of all duties and taxes levied at the customs cordon, excluding community levies on raw materials, equipment, other goods and the right to export the same goods free of charge outside the national territory;
- An exemption from the payment of all income taxes;
- A tax rate of 15% on corporate income tax;
- The possibility of concluding fixed-term contracts for a period of five (05) years;
- An exemption from the lump-sum contribution payable by the employer or any other tax based on the salaries paid by the companies and borne by them;
- An exemption from the minimum flat-rate tax on companies.

The main vocations of the SEZ are the following sectors of activity :

- Agribusiness
- Industry
- Information and communication technologies
- Tourism
- Medical services
- Services

3. AGRICULTURAL TRADE

Agricultural imports represent 1/3 of total imports, while agricultural exports barely reach 1/5 of total exports. Food imports increased steadily over the period 2001-2007 with an average growth rate of 12.1% over the period. The most imported food products are rice (30.8%), wheat (9.3%), milk (7.1%), soybean oil and its fractions (6.8%), and the most exported agricultural products are fresh and frozen fish (27.6%), mollusks (16.2%), peanut oil and its fractions (12.0%), and shellfish (11.7%).

Senegal's imports decreased by 5.9% in 2020, to FCFA 4494.4 billion compared to FCFA 4773.9 billion in 2019. This change is attributable to the decline in external purchases of the main manufactured products, including machinery and equipment (-9.7%), transport materials and spare parts (-26.9%) and petroleum products (-15.6%). However, the increase noted in purchases of dairy products and fruit and vegetables (+10.2%) limited this decline.

The structure of exports of goods is dominated by primary products, which account for an average of 60.5% of total foreign sales. These primary products are essentially mining products (gold, phosphate, zircon and titanium), fishery products and agricultural products, in particular groundnuts and fruit and vegetables. Senegal's exports in 2020 amounted to CFAF 2,261.3 billion compared to CFAF 2,446.7 billion in 2019, a decrease of 7.5%.

A. IMPORTS FROM SENEGAL

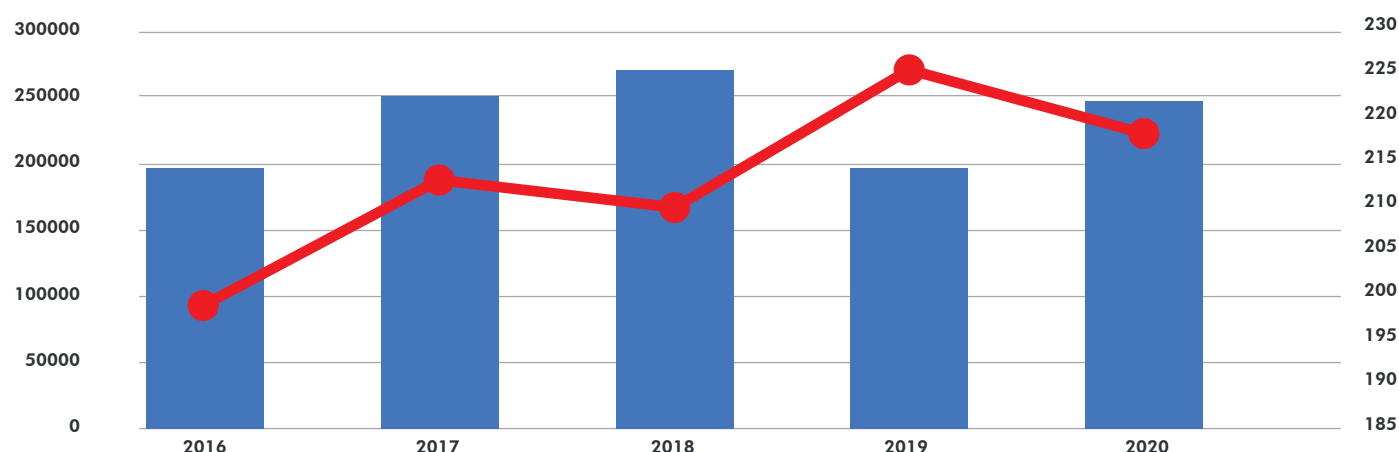
Senegal depends primarily on imports to meet its food needs. Staple foods, such as wheat, rice, and processed products such as vegetable oil and milk powder, are still the country's largest agricultural imports. Despite having a stable consumer base, Senegal produces only the equivalent of 30% of its grain needs. Cereals account for 80% of all food imports, with rice accounting for 50% of total imports. Because milk production is not sufficient to meet needs, the market for imported dairy products is flourishing. The country also imports most of its sugar and unrefined soybean oil needs.

Senegal's billion-dollar agricultural import market is dominated by four product categories: fruits and vegetables; milk, cream, and their derivatives; animal and vegetable oils and fats; and grains. These categories account for more than 50 % of all agricultural imports. The country also imports a large amount of sugar and sweeteners, as well as various fruit juices, food preparations, beverages and other processed products.

■ RICE IMPORTS

Rice plays a major role in household consumption in Senegal. Rice imports are estimated at CFAF 246.2 billion in 2020 compared to CFAF 201.1 billion in 2019. They thus experienced a 22.0% rebound in value in 2020. At the same time, external purchases, in quantity, increased by 26.0% in 2020 to reach 1127.0 tons compared to 893.0 tons in 2019.

GRAPH 1 EVOLUTION OF RICE IMPORTS IN VALUE (MILLIONS OF FCFA)



	2016	2017	2018	2019	2020
■ importations million FCFA left	193 712	251 964	270 177	201 063	246 176
—●— importations million FCFA right	199	213	210	225	218

SOURCE

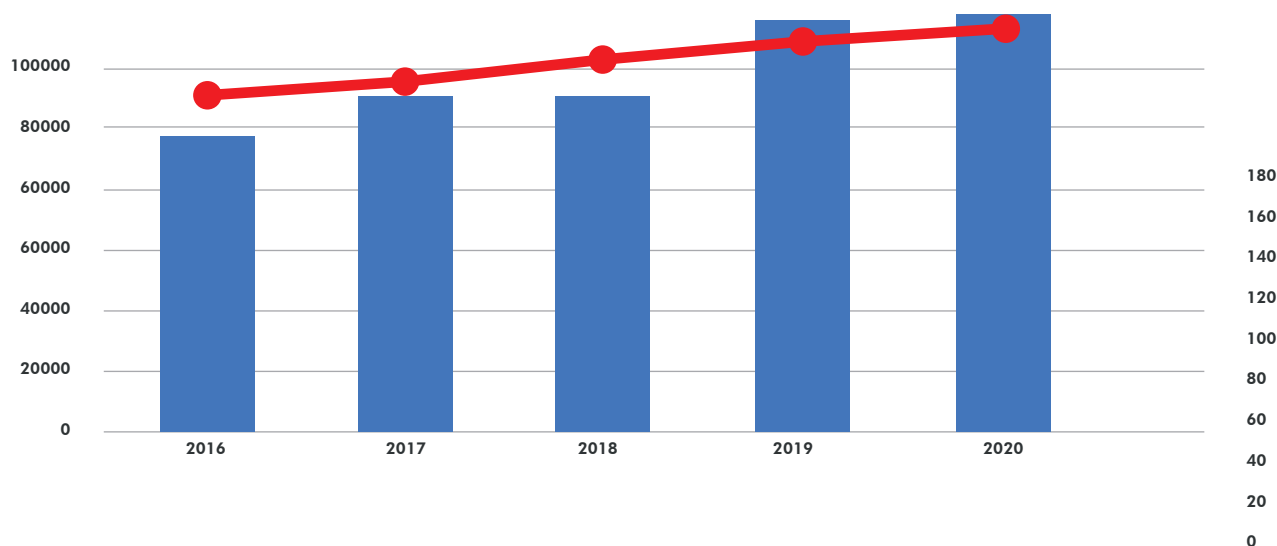
ANSD

WHEAT IMPORTS

During the 2016-2020 period, wheat and meslin imports increased by 41.0% from CFAF 78.2 billion in 2016 to CFAF 110.4 billion in 2020. In particular, they recorded an increase of 2.0% in 2020, compared with the previous year. In addition, the volume of imports declined by 1.8% in 2020 to 694.0 thousand tons compared to 706.6 thousand tons in 2019.

Wheat accounts for 2.4% of total imports in 2020. It is largely supplied by Russia (+50.8%), France (+37.9%), Canada (3.5%) and the Republic of Lithuania (+3.2%). Ukraine (6.0% in 2019) and Argentina (3.3% in 2019) have seen their market share shrink in 2020 to the benefit of France (32.2% in 2019).

GRAPHIQUE 2 EVOLUTION OF WHEAT IMPORTS IN VALUE (MILLIONS OF FCFA)



	2016	2017	2018	2019	2020
■ importations million FCFA left	78 241	88 994	87 925	108 244	110 388
—● VU (FCFA/KG) right	132	138	144	153	159

SOURCE

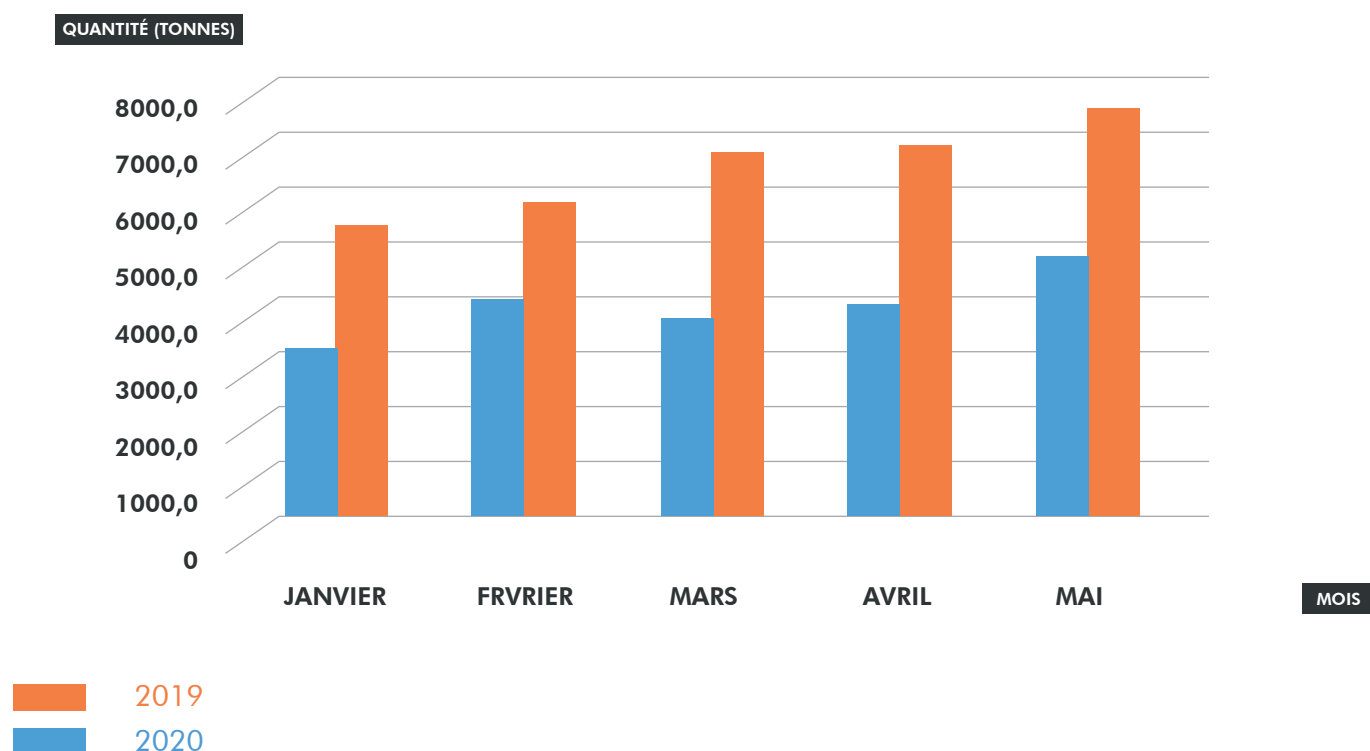
ANSD

MILK IMPORTS

Imports of milk powder and dairy products in the first half of 2020 increased dramatically by 41.5% from 5211 mt in January to 7,373 mt in May 2020 (Figure 1). Compared to the same period in 2019, imports of milk and milk products climbed 64.7% (averaging 3805.2 mt in 2019 to 6267.8 mt in 2020).

This situation is explained by the performance of local breeds in terms of milk production, which remains very low due to their very limited genetic potential. They produce 1 to 3 liters of milk per day, or even less during the dry period, or about 450 liters per lactation, compared to 40 to 50 liters per day for Holstein cows in Europe.

GRAPHIQUE 3 IMPORTS OF MILK POWDER AND DAIRY PRODUCTS IN THE FIRST HALF OF 2020 (IPAR STUDY)



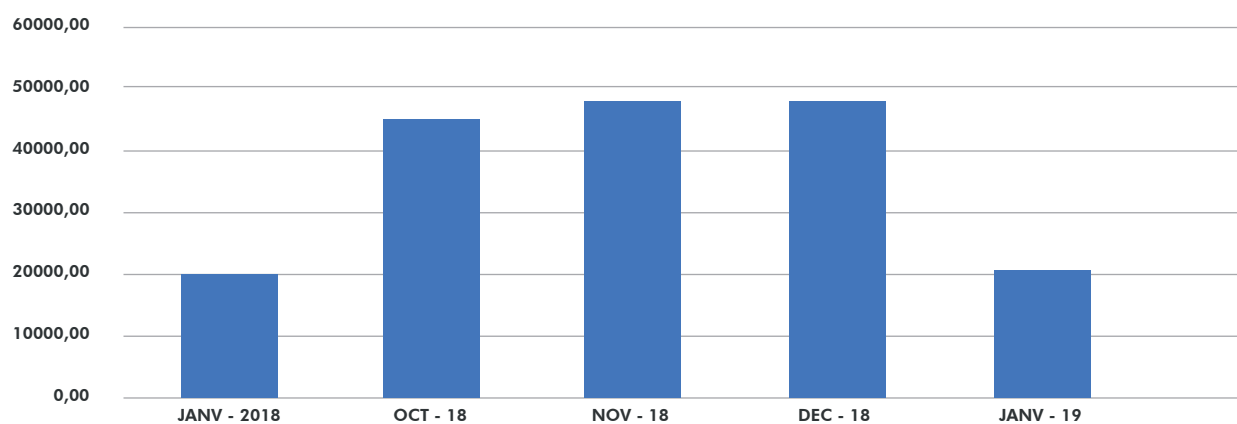
SOURCE

IPAR

IMPORTS OF HORTICULTURAL PRODUCTS

The table below shows the evolution of imports of horticultural products for the period January 2018 to January 2019 (ANSD 2020 data). It shows the country's heavy dependence on market garden products imported mainly from Europe.

GRAPHIQUE 4 EVOLUTION OF IMPORTS OF HORTICULTURAL PRODUCTS



SOURCE

ANSD

■ ■ IMPORTS OF HORTICULTURAL PRODUCTS

The livestock sector is characterized by a great diversity of outputs. Its development remains, however, dependent on important factors such as the control of the food and sanitary situation and the improvement of its productivity. This explains the country's high dependence on imported animal products, with the exception of poultry, which is protected by a ban on imports following an avian flu epidemic.

TABEAU 1 CONTROLLED SLAUGHTER OF LIVESTOCK IN SENEGAL FROM JANUARY 2018 TO JANUARY 2019 (NUMBER OF HEAD, WEIGHT IN TONS)

SPECIES		JAN.-18	OCT.-18	NOV.-18	DEC.-18	JAN-19	CHARGE (IN%)
						JANV.-19/ DÉC.-18	JANV.-19/ JANV.-18
CATTLE	NOMBRE	9 968	10 751	10 649	11 071	9 933	-10,3
	POIDS	1 538,1	1 517,6	1 524,8	1 635,1	1 485,2	-9,2
SHEEP	NOMBRE	35 206	33 851	37 785	46 656	36 904	-20,9
	POIDS	510,4	465,7	498,9	680,5	554,1	-18,6
GOATS	NOMBRE	18 719	25 023	23 123	26 266	22 109	-15,8
	POIDS	185,8	244,7	221,0	252,1	215,8	-14,4
PIGS	NOMBRE	475	452	647	589	455	-22,8
	POIDS	22,0	20,7	31,7	25,1	21,0	-16,4
	POIDS						
	POIDS						
	POIDS						
TOTAL WEIGHT		2 256,3	2 250,7	2 278,2	2 594,4	2 276,1	-12,3
							0,9

SOURCE

DIREL/SOGAS

B. SENEGAL'S EXPORTS

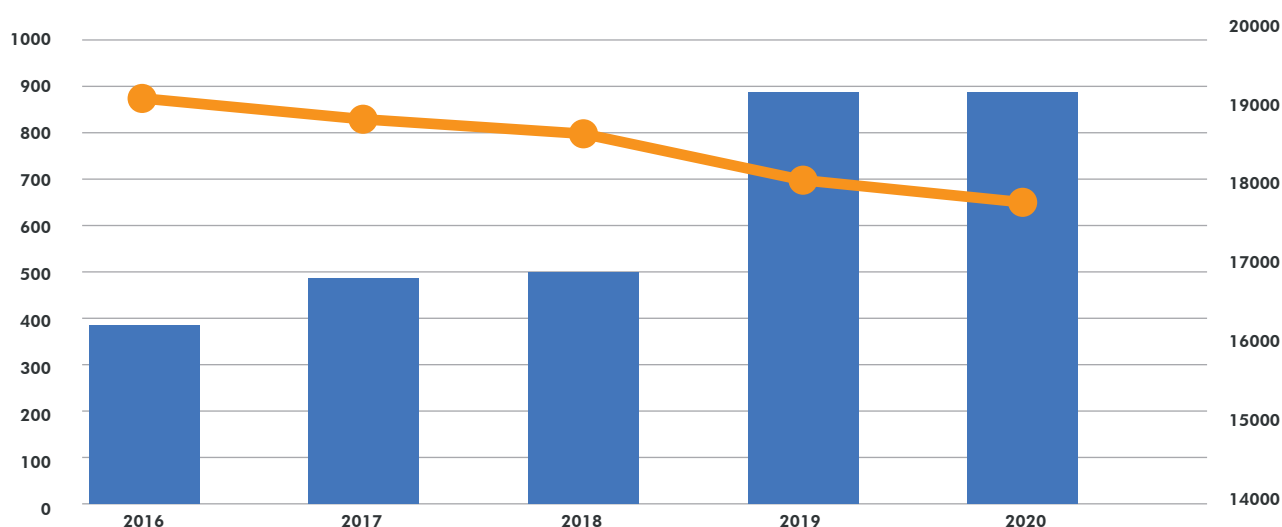
Senegal's agricultural exports are small. This is due to the country's low production capacity. Like most of its products, agricultural exports are largely destined for European markets. Despite these general shortcomings, Senegal remains one of the world's largest exporters of fish and seafood.

The main products exported are:

■ FRESH SEA FISH

External sales of fresh marine fish showed an upward trend from 2016 to 2019 in line with the decline in their price over the period under review. However, they declined slightly (-0.3%) in 2020 to CFAP 193.6 billion (after CFAP 194.1 billion in 2019). This regression is explained by the decline in shipments to European countries, particularly France (-28.0%), Italy (-56.9%) and Spain (-32.2%). In fact, fish are transported to Europe by air, which has seen a decrease in traffic following the health situation. However, the decline in external sales of this product is mitigated by the increase in exports of fresh sea fish to Côte d'Ivoire (+19.6%), South Korea (+46.7%) and Colombia (+256.4%). The share of exports of fresh sea fish in the overall level of foreign sales is 8.6% in 2020, which places it in third place.

GRAPHIQUE 5 EVOLUTION OF FRESH SEA FISH EXPORTS IN VALUE (MILLIONS OF FCFA)



	2016	2017	2018	2019	2020
■ importations million FCFA left	161 833	168 559	169 030	194 145	193 606
—●— importations million FCFA right	868	817	790	707	626

SOURCE

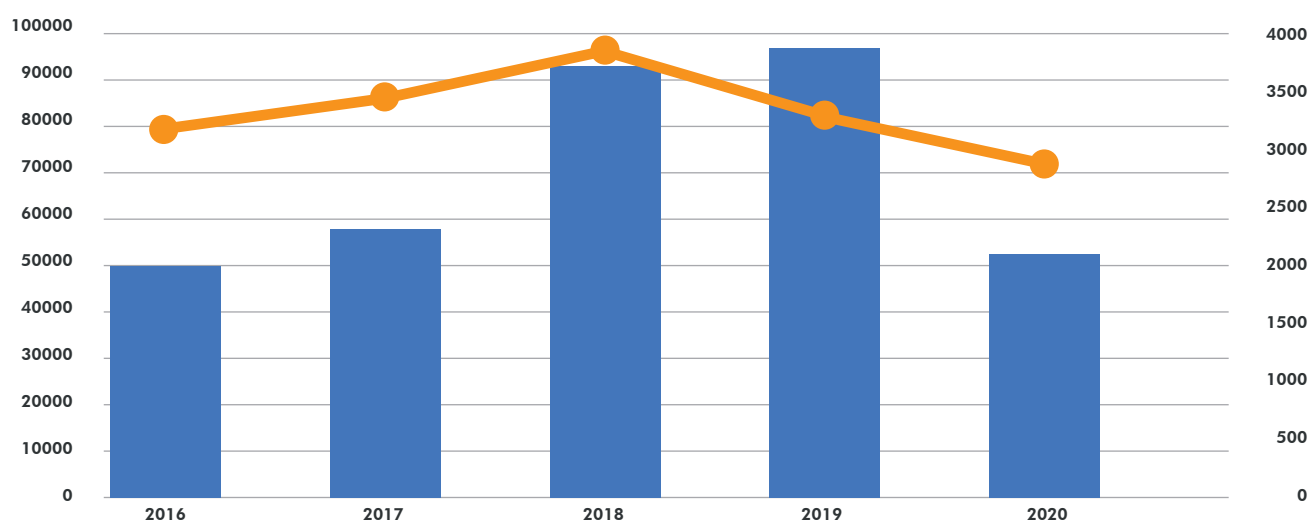
ANSD

■ CRUSTACEANS, MOLLUSKS AND SHELLFISH

Shipments of crustaceans, mollusks and shellfish have grown steadily over the first four years since 2016 to reach CFAF 94.0 billion in 2019 compared to CFAF 49.9 billion in 2016, an average annual increase of 23.5%. However, in 2020, external sales of these products fell by 44.3% compared to the previous year to 52.3 billion CFA francs. This development is induced by the decline in sales to major customers, including France (-64.4%), Italy (-51.3%), Spain (-42.0%) and China (-37.1%). However, shipments of this product to South Korea rose by 2.2% and mitigated this downward trend.

Senegal's main customers are Spain (41.8%), Italy (26.8%), China (8.1%), South Korea (3.5%) and Japan (3.5%).

GRAPHIQUE 6 EVOLUTION OF EXPORTS OF CRUSTACEANS AND MOLLUSKS IN VALUE (MILLIONS OF FCFA)



	2016	2017	2018	2019	2020
■ importations million FCFA left	49 917	59 740	91 706	93 966	52 324
—●— importations million FCFA right	3 041	3 351	3 715	3 374	3 103

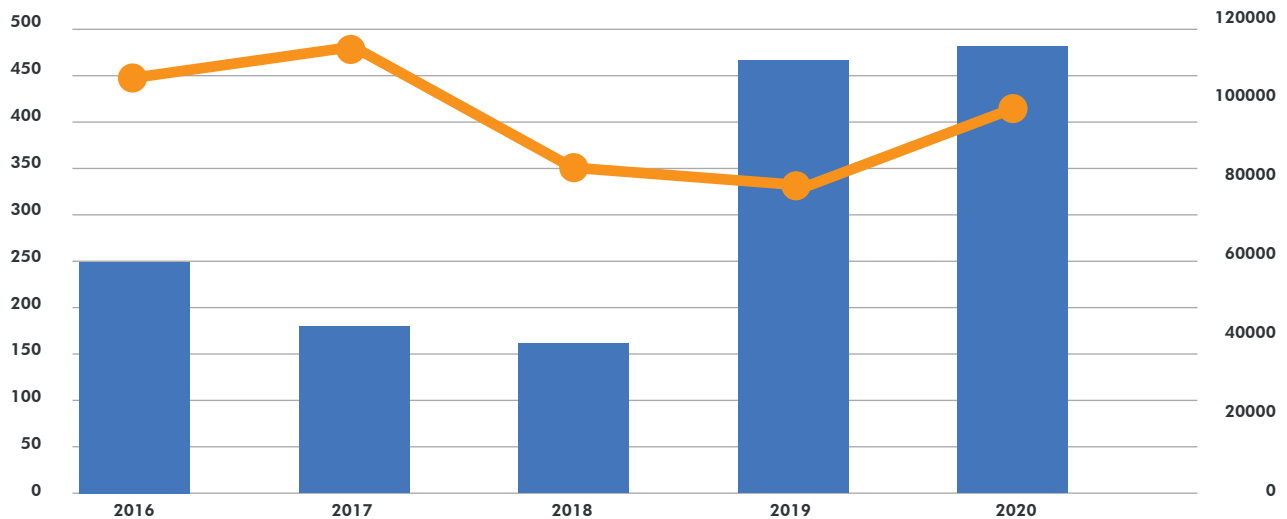
SOURCE

ANSD

RAW PEANUTS

Exports of unroasted peanuts continued the growth that began in 2019 and stood at CFAF 113.7 billion in 2020 compared to CFAF 111.5 billion the previous year, an increase of 1.9% (after 182.0% in 2019). This development in 2020 is due to the increase in sales of this product to the main customer, the People's Republic of China (+3.2%). However, the lack of sales to new customers in 2020, including Ghana, Kenya, and South Africa, limited shipments of this product.

GRAPHIQUE 7 EVOLUTION OF UNROASTED PEANUT EXPORTS IN VALUE (MILLIONS OF FCFA)



	2016	2017	2018	2019	2020
■ importations million FCFA left	59 967	46 925	39 538	111 511	113 684
● importations million FCFA right	448	471	360	341	427

SOURCE

ANSD

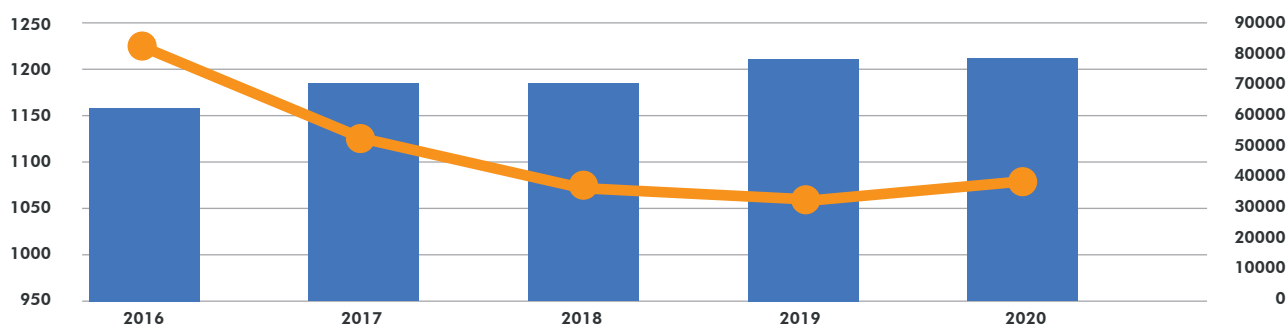
■ PREPARATIONS FOR SOUPS AND BROTHS

Exports of preparations for soups, soups and broths are on an upward trend, reaching CFAF 76.2 billion in 2020 compared with CFAF 62.7 billion in 2016, an average annual increase of 21.7%. However, they fell by 0.7% in 2020, compared with 2019, due to the restrictive measures taken by the authorities, which reduced production activities for goods and services. This decline was reflected in lower sales to countries such as Nigeria (-44.9%), Mauritania (-28.8%) and Burkina Faso (-25.2%).

Moreover, in 2020, these products were mainly destined for the sub region as a result of spending by agribusiness to promote food preparations, particularly advertising. Thus, the main partners in 2020 were Mali (30.2%), the Republic of Guinea (14.7%), Burkina Faso (8.3%), Niger (8.3%) and Gambia (7.6%).

Shipments of preparations for soups, soups and broths represent 3.4% of total sales outside Senegal.

GRAPHIQUE 8 EVOLUTION OF EXPORTS OF PRODUCTS FOR SOUPS, BROTHS AND STOCKS IN VALUE (MILLIONS OF FCFA)



	2016	2017	2018	2019	2020
■ importations million FCFA left	62 657	72 296	71 730	76 755	76 283
—●— importations million FCFA right	1 220	1 119	1 072	1 066	1 085

SOURCE

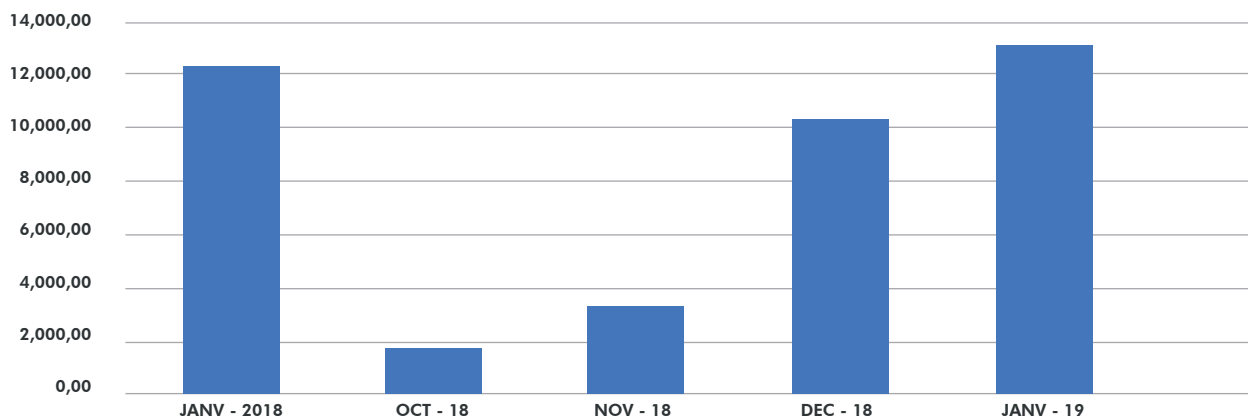
ANSD

■ HORTICULTURAL PRODUCTS

The Senegalese horticultural sector has seen strong growth in production (6.5% between 2000 and 2010), a sustained increase in exports (a twofold increase between 2008 and 2011), as well as investments by world-class operators such as Grands Domaines du Sénégal (a subsidiary of the Compagnie fruitière) and the emergence of local champions such as Miname Export.

Exports of vegetable products from Senegal over the past decade have grown at an exponential rate. For the first time, the country's vegetable exports exceeded 50,000 tons in 2011 (less than 10,000 tons in 2001).

GRAPHIQUE 9 EVOLUTION OF EXPORTS OF HORTICULTURAL PRODUCTS



SOURCE

ANSD

Details of the horticultural products exported are given in the annex (Cf. Annex 2)

4. OVERVIEW OF THE AGRO-INDUSTRY IN SENEGAL:

PROBLEMS AND DEVELOPMENT POLICY

The agri-food industries in Senegal include several important sectors for the development of local agricultural products. Their development is a permanent concern for the public authorities who have taken several measures to support them. This branch is part of the priorities of the Senegalese authorities because it is the first economic sector of the country. Indeed, it is recognized that the development of the agri-food industries subsector strongly leads to the development of the agricultural sector thanks to the valorization of the agricultural production which results from it. For these reasons, the productive investments approved in Senegal in 2019 have given priority to agribusiness with 36 billion, or nearly 30% of investments according to the National Agency for Statistics and Demography (ANSD) in its publication Recent Economic Developments.

The agri-food industry is very present in all agricultural sectors. The development of private processors, artisans and small businesses, which target the domestic market, makes it possible to respond in part to the explosion in urban demand for local products: dairy products, fruit juices, vegetables and cereals.

In addition, several studies have shown that the agro-industry in Senegal represents 30% of the industrial sector's output, with unexploited potential attributable to several internal and external factors.

Internally, these include low industry diversity, a lack of technological innovation, an inadequate level of industrialization, low productivity and seasonality of raw materials, insufficient conservation structures and central purchasing, and finally the narrowness of the market and the low purchasing power of consumers.

Externally, the agri-food industry also faces many challenges (environmental, technological, commercial and organizational), the most notable of which are:

- The respect of the rules of hygiene and sanitary safety;
- The requirement of the traceability of products for a control of the products and a better protection of the consumers;
- Access to new technologies and product innovation for a better valorization of local products;
- A strong capacity of adaptation of their production tool;
- The valorization of the local know-how

Faced with all these constraints, it is necessary to promote an agro-industry adapted to the environment and based on a network of complementary companies whose size and capacity will be adapted to the volume and production system of the raw materials to be processed.

To this end, the creation of small and medium-sized enterprises (SMEs) specialized in the processing of agricultural products using simple technologies and equipment is one of the solutions at the level of the main units of valorization of the local production.

This is what led the public authorities to promote industrial estates and agro poles.

■ INDUSTRIAL FIELDS

With the decentralization policy initiated several years ago by the State, new local authorities have been created (municipalities, departments, rural communities, regions) in Senegal. As a result, the need to implement a policy of establishment and development of dynamic companies in the different territories becomes relevant to increase investments, jobs, added value (valorization of local resources), and the budget of local communities. In this sense, one of the structures that can help the development of this local economic fabric is the industrial field.

Regional industrial estates can be useful institutions for local economic development and the promotion of private initiative. Only dynamic companies that will be able to support sustainable growth are installed there according to certain well-defined criteria.

They are governed by: Law 77-90 of August 10, 1977, defining the "Industrial Domains," the management companies of these domains and sets the tax regime of the said companies, as well as certain companies they assist. These SMEs are defined by the law as companies with a maximum of 100 jobs.

The means of intervention of the Société du Domaine are:

- Development and equipment of land and professional premises
- Selection of small entrepreneurs and craftsmen to set up
- Legal and administrative assistance
- Assistance for the financing of projects

There are 11 regional industrial areas with the same objectives as defined above. Table 2 below shows the industrial areas and the surface areas of each.

VILLE ET NOM DU DOMAINE	SURFACE (HA)
DAKAR	8
THIES	200
SAINT LOUIS (SODIZA)	15
LOUGA	50
MATAM	200
TAMBA	100
KEDOUGOU	50
KOLDA	50
ZIGUINCHOR (SODIZI)	32
DIOURBEL	20
FATICK	25

■ LES AGRO POLES

Senegal has begun to create agro poles in three areas of the country (South, Center and North), the main objective of which is to increase the added value of agricultural products and reduce dependence on imports of agri-food products through sustainable and inclusive industrialization.

The agropolis is supposed to be a modern agro-industrial development pole that facilitates the networking of all value chain actors (producers, processing companies, product distributors, service providers, etc.), whether or not they are located in the same geographical area, through vertical and horizontal partnerships aimed at building business synergies in order to achieve common objectives.

After completing the financing of the Agro pole Sud project in 2019, it has begun the structuring phase of the Agro pole Center covering the regions of Kaolack, Kaffrine, Fatick and Diourbel in collaboration with the United Nations Industrial Development Organization (UNIDO), the Belgian Development Agency (ENABEL) and the African Development Bank (ADB).

In addition to these initiatives Senegal also started in 2014 the Project of Domaines Agricoles Communautaires (PRODAC). These are real agro poles, places of integration of rural youth, graduates of training schools (in agriculture and related disciplines), but also private promoters wishing to invest in the sector, both in its production activities and those of processing and agricultural products.

The creation and effective implementation of special economic zones (SEZ) and agropolises are a priority in the implementation of the strategic orientations of the Emerging Senegal Plan (ESP). The Government is committed to the creation of a regional logistical and industrial hub, enabling it to initiate an industrialization process in order to increase the potential of exports, to rebalance the trade balance in a sustainable manner and to create massive employment.

The objective is to demonstrate Senegal's ability to offer high-value-added products and services to attract foreign investors and retain domestic human resources.

These orientations of Senegal remain relevant with the African Continental Free Trade Area (ACFTA) which is a free trade area project being created on the entire African continent. It is to bring together the tripartite free trade area, which is to include the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC) and the Southern African Development Community (SADC), with the Economic Community of Central African States (ECCAS), the Economic Community of West African States (ECOWAS), the Arab Maghreb Union, and the Community of Sahel-Saharan States. The goal of the project is to eventually integrate all 55 states of the African Union into the free trade area.

In August 2020, the secretariat of the free trade area was inaugurated in Accra, Ghana. On January 1, 2021, the ACFTA is implemented for countries that have ratified the agreement including Senegal, while this implementation was initially scheduled for July 1, 2020, but was delayed because of the Covid-19 pandemic.

5. PRIORITY VALUE CHAINS OF THE AGRI-FOOD SECTOR

Tenant compte de la forte dépendance du Sénégal et de l'ensemble des pays membres de la CEDEAO (15 pays) en denrées alimentaires importées, de réelles opportunités d'investissements s'offrent au secteur privé Finlandais dans diverses chaînes de valeurs. Ces opportunités seront amplifiées avec l'avènement de la ZLECA.

Il s'agit des chaînes de valeur ci-après :

Des produits de la pêche et de l'aquaculture (pêche maritime et continentale et aquaculture marine et continentale) qui présentent une balance commerciale positive et un très fort potentiel de développement en terme de valeur ajoutée, soutenu en cela par une demande forte tant sur les marchés d'exportation que sur le marché domestique;

Des produits de l'élevage (filiales bétail-viande ; cuirs et peaux et ; lait et avicole) qui présentent une balance commerciale négative mais un fort potentiel de développement soutenu par une demande interne croissante et un potentiel intéressant de substitution (notamment pour ce qui est du lait) aux importations et un potentiel d'exportation (notamment pour les cuirs et peaux) ;

Des céréales et légumineuses (filiales riz, mil, maïs, sorgho, niébé, etc.) qui présentent une balance commerciale négative et un potentiel de développement moyen soutenu par une demande croissante du marché domestique, un potentiel de substitution aux importations et des niches de marché à l'export ;

Des oléagineux et légumineuses (arachide, sésame, tournesol et anacarde) qui présentent une balance commerciale positive notamment pour les huiles et potentiel de développement élevé soutenu par la demande des marchés domestique et d'exportation ;

Des fruits et légumes (légumes, mangue/papaye, horticulture d'exportation, etc.) qui présentent une balance commerciale négative et un fort potentiel de développement soutenu par une forte demande des marchés d'exportation et domestique ;

Des produits du bissap qui recèlent un énorme potentiel de développement en raison du volume du marché d'exportation et des répercussions économiques en termes de revenus d'appoint sur de larges populations ;

Du sel qui présente des perspectives de développement importantes avec une demande importante des marchés export et national. Des produits de la pêche et de l'aquaculture (pêche maritime et continentale et aquaculture marine et continentale) qui présentent une balance commerciale positive et un très fort potentiel de développement en termes de valeur ajoutée, soutenu en cela par une demande forte tant sur les marchés d'exportation que sur le marché domestique ;

IV.

PACKAGING
IN SENEGAL
SEEKING
FINNISH
KNOW-HOW

SOMMAIRE

1 - GENERAL INFORMATION ON PACKAGING

- 1.1. Packaging characteristics
- 1.2. The Main Packages
- 1.3. Choice of packaging

2 - EXTERNAL RESTRICTIONS

3 - THE NATIONAL PACKAGING MARKET

- 3.1. The offer
- 3.2. The demand

4 - THE GLOBAL PACKAGING MARKET

- 4.1. Agri-food sector
- 4.2. Cosmetic sector
- 4.3. Textile sector
- 4.4. Pharmacy sector

5- CHALLENGES AND TRENDS

- 5.1. Challenges
- 5.2. Trends

6 - REGULATIONS IN THE PACKAGING INDUSTRY

- 6.1. National standards
- 6.2. International standards

7 - PACKAGING SECTOR IN SENEGAL

- 7.1. The producing companies of the sector
- 7.2. Packaging importers and individual initiatives

8- THE MAIN STUDIES ON PACKAGING IN SENEGAL

- 8.1. Packaging restrictions
- 8.2. Solutions to the constraints linked to packaging and valorization of local products

9- RECOMMENDATIONS AND CONCLUSIONS

I . INTRODUCTION

The value of local fresh or processed products in particular is highly dependent on their packaging. Several studies and analyses have shown that the share of packaging in the cost price of the product is 25 to 40%. It is necessary to see the ways and means to reduce this rate in order to make the products which it contains more competitive and accessible.

In what follows, the areas of activity selected to analyze this issue is food processing, cosmetics and textiles-clothing. This study addresses "the packaging issue: what solutions for the valorization of local products" from different angles: demand, supply (availability), prices, regulations and support for producing and using companies. In conclusion, recommendations are made to Finnish companies to enhance the value of their know-how in the packaging market in Senegal, from training to the creation of ecological companies focused on offering innovative packaging products that can improve the competitiveness of local products.

2. GENERAL INFORMATION

2.1. PACKAGING FUNCTIONS

The essential functions of the packaging are essentially related to:

- Protection and preservation: the packaging must isolate the food product from external contacts and also slow down and slow down the degradation that it would naturally undergo
- Transport, handling and storage: the packaging must ensure transport from the place of production to the place of consumption, i.e. resist compression forces, stacking and vibrations.
- Marketing and sales: packaging must help sell products, promote them, convey advertising messages and meet the requirements of distribution.

2.2. PROPERTIES OF A PACKAGE

Whatever the material used, the packaging must have a certain number of properties of which the most important are:

- The resistance and the mechanical protection
- Watertightness, water vapor tightness and gas tightness
- Stability, neutrality and inertia
- The aspect not modified by the contact with the various components

2.3. PACKAGING IN THE AGRI-FOOD SECTOR

The materials used in the industry for the packaging of food products are very numerous and varied. In the case of the food industry, they must have properties and characteristics that are distinct and different from each other.

3.4. THE TYPES (CATEGORIES)

Packaging can be classified according to its destination, nature or properties. Thus, we distinguish:

- Primary packaging that directly contains the product: bag, jar, bottle, plastic bottle, bottle and glass jars, metal box, plant packaging ;
- Secondary packaging that is not in direct contact with the food: they wrap a first packaging and are used for its sale. They have a function of protection, grouping and sale. Above all, they must prevent the buyer from damaging the product or deforming the first package when in contact with the product. This is the case of the cardboard box containing the plastic bag containing the cocoa powder or ground coffee, the plastic bag containing one or more bags of cereal-based products, the tray or basket made of braided raffia containing products packed in a sheet, etc. ;
- Tertiary packaging that allows the storage, transport and distribution of the product in batches; this is the case of bottle cases, thick cardboard boxes, wooden pallets, etc.

3.1 LES TYPES (CATÉGORIES)

The materials used for the manufacture of food packaging are:

- Glass,
- Metal,
- Plastics
- The complexes

All these materials are frequently combined to meet the overall packaging specifications. In addition, a single category usually includes a whole series of materials with different properties that can also be combined. These packages made of several raw materials are called "composites."

3.2.1 GLASS

It is obtained from a mixture containing mainly sand, soda, limestone and, in a more or less important proportion, groisil (broken glass, therefore recovered), to which are added, according to the product we want to obtain, decolorizers (cobalt, selenium), coloring agents (manganese, iron oxides) and oxidizers or reducers (sulphate, coal, sulphide).

Most of the glass produced is used for packaging, mainly for beverages, and to a lesser extent for solid or semi-liquid food products (dairy products, baby food, compotes, juices, syrups, jams, fruit or vegetable preserves, etc.).

There are several varieties of glass according to their ability to absorb thermal radiation and block ultraviolet rays: white glass for water, certain juices, jams, yoghurts, etc.; champagne glass (green-blue tint) for beer, wine and oil; dead leaf glass for certain juices; amber-red glass (for beer and certain juices).

Glass packaging has certain advantages: inert, odorless, no risk of reaction between the content and the container, shows the product it contains.

3.2.2 METAL PACKAGING

They are made from tinplate (steel sheet coated with a layer of pure tin on both sides), chromium-plated iron (mild steel coated with metallic chromium and chromium oxides) or aluminum alloys. Their interior is coated with a varnish (based on epoxy, acrylic, polyester or vinyl organosol), in order to limit the attack of the metal by the food, especially if it is acidic. The varnish must therefore be chemically inert, odorless, colorless, have good mechanical resistance (protection against scratches) and be elastic, to adapt to the shape of the packaging and to possible deformations, for example during heat treatment of the latter.

Several varieties of metal packaging exist:

- Cans for food products packaged by appertization (heat treatment allowing their preservation);
- Light packaging in the form of heat-sealed trays;
- Cans and tins for non appertized food products (oils, syrups, fruit pulps, soft drinks, milk, coffee or chocolate powders, teas...).

Despite the development of aluminum packaging and new preservation methods, tinplate packaging remains predominant. This behavior is in line with the trend observed abroad where temporary substitutions are made according to prices.

Tinplate packaging still has a bright future to come. Its advantages lie in its long-term price stability as well as in its conservation and recycling properties. Despite competition from aluminum and plastic composites for certain products, tinplate packaging is still well ahead. However, the expansion of new food preservation methods in the European market, such as deep-freezing, freezing and freeze-drying, will have to be taken into account. Tinplate constitutes 90% of the materials used in light packaging, compared to aluminum with 10% of uses.

3.2.3 PLASTIC PACKAGING

Plastics are of petrochemical origin, i.e. derived from petroleum chemistry. The most common for food packaging are polyethylene (PE), high density (HDPE) and low density (LDPE), polypropylene (PP), polystyrene (PS) and polyvinyl chloride (PVC). The range of plastics, their properties and therefore their applications is very wide.

The plastic food packaging allows conveying easily a liquid, compact or gaseous product. Plastic has become an essential element of food packaging. It is used to pack cold cuts, ready meals, salads, cheese... It has many advantages, it is light, solid, can sometimes be put in the microwave oven...

Plastic packaging has many advantages:

- They are shock resistant and therefore prevent food loss.
- They guarantee the freshness of food and avoid contamination.
- They are light, which makes the products easier to transport.
- They can take all shapes and colors.
- They are transparent, which allows seeing the food.

All plastic packaging used in the food industry are suitable for contact with foodstuffs. They do not present any danger to the health of consumers as long as their conditions of use are respected by both professionals and users.

PET is a type of plastic called polyethylene terephthalate: PET is used for packaging soft drinks, mineral water and edible oils. It is widely used for soft drinks because it is impermeable to gas. Thus, our carbonated drinks keep all their gas! It also resists very well to the pressures of gas on the bottle.

High-density polyethylene is also a plastic that is widely used in the manufacture of milk bottles.

Low-density polyethylene (LDPE) is used to package bread bags, frozen foods and also in cups that are designed to hold hot foods. This plastic shows little migration when in contact with food and has good compatibility with food use.

Polypropylene is notably used in some water bottles or in microwaveable plastic trays... As for high-density polyethylene and low-density polyethylene, this plastic shows little migration when in contact with food and is therefore compatible with food use. However, this plastic degrades over time and as it ages it can release degradation molecules into food.

Polystyrene is used to make cutlery, cups, clear flutes and yogurt cups, but polystyrene contains styrene that can migrate into food when the packaging is heated.

PVC is rarely used in food packaging. This plastic is considered particularly problematic for health because its manufacture requires phthalates, the most common of which, DEHP (di (2-ethylhexyl) phthalate, is classified as toxic for reproduction.

3.2.4 THE COMPLEXES

It is packaging composed of several layers of plastic-aluminum, paper-plastic, paper-aluminum. They are more resistant and protect the products they contain from air, humidity and sun. They allow to have a long conservation period; 6 to 9 months and are more attractive.

3.2.5 SUMMARY OF THE ADVANTAGES AND DISADVANTAGES OF FOOD PACKAGING

Due to their function and properties, food packaging is used for specific products but with their advantages and disadvantages as summarized below.

Summary table: Advantages and disadvantages of the main packaging materials

ADVANTAGES AND DISADVANTAGES OF THE MAIN PACKAGING MATERIALS		
PACKAGING MATERIAL	ADVANTAGES	DISADVANTAGES
ALL PLASTICS	<ul style="list-style-type: none"> - WIDE RANGE OF POSSIBLE SHAPES AND PROPERTIES - EASY TO WELD - LIGHTWEIGHT - PRINTABLE - LOW-COST LOW VOLUME STORAGE - RECYCLABLE 	<ul style="list-style-type: none"> - LIMITED INERTIA: POSSIBLE MIGRATION OF HARMFUL ELEMENTS - LIMITED HEAT RESISTANCE - NOT BIODEGRADABLE - SOME ARE PERMEABLE TO WATER AND GASES
PEBD	<ul style="list-style-type: none"> - THE CHEAPEST, THE MOST PRODUCED - LIGHTWEIGHT - RESISTANT TO FREEZING TEMPERATURES 	HIGH GAS AND WATER VAPOR PERMEABILITY
PP	<ul style="list-style-type: none"> - ONE OF THE LIGHTEST - TRANSPARENT 	- GAS AND WATER VAPOR PERMEABLE
PET	VERY TRANSPARENT <ul style="list-style-type: none"> - GOOD MECHANICAL RESISTANCE - NOT VERY PERMEABLE TO GASES (BOTTLE) 	- PRIX ÉLEVÉ
PVC	<ul style="list-style-type: none"> - TRANSPARENT - GOOD RESISTANCE TO HUMIDITY - LOW GAS PERMEABILITY 	- POLLUANT (DE PLUS EN PLUS REMPLACÉ PAR LE PET POUR L'EAU)
EVOH (ETHYLENE AND HYDROLIZED VINYL ACETATE)	GOOD OXYGEN BARRIER PROPERTIES	- HIGH PRICE
GLASS	<ul style="list-style-type: none"> - HIGH INERTIA: CONSUMER SAFETY - VERY GOOD BARRIER PROPERTIES - GOOD THERMAL RESISTANCE - PRINTING POSSIBLE - REUSE AND RECYCLING POSSIBLE 	<ul style="list-style-type: none"> - WEIGHT MUCH HIGHER THAN OTHER MATERIALS - FRAGILE - BULKY TO STORE AND TRANSPORT - COST CAN BE HIGH
CARDBOARD	<ul style="list-style-type: none"> - LIGHTWEIGHT AND FLEXIBLE - RECYCLABLE - BIODEGRADABLE - INEXPENSIVE 	<ul style="list-style-type: none"> - SENSITIVE TO HUMIDITY (THEREFORE USABLE FOR PRODUCTS WITH LOW HUMIDITY OR SHORT SHELF LIFE) - LIMITED MECHANICAL RESISTANCE - OPAQUE
METAL	<ul style="list-style-type: none"> - GOOD BARRIER PROPERTIES - VERY GOOD MECHANICAL AND HEAT RESISTANCE - RECYCLABLE 	<ul style="list-style-type: none"> - CORROSION POSSIBLE - SENSITIVE TO SHOCKS AT THE LEVEL OF THE CLOSURES - LIMITED REUSABILITY - OPAQUE

SOURCE

O.SY, consultant

3.2.6 CRITERIA FOR THE CHOICE OF A PACKAGING

The packaging material will be chosen according to the "barrier" properties required to protect and preserve the product

PROPERTY BARRIER MATERIALS	H2O/HUMIDITY	GASES AND AROMAS	UV/LIGHT
PAPER	--	---	+++
ALUMINIUM	+++	+++	+++
PLASTIQUE			
POLYAMIDES OPA	-	+	
POLYESTER PET	++	IF COATED ++++	IF COATED + IF METALIZED ++++
POLYPROPYLENE OPP	++++	IF COATED ++	IF COATED +
POLYETHYLENE PE	+++	----	-
CELLOPHANE	++	+++	--

++++ Very good level of protection

+ Low level

3.2.7 ABOUT LABELING

Some of the information related to the product must appear on the packaging (or on the label associated with it):

- Contact information for the manufacturer or seller (processor, packer or importer) may be given in plain text (name and address) or in the form of a code or address preceded by "Emb" if it is the person responsible for packaging.

The selling designation: essential information because it allows the consumer to identify the product. It must be as precise as possible and must not be confused with the brand.

It indicates the nature of the food contained in the package (fruit jam, sweetened curd, tamarind syrup ...) and must mention the treatment it has undergone (pasteurized pineapple juice, dried mangoes, etc..) or the physical state in which it is (powdered, defrosted ...) not to create confusion in the mind of the consumer. This name of sale can be accompanied by a denomination (example: "coffee Touba", "jam of the Tropics"...).

- The list of components: it indicates all the components used in the manufacture of the food (raw materials, spices, additives ...) and present in the finished product. These ingredients are listed in descending order of importance.

- The net quantity indicates the consumable part of the product (drained net weight for preserves, net weight of fruit juice...). It is expressed in unit of volume (liter or ml) for liquid products and pastes, creams and in the unit of mass (kg or g) for the other products. It is not mandatory when it is less than 5 g (except for spices) or 20 g in the case of confectionery.

- The consumption dates are in principle under the responsibility of the manufacturer but they can be fixed by decree (case of milks, creams, for example). They give the period during which the product retains its properties (in relation to its shelf life) and must also specify its storage conditions.

The use-by date is necessary for perishable foods (fresh dairy products, juices, fruits in bags...). Beyond this date, their consumption is dangerous for human health and the distributor is no longer authorized to sell the food.

The deadline for optimal use (DLUO) indicates the time beyond which the gustative or nutritional qualities of the product may deteriorate, with the mention: "to consume preferably before the end of..." or "to consume preferably before... day/month/year".

This period is the year (products whose durability is higher than 18 months), the month and the year (durability from 3 to 18 months) and the day and the month (durability lower than 3 months).

This mention is necessary in particular in the case of products preserving much longer (canned food, breakfast cereals, pasta...).

The number of the manufacturing batch: allows to easily identifying the product (within a set of commodities grouped under the same batch) in case of defect, research or claim, according to a system set up by the contractor. The lot defines the manufacturing period, the place, the manufacturing process and the product. Its number contributes to set up a traceability system and it can be sent to the manufacturer in case of problems.

The instructions for use if this omission can create confusion for the consumer (misuse of the product for example).

The bar code, widely used in mass distribution, has thirteen digits (in order: two for the country, five for the manufacturer or distributor code, five to identify the product and the last one for the control), all expressed by a vertical bar of variable thickness.

The "green dot" logo, finally, attests that the manufacturer participates in a program of collection and sorting of packaging waste for recycling (example in France: Eco-emballages).

3.2.8 ENVIRONMENTAL LIMITATIONS

Normative and regulatory constraints

- Consumer requirements
- The packaging market must meet the growing and evolving requirements of the European consumer. These requirements mainly concern the following points:
 - Practicality of packaging: the consumer wants products that are easy to open, easy to transport, easy to consume, easy to prepare...
 - Growing demand for pre-packaged products, especially for fruit and vegetables.
 - Growing demand for "ready-to-eat" products
 - Food safety: water tightness, inviolability of the packaging, conservation, information on the product, etc.
 - The packaging must allow a long conservation of the product
 - Quality of packaging:
 - Thanks to a wide variety of materials and the use of high-performance techniques, the adequacy of the content/container is guaranteed
 - Wide variety of shapes, designs and practicality of the packaging (cooking packaging, easy to transport packaging, ...)

Distributor's requirement

- Standardization of over packs (to facilitate and improve transport and storage)
- Packaging that takes up less shelf space
- Packaging that reduces shelving costs

Marketing functions of the packaging:

- Packaging must promote sales: in self-service stores, the product must sell itself. Consequently, the packaging must contribute to the product being easy to place on the shelf, support handling by the customer, be identifiable among competing products, and have a good image, if possible in the language and according to local habits.
- Design: the packaging must be beautiful, fashionable, correspond to the image of the product it packages, and have a pleasant touch.
- **PACKAGING IN THE COSMETICS SECTOR**

There is a wide range of possibilities in cosmetic packaging. The packaging industry is changing drastically and the supplier must be able to adapt to the new market demands.

A cosmetic packaging suitable for the following functions:

- Facilitate transportation and storage
- Protect against damage, weather and theft
- Identify the product and the brand
- Explain how the product is to be used
- Facilitate opening, closing and use
- Attract the buyer's attention and convince him to buy

4.1 Types of packaging for cosmetics

When it comes to packaging, we also think of three different layers: the outer packaging, the inner packaging and the product packaging.

- The outer packaging

The outer packaging is the box in which the cosmetic products are delivered or the bag in which they are packed at the checkout in the case of a point of sale.

- The inner packaging

The inner packaging houses the product, such as the small box that customers open to access the product.

- Product packaging

The product packaging is the container that holds the product (cream, powder).

4.2 plastics

It is a leading material in cosmetic packaging due to its low cost, light weight, flexibility, durability, colorability, ease of storage and other factors.

Plastics are the material of choice for the manufacture of unbreakable and "spill-proof" bottles, jars, tubes, caps and closures for personal care products. The most common type of plastic used for cosmetic containers is polypropylene (PP) plastic. However, these can also be offered in a more affordable PET plastic or a high-end acrylic plastic. Acrylic plastic is usually clear and looks like glass. This type of material has an advantage over glass because it is not prone to breakage. However, PP plastic is more affordable than acrylic and usually comes in round or tube-shaped plastic containers.

Plastics offer exceptional gains in terms of providing lightweight packaging solutions that use less material. In addition, over the past decade, the environmental impacts of plastics have led to a slowdown in the segment. However, the availability of recycled plastics and innovations in materials technology has enabled environmentally friendly packaging solutions. Players are focusing on refillable packaging as a design solution to create sustainable features. Brands are embracing natural decolorization that provides PCR (post-consumer recycled) plastics.

4.3 Ideas for Choosing Cosmetic Packaging

Industrial packaging has a role to play in the decision to buy a product. This is why it is essential to choose them well. The big cosmetic brands do not hesitate to use the graphic design studio in its implementation. Choose your box according to the product.

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4. PACKAGING IN THE COSMETICS SECTOR

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A cosmetic packaging suitable for the following functions:

- Facilitate transportation and storage
- Protect against damage, weather and theft
- Identify the product and the brand
- Explain how the product is to be used
- Facilitate opening, closing and use

4.1. TYPES OF PACKAGING FOR COSMETICS

When it comes to packaging, we also think of three different layers: the outer packaging, the inner packaging and the product packaging.

- *The outer packaging*
The outer packaging is the box in which the cosmetic products are delivered or the bag in which they are packed at the checkout in the case of a point of sale.
- *The inner packaging*
The inner packaging houses the product, such as the small box that customers open to access the product.
- *Product packaging*
The product packaging is the container that holds the product (cream, powder).

4.2 PLASTICS

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4.3. IDEAS FOR CHOOSING COSMETIC PACKAGING

Industrial packaging has a role to play in the decision to buy a product. This is why it is essential to choose them well. The big cosmetic brands do not hesitate to use the graphic design studio in its implementation.

Choose your box according to the product

A cosmetic product can indeed be low-end, mid-range or high-end. The packaging must be appropriate to its content.

For popular products, it is customary to use a simple and inexpensive box. This allows reducing charges. It will protect the product, while displaying the information about it, namely the content and composition.

As for the mid-range cosmetic products, they require quality. Unlike the previous ones, cardboards are used and are denser and of better quality. Consumers increasingly want companies to offer them environmentally friendly packaging and reduced waste. Cardboard boxes are recycled, recyclable and produced in an environmentally responsible way.

Finally, when it comes to luxury or high-end products, custom-made boxes are used. In this case, the packaging is a true symbol. Its design must reflect the uniqueness of its contents. Organic and recyclable material is recommended. It is original and ecological.

Situation overview in Senegal

Some companies in the sector: La maison du karité, Cosmétique baobab des saveurs, Baobab fruit company Senegal, Bégué coco, Biosene, Dr Marie Diallo laboratories, Etounature, HD Industrie, Laboratoires Bio essence, Les saveurs du sahel, Senecor, Sivop Sénégal, Amyrel, Verte Casamançaise.

The cosmetic sector is growing in Senegal due to the effects of fashion and mimicry, especially among women who are more users of cosmetic products. These products include creams, ointments, gels, Vaseline, perfumes, deodorants, hair products, etc.

Main packaging used: glass and plastic dominate in the form of jars, jars, tubes, bottles in several volumes (20 g to 1000-1250g).

The trend is the use of local natural raw materials very rich in elements and benefactors of body care. These include shea butter and some essential oils such as neem, the desert date balanites "soump", sesame, baobab, touloukouna, etc. Several small start-up companies have invested in this niche of natural or "organic" to offer products manufactured by hand and designed by the promoter. However, their irregular quality and very short shelf life do not favor their positioning on the market. On the other hand, some SMEs manage to export their products to the diaspora.

Choosing the right packaging

The choice of cosmetic packaging should not be made at random. The first objective to consider is that it exists to develop the brand image. As an expected result, the consumer must be able to identify, at first glance, the proposed product when passing through the supermarket shelves. It is necessary to have a well-visible logo and design.

The packaging must not, however, distort its contents. Its initial function is to protect the product inside. It must be effective in blocking light, bacteria and water vapors. This explains the excessive use of glass by the dermatological and pharmaceutical industries.

Another interesting choice for natural cosmetic packaging is the stand-up pouch (doypack). Tightly sealed and customizable, it protects the products and facilitates their use. If the product is certified by Ecocert, Cosmebio or another competent organization, it must be displayed and highlighted on the packaging. If the product is additive-free, without chemical substances, it must be visually shown through pictograms.

The cost of cosmetic packaging

Cosmetic Packaging Cost

The cosmetic packaging costs depends on the size, materials and finishing options chosen. Naturally, some are more expensive than others and by purchasing larger quantities bigger discounts will result. If the positioning is at the higher end of the market, select packaging that aligns with the positioning and absorb the cost by increasing the selling price. The packaging that will be in direct contact with the product should be closely studied. Depending on the formula of the products, some can be well preserved in glass but not so well in plastic. A change in color, smell or texture could occur. The compatibility of the container should always be tested with the contents through ageing tests. If for example the product oxidizes in contact with air, the ideal cosmetic packaging would be an airless bottle. The design of cosmetic packaging is of crucial importance for the success of the business. It is best to use an experienced designer or supplier and accept to pay for a quality service.

5. PACKAGING IN THE CLOTHING SECTOR

Packaging for clothing products must offer a solution for displaying the product on the shelf, be seen by the consumer and sometimes even allow him to touch it. Ensuring in this case, much more than a simple protection, the packaging becomes a multifunctional asset. The packaging of clothing must above all protect the articles during shipping. Several solutions can be considered for the packaging of a ready-to-wear garment.

5.1. THE SELF-ADHESIVE BAGS

It is available in several sizes. They are interesting because of their lightness, flexibility and solidity. They are made of polypropylene or bi-oriented polypropylene in order to ensure a perfect transparency and a better display of the products. Moreover, the repositionable self-adhesive flap allows testing and touching the product before use without damaging the packaging. The self-adhesive closure packaging allows the bag to be manually packed and easily reclosed with the adhesive flap.

5.2 SLIDER BAG

It is also often used in textiles to highlight underwear or swimwear, for example.

5.3. THE OPAQUE PLASTIC BAG

The most common one is the one used by the major mail-order companies. This VAD pouch is the clothing packaging par excellence because it is light and resistant at the same time. Reputedly tear-proof and water-proof, it protects clothing from rain and dust. Thanks to its light weight, you can save on shipping costs. With several sizes, you can pack t-shirts, pants or even coats. With one VAD bag, you can ship multiple garments at once.

Advantages: light, flexible and resistant, suitable for all types of clothing (several sizes available)

5.4. THE BUBBLE WRAP

This great classic is a must in e-commerce. Online shopping for clothes is a huge success. Packaging plays an even more important role in the purchasing process. Indeed, it must ensure the protection of the clothes during all the steps of the supply chain and the delivery. It offers customers a satisfactory unboxing experience. In addition, there are new constraints linked to the climate crisis. Consumers are uncompromising towards brands that do not demonstrate a minimum of eco-responsibility.

5.5. FOLLOW-UP LETTER

This cardboard packaging for clothes is rigid, but also resistant.

The cardboard box: rigid, robust, available in several formats, this simple packaging will promote the efficiency of transport and distribution of clothing. It can also be used to ship shoes.

5.6 CASE OF CUSTOMIZED CLOTHING PACKAGING.

By creating a personalized clothing packaging in accordance with the identity of the brand, we seek to satisfy the customer, especially in the case of sales via the e-commerce site. Several elements must be taken into account to create a custom clothing packaging:

- The solidity: it is necessary to design a shock-resistant packaging. The garment must arrive in perfect condition;
- Dimensions: opt for a standard size packaging to reduce costs;
- Re-usability: a re-usable packaging is a key element to seduce consumers concerned about the environment, especially if the box is pretty and practical.

■ OVERVIEW IN SENEGAL

The clothing market is extremely dynamic in Senegal with a structure characterized by a predominance of imported products which monopolize more than 80% of the ready-to-wear market. On the supply side, there has been a steady increase in clothing imports.

The two predominant styles of clothing are traditional, which is still very popular with the local population on the occasion of events (Muslim festivals, weddings, christenings, etc.), and casual, which is the everyday outfit. Today, local production is focused on the traditional segment, for several reasons: first, the availability of raw materials in sufficient quantity and quality; indeed, most of the fabrics used are imported (bazin, filafil, gagnila, thioub, etc.) and local production of woven cloth. In addition to this can be added the know-how of designers who have a renowned expertise in terms of launching trends and quality of work. In addition, traditional clothing is a sector that is difficult to penetrate by foreign competition and the demand is entirely covered by the supply. Senegal has nearly 40,000 sewing workshops (ANSD 2016 survey). 51% of the workshops are in Dakar. But they can be found everywhere, in markets, in neighborhoods. The region of Thiès comes second with 13% of the total and Diourbel follows with 12%. 24% of the remaining workshops are distributed among 11 regions (Kaolack, Fatick, Kaffrine, Saint-Louis, Louga, Tambacounda, Kolda, Ziguinchor, Kédougou, Matam, and Sedhiou). It is said that Senegal is a country of couture and many Africans dress in Dakar.

The clothing market is extremely dynamic in Senegal with a structure characterized by a predominance of imported products which monopolize more than 80% of the ready-to-wear market. On the supply side, there is a constant increase in clothing imports. Today, local production is focused on the traditional segment, for several reasons: first, the availability of raw materials in sufficient quantity and quality; indeed, most of the fabrics used are imported (bazin, filafil, gagnila, thioub, etc.) and local production of woven cloth. To this can be added the know-how of designers who have a renowned expertise in terms of launching trends and quality of work. In addition, traditional clothing is a sector that is difficult to penetrate by foreign competition and the demand is entirely covered by the supply.

In the Senegalese capital, traditional trades such as sewing are being modernized. In a working-class district of Dakar, women are trained in digital embroidery and 3D modeling. An innovation that is revolutionizing the fashion industry

Dakar women buy more according to their tastes and preferences of the moment (36%), than according to the brand (21%), the model (15%), the fashion (11%) or the color (8%).

Cream (24%), pink (19%), blue and beige (tied at 14%) are the preferred colors for tops while beige (51%), blue (18%) and cream (11%) are chosen for bottoms (source: data and people 2020)

Traditional and woven loincloth or art clothing is well exported in the region (Congo, Burundi, Mali, Burkina Faso, Cameroon), in Europe (France, Italy, Spain) and in America (USA, Canada).

Key Players:

Confection et Stylisme Adama Paris, Amadou Diop Da Fashion, AZ et OUZ Wear, Boul-Comprendre, Ardo Couture, Complexe Sadiya Gueye, Confabad, EGA confection, Emma style, Génite Création et Leather, Les Ateliers Leydi, Oumou Sy, Mamata Design, Mame Fagueye Ba, Rama Diaw Fashion, Sartorisen, Selly Raby Kane, Setsy, Shalimar Couture, Toolah Création, Keyfa, Yody création.

The packaging generally used by fashion designers and stylists are:

- The transparent polypropylene bag for the outer packaging.
- The polyethylene bag for transport with the name of the designer, logo and contact.

This last one is generally quite well designed; and it is beautiful and especially reusable.

6. GLOBAL PACKAGING MARKET

6.1 GLOBAL MARKET OVERVIEW

The global packaging market was valued at US\$851 billion in 2017, +2.8% compared to 2016 at constant prices according to Smithers Pira, of which US\$52.72 billion was for industrial packaging. It would reach US\$876 billion in 2018 and, at +2.9% per year, would reach US\$980 billion in 2022 and \$1,000 billion in 2023, a slight inflection since the previous forecast of \$1,000 billion in 2020. In 2028, the additional increase would be US\$150 billion.

Cardboard remains the most represented material with 35.7% of global consumption in 2016 followed by flexible packaging at 23.3%, rigid plastics at 18.2%, metal at 12.2% and glass at 6.6%.

The levers of growth in the packaging market are the global urbanization of populations estimated at 3.9 billion in 2014 and projected at 6.3 billion in 2050, the availability of products, the shift from traditional markets to the trade of prepackaged products especially in the food segment, the diversification of the retail industry landscape.

Food: The world's largest packaging user market is estimated¹⁰ at US\$273.9 billion in 2017 and is expected to reach \$356.7 billion in 2023 with an average annual growth rate of +4.5%. L'emballage pour la cosmétique estimé à 29,6 Mrds US\$ en 2017 annonce un TCAM de +4,16% à 31,75 Mrds \$ en 2023.

Cosmetics packaging estimated at US\$ 29.6 Billion in 2017 announces a CAGR of +4.16% to US\$ 31.75 Billion in 2023.

In 2016, the luxury packaging market is forecasted at US\$12-13.8 billion, up +2.9% from 2015, and is estimated at \$15.9 billion in 2020. Food: The world's largest packaging user market is estimated¹⁰ at \$273.9 billion in 2017 and is expected to reach \$356.7 billion in 2023 with an average annual growth rate of +4.5%. Cosmetics packaging estimated at US\$ 29.6 Billion in 2017 announces a CAGR of +4.16% to US\$ 31.75 Billion in 2023.

In 2016, the luxury packaging market is forecasted at US\$12-13.8 billion, up +2.9% from 2015, and is estimated at \$15.9 billion in 2020. Green" packaging would reach 132 billion US\$ in 2015. Its growth of +5.41% per year would lead it to \$207 billion in 2020.

- The global packaging business has grown continuously over the past decade due to changes in substrate choices, expansion of new markets and changing ownership dynamics. Sustainability and environmental issues may continue to be emphasized, especially in developed countries, and various innovations regarding paper and plastic packaging are observed in the market.

- The usage of non-recyclable plastic packaging is on the rise. This may lead to an increased need for more easily recyclable and sustainable packaging materials, such as paper and cardboard, recycled PET (RPET) and bioplastics, as well as a decrease in secondary packaging

- traditional packaging may continue to be replaced by flexible packaging. High-barrier films and pressure-sensitive pouches can challenge rigid packaging formats such as metal cans and glass jars for a wide range of food products.

- Microwaveable convenience foods, more portable packaging, on-the-go packaging and convenient features such as easy-to-open and reseal components can all address consumers' desire for convenient food.

- According to the Flexible Packaging Association, flexible packaging is primarily used for food, which accounts for more than 60 percent of the total market. Because it could incorporate new solutions to the many packaging challenges it faced, the flexible packaging industry is experiencing robust growth.

■ PAPER AND PAPERBOARD PACKAGING PRODUCTS WILL EXPERIENCE THE STRONGEST GROWTH.

Paper packaging products such as paper bags, pouches and cartons are the fastest growing sustainable packaging materials. The growing trend of online retailing and environmental regulations on non-biodegradable and non-recyclable packaging solutions is gradually creating a massive demand for environmentally friendly paper packaging solutions.

- **EXAMPLES :**

- Coca-Cola has tested its first paper bottle trial using an extra-strong paper shell with a thin plastic liner. The company's goal is to create a 100% recyclable, plastic-free bottle that can prevent gases from escaping from soft drinks.
- Smarties have developed recyclable paper packaging for confectionery products.
- Nestlé wants to make all of its paper-based packaging recyclable or reusable by 2025 and to reduce the use of virgin plastics by one-third over the same period.
- Companies in the paper packaging market are increasingly focusing on sustainable packaging solutions that meet consumer demands.
- In addition, various suppliers are adapting and innovating new packaging with paper packaging materials to reduce the environmental impact of packaging and launching various recycling initiatives.

7. REGULATIONS

7.1 INTERNATIONAL PACKAGING STANDARDS

The member countries of the European Union share the same regulations, which are the responsibility of the Directorate General for Health and Food Safety (DG HEALTH), within the European Commission.

This regulation is essentially based on the EC regulation 1935/2004, which describes specific regulations or directives with which materials that come into contact with foodstuffs, such as packaging, must comply. This regulation stipulates in particular that materials in contact with food must not release components that are harmful to the health of the consumer.

The EC regulation 2023/2006 completes this law by stating the good practices to be respected during the manufacturing of the materials in question.

In the case of plastics, the EC regulation 10/2011 is in force. It sets out the 1000 plastic substances that are allowed for the manufacture of materials that may come into contact with foodstuffs in the European Union. It also limits the migration to the foodstuff, which must always be below the limits set.

Some materials are not covered by a regulation at European level. That is why the member states also have their own legislation to remedy this shortcoming.

7.2 NATIONAL PACKAGING STANDARDS

The Senegalese Association of Standardization (ASN) is a semi-public structure. Its mission is to develop national standards in several areas. ASN supports economic operators in the quality approach, assists them in the implementation of quality management systems in general and health in particular. In addition, it provides the Regional Technical Secretariat of WAEMU "Food Products" Standardization. The association benefits from the growing involvement of the private sector in its operations. It has made great efforts to promote quality, particularly through the establishment of the "National Quality Oscar," which rewards national companies of all sizes that have made efforts in this area. Currently, the association advocates the generalization of the principles of hygiene and food safety, support for the establishment of a quality standard to which any company wishing to benefit from the support system will have to submit, and the improvement of regulations on legal information on packaging for all products marketed in Senegal, whether manufactured locally or imported. In addition to the words "sold in Senegal," packaging should display all legal information for consumer protection in the common languages of French and English. This step will have to be undertaken with the help of public authorities and consumer associations.

REFERENCE	NATIONAL STANDARDS ON PACKAGING (SOURCE: ASN)
NS-05-098	PACKAGING - REQUIREMENTS FOR PACKAGING RECOVERABLE BY COMPOSTING AND BIODEGRADATION
NS 015-011-9	PACKAGING OF HEALTH CARE WASTE - CARDBOARD BOX WITH INNER BAG FOR HEALTH CARE WASTE WITH INFECTIOUS RISKS
NS-05-0104	PACKAGING - BAGS - METHOD OF SAMPLING EMPTY BAGS FOR TESTING
NS 05-095	BIODEGRADABLE PACKAGING - SMALL AND MEDIUM CAPACITY PAPER BAGS - SPECIFICATIONS AND - REQUIREMENTS
NS 015-011-2	PACKAGING OF HEALTH CARE WASTE - BAGS FOR SOFT HEALTH CARE WASTE WITH INFECTIOUS RISKS
NS 015-011-6	PACKAGING OF WASTE FROM HEALTH CARE ACTIVITIES - WASTE FROM HEALTH CARE ACTIVITIES - PLASTIC DRUMS AND JERRY CANS FOR WASTE FROM HEALTH CARE ACTIVITIES WITH INFECTIOUS RISKS

Another standard applied to the packaging sector is the CAC/RCP 44-1995 code of practice (Codex Alimentarius) recommended for the packaging of fresh tropical fruits and vegetables.

There is no structure dedicated to packaging in Senegal. The ITA (Food Technology Institute) whose mission is to develop national agri-food resources by focusing on the development of food preservation, processing and packaging processes, wanted to develop its activities as a support structure for packaging.

8. PRICE OF PACKAGING

The table below shows some of the packaging used in the valorization of local food products (juice, syrup, jam, preserves).

TYPES OF PACKAGING	UNIT PRICE (FCFA)	PRODUCTS	COST PRICE FCFA	SHARE OF PACKAGING IN THE COST PRICE (FCFA)
GLASS				
BOTTLE DE 25 CL	275-285	BISSAP JUICE	720-750	200
BOTTLE DE 50 CL	300-350	GINGEMBRE JUICE	900-975	15
BOTTLE DE 75 CL	400-450	JBISSAP JUICE	1100-1250	50
CAPSULE	50			
JAR 270 G	250-275	MANGO JAM	600-750	100
JAR 450 G	300-325	MANGO JAM	925-1100	50
COVER	75-85			
PLASTIC				
BOTTLE PET 25 CL	45-60	BISSAP JUICE	200-225	20
BOTTLE 100 CL	85-100	BISSAP JUICE	475-500	20-22%
COVER	8			

SOURCE

P2R SURVEY-JUNE 2022)

The analysis shows that the prices of packaged juices and jams represent between 20 and 45% of the selling price. With these examples, it is demonstrated that the packaging has a serious impact on the profit margin of the company. So a serious problem to solve.

9. CHALLENGES AND TRENDS

9.1 NEW PACKAGING CHALLENGES

The increase in global demand for packaging brings with it new challenges for brand owners and manufacturers. Consumers are increasingly demanding sustainability from retailers and brands, and prefer to buy from companies that have made a difference in this area. At the same time, products and packaging are also being influenced by shoppers who are looking for ways to control their budgets while having smaller, more portable packages.

For brand owners, packaging increasingly represents a new way to engage with consumers: to reinforce the brand's image, to increase sales and build customer loyalty with exclusive limited edition packaging, to guarantee product authenticity and to give consumers the ability to access the information they seek about the item or brand.

Packaging is the most accurate and reliable marketing tool to reach the consumer. Packaging made of cardboard or flexible materials currently accounts for more than half of the world total.

■ LES 4 TENDANCES FORTES DU MARCHÉ DE L'EMBALLAGE

Processors, manufacturers and brands will need to pay particular attention over the next decade to consumer behavior, which is significantly influencing the packaging industry.

Four essential elements in the manufacture and use of packaging:

- E1 : Development of packaging for e-commerce
- E2 : To be in line with the priorities of brands in a globalized market
- E3 : Offer increased packaging functionality to customers for take-out consumption
- E4: Integrate packaging into multi-channel marketing campaigns, including social networks.

9.2 PACKAGING THAT ADAPTS TO LIFESTYLES

In addition to eco-design and source reduction of packaging waste, as well as premium classification of products via those of packaging, the main trends driving the global packaging market are:

- The development of materials of natural renewable origin and biodegradable materials;
- The deployment of recycling, especially for plastics and de-inked paper;
- The optimization of packaging for e-commerce;
- Increasing connectivity with consumers and data that will be exploited for individual promotions;
- Digital printing and customization of packaging for promotional campaigns;
- Consumer engagement in the fight against counterfeiting through smart packaging that allows verification of purchased products;
- An "open bar" strategy for companies using packaging, portals and promises in an ethical perspective of truth and transparency;
- Packaging adapted to food and beverage products that design a healthy and balanced daily diet, even digitalized;
- An "essentialist" design of labels and packaging to bridge the gap between too little and too much essential information, so that consumers can make an informed and confident purchasing decision;
- The adaptation of packaging to local specificities

9.3 ACTIVE PACKAGING

In contradiction with most legislation that defined packaging as inert, the new packaging is an active or intelligent element.

Smart packaging" is a concept that includes both "intelligent packaging" and "active packaging" (Robertson, 2006). Intelligent packaging detects change and signals it, while active packaging detects change and modifies its properties to adapt to that change (Brody, 2010)

Certain consumption habits common to industrialized countries such as the development of snacking, the reduction of time and frequency for shopping, and the demand for easy and quick to prepare and consume dishes, all these changes in the daily life of consumers are at the origin of a global market for Smart Packaging.

Integrated into the walls of packages, or independent in the form of bags or labels, active packaging slows down the degradation of food. At the same time, smart packaging (indicators and RFID chips) establishes monitoring and traceability of food and medicines, thus ensuring product safety and tracking.

Usually, choosing a type of packaging is only a negligible element in the technical design of a product, where the main criterion is price. The fundamental principle of any type of packaging is to provide a means of preserving and transporting the product it encloses throughout storage and distribution. The advent of high-tech packaging has made the choice much more complex even for basic products such as food and beverages. In addition, increasingly well-informed consumers have additional expectations such as environmental friendliness, convenience and aesthetics - all in a highly competitive market.

The next challenges for active and intelligent packaging are to control and manage the migration of substances, and to convince manufacturers and consumers. To counterbalance the industry's need to package food efficiently and safely for transport and storage, while maintaining a good level of quality, manufacturers must meet consumer demands for fresher, easier-to-use and less processed food, which are very interesting medium- and long-term prospects for new packaging technologies.

The Smart Packaging industry will experience major twists and turns and innovations for several years. What is certain is that tomorrow's packaging will have little to do with today's. These new technologies open doors to radically different perspectives than what we know, namely the transformation of packaging from inert and passive bodies to interactive and intelligent elements. Nanotechnologies are never far behind active packaging, and digital technologies behind intelligent packaging.

9.4 Recommendations

The launch of new products is often the occasion to launch innovative packaging. To achieve this, close collaboration between packaging specialists and food manufacturers is a prerequisite. It is also essential for the latter to recruit staff with cross-disciplinary skills to develop these products in line with the company's needs, objectives, applications and strategies. Active and intelligent packaging should no longer be developed according to technological possibilities, but rather be developed according to real market needs, with opportunities for bundling of several complementary technologies and combinations of Smart Packaging's. The implementation of an adapted and efficient marketing strategy and a targeted innovation policy are the strategies of the future.

9.4 RECOMMENDATIONS

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10. OVERVIEW OF THE PACKAGING SECTOR IN SENEGAL

The largest companies in the packaging sector are equipped with the best printing technologies for the materials they work with and their own laboratories for the design of packaging by graphic designers. When these companies are not subsidiaries of foreign companies, they also use European designers.

10.1 PACKAGING DEMAND

The demand for packaging analyzed comes from the following sectors: agri-food, cosmetics, and textiles-clothing. The diversified offer of packaging suppliers allows satisfying a significant part of the needs of the agri-food sector in Senegal and even of companies from neighboring countries (Mali, Gambia). The products concerned are: flexible bags, cardboard boxes, folding boxes, labels, paper bags, metal boxes, polypropylene bags, polystyrene boxes. The packaging sector contributes largely to the evolution of the national industrial supply of food products. In spite of this varied range of products, there are needs not satisfied by the local industry. In this case, we have recourse to the import in particular of the multiplayer bags, the lids, the capsules and metallic stoppers for glass bottles.

■ ■ MID-TERM DEMAND DEVELOPMENT:

Growing and evolving consumer expectations focus on:

- The practicality of packaging: products that are easy to open, transport, consume, recycle and reuse;
- The growing demand for pre-packaged products (fruits and vegetables) and "ready to eat" products;
- The need for food safety (waterproofing, tamper evidence, information on the product and its conservation, conservation properties of the container);
- The development of the medium and large-scale distribution in Senegal imposes requirements related to the sale of products, such as
- The standardization of secondary packaging to facilitate and improve transport and storage
- The creation of packaging that is easy to place on the shelf
- The reinforcement of the marketing function of packaging by promoting industrial production (80% of Nestlé products were distributed in traditional markets after handling).

10.2. THE PACKAGING OFFER

10.2.1 LOCAL OFFER

There are several companies in Senegal that manufacture metal, plastic and cardboard packaging. However, there is no glass packaging industry. Industries that use glass packaging are forced to import it. The most famous packaging producers in Senegal are :

RUFSA, SIMPA, LA ROCHETTE DAKAR, SOCIÉTÉ D'EMBALLAGES DU SÉNÉGAL (SES), CIFS, COMPAGNIE INDUSTRIELLE DES FIBRES SÉNÉGAL, SEIS SARL, FUMOA-COFISAC, SOSEM - SOCIÉTÉ SÉNÉGALAISE D'EMBALLAGE, POLYÉTHYLÈNE SÉNÉGAL, SECOS INDUSTRIES, EXO PACK, INDILL ; SAPIN ; SOSENA, SENPACK, SIPLAST, SIPASEN, SOTRAMAP, POLYKROME, YASBACK A.M, CARTONNAGES DE DAKAR, TRADERS (importers and resellers)

Some food industries have their own integrated packaging unit for the production of metal cans (Socas, Agroline) and plastic bottles (HDI, other hygiene product companies).

The raw material used by the packaging industry comes mainly from outside. The price of raw material is subject to important and unpredictable variations from one year to another and even during the year. These

events are at the origin of the difficulties in the organization of the production and do not allow to satisfy the demand directly. If at the level of the import, there are a free entry for certain raw materials as the jute, it is otherwise for the tinplate, the sheet and the other materials. Indeed, the latter are on the list of goods subject to fairly high customs duties. In addition, the most commonly used packaging materials (metal cans, glass jars) are generally too expensive in relation to their contents. The products packaged in this way are therefore too expensive. The cheap packaging that is often used does not generally offer sufficient protection to the contents and causes very high losses during transport and handling. While some products are insufficiently packaged, or even lack packaging altogether, which justifies the application of minimum standards of protective packaging; others are excessively packaged (metal cans and jars instead of cheaper plastic, paper or cardboard).

10.2.2 PACKAGING IMPORTS IN SENEGAL

According to the National Agency for Statistics and Demography (ANSD), packaging imports between 2018 and 2020 are as follows:

	2018	2019	2020
VALUE CAF (FCFA)	9 783 907 588	10 306 169 448	10 326 856 377
VOLUME (KG)	7 185 029	8 674 968	7 327 279

The analysis shows that imports are constantly increasing in value and quantity. These packages are of different kinds: bags, sacks, containers made of flexible and rigid plastic, glass, metal, jute, simple or layered paper, etc. Most of them come from Europe (France, Belgium, Italy, Spain, Netherlands, and Germany), Asia (Turkey, China, India, Pakistan, and Thailand), North Africa (Morocco, Tunisia, and Egypt) and West Africa (Ivory Coast, Ghana).

■ INITIATIVES OF LOCAL PRODUCE PROCESSORS' ASSOCIATIONS TO SOLVE THEIR PACKAGING SUPPLY.

- **TRANSFRULEG**: association of fruit and vegetable processors: in partnership with SIMPA, has molds at the manufacturer for the production of PET bottles and sold to their members only (more than 15 years)
- **Central purchasing office ANDANDO of DAKAR**: import and sale of glass packaging (jar and bottle) to their members
- **Central purchasing office for packaging in KAOLACK**: sale of packaging to processing units

■ OTHER INITIATIVES

Private operators have invested in importing packaging that is in high demand by processors and that is not produced by the local industry. This is the case of glass packaging in the form of jars and bottles of different capacities, paper bags with a window allowing the consumer to see the product it contains, and complex bags with the cap already installed. Two importers located in the capital (Dakar) and are well known by the processors.

- **Centrale équipement de Dakar**: company that imports and sells plastic and paper packaging
- **Omar LO (Patte d'Oie)**: importer of glass, plastic and complex packaging

11. ANALYSIS OF PACKAGING CONSTRAINTS IN SENEGAL

11.1 STUDIES ON THE PACKAGING SECTOR IN SENEGAL

Several studies have been conducted on the packaging sector in Senegal.

- 1995:** Proceedings of the 1st Francophone agri-food conference "Conservation, technology and packaging of food". AFATTA
- 2005:** The Company Upgrading Office (Bureau de Mise à Niveau des Entreprises) conducted a study on the positioning of the packaging sector.
- 2006:** The current situation and prospects of the food packaging sector, International Trade Center-Geneva.
- 2006:** Packaging industry in Senegal: this market which is not packed
- 2006:** Inventory of the fruit and vegetable sector in Senegal: a sub-regional study of the packaging of food products.
- 2015:** Biodegradable packaging - Small and medium capacity paper bags - Specifications and Requirements - Draft Standard PNS 05-00093-ASN

11.2. SUMMARY OF THE STATE OF PLAY FROM THE PACKAGING STUDIES

All these studies converge on the following findings:

- High cost of packaging
- Large companies are turning more and more to imported packaging or to vertical integration solutions - when they have the means (Sonacos, Socas, Agroline, HD Industrie) - to the detriment of national companies producing packaging
- The big industries are aware that food safety is undermined by the artisanal repackaging of the products they sell "mbouss". They have therefore launched the micro-packaging of their products for energy, technical and commercial reasons.
- Only the industries that export respect quality and food safety standards. The others pay little attention to the traceability opportunities that packaging can provide, due to the lack of requirements from the legislator in Senegal or the local consumer.
- Producers and processors complain about the irregular quality of packaging provided by Senegalese companies.
- Because production is limited in quantity due to the size of the market, the industry, which is generally small, does not order sufficient quantities of packaging to be able to benefit from attractive prices and cannot afford to buy original packaging, which prevents differentiation.
- Most industries do not have the means to invest in packaging equipment.
- The user industry puts few resources into research and development of its products and their packaging in terms of design and marketing.

Packaging companies are faced with unfair competition caused by parallel markets that do not comply with any basic safety and quality rules.

If access to plastic-based packaging is easy, the consumer is not sure that the product really conforms to the packaging. In addition, products of very different quality are sold in the same bag, which can lead to consumer rejection of all products sold in that package. If market studies show that consumers are willing to pay a little more for a product with a "labelled" origin, it may be interesting to develop collective brands or labels that provide more guarantees to consumers and allow access to markets and distribution channels that are more demanding in terms of quality and presentation (supermarkets, certain restaurants, petrol station stores, etc.) In this case, they can also be more remunerative for producers and processors.

The packaging industries manage to partially satisfy the needs of the local market. As well the industry of the transformation of food as that of the packaging; they cross all the difficulties of supply in raw materials; that is reflected by the underutilization of the installed capacities.

CONSTRAINTS ON PACKAGING PRODUCERS

- Constraints on packaging producers
- Import raw materials
- Penalizing customs tariffs on inputs
- Situation of quasi-monopoly
- Their activity is totally dependent on the level of activity of national producers of consumer goods
- Must fight against counterfeiting
- Equip themselves to meet the demand for micro-packaging

CONSTRAINTS AT THE LEVEL OF PRODUCERS/PROCESSORS OF LOCAL PRODUCTS

- Many companies do not master the technological processes of production and transformation
- The quality of the products is not consistent
- The majority of promoters do not know the standards for products and packaging
- The production capacities are low and the processes are often artisanal
- The food user industry is not sufficiently up to date in terms of product safety, making it difficult to grow in export markets that are buoyant but demanding.

EXTERNAL CONSTRAINTS

- Insufficient number of packaging specialists in Senegal
- Insufficient or non-existent packaging designers in Senegal

12. SOLUTIONS PRECONISEES

12.1 AU NIVEAU DES PRODUCTEURS ET AUTRES FOURNISSEURS D'EMBALLAGES

- To draw the attention of the authorities to the importance of the packaging and the conditioning in the valorization of the local products;
- To take all the necessary measures to zero-rate the raw materials to the importation;
- Encourage the production of packaging that meets international standards;
- To define national standards of quality for the packing and the conditioning of the most current food products;
- Create and improve local skills through training and information for packaging technicians and managers.
- To know the standards on packaging
- Build capacity to analyze technological information provided by producers/processors of local products
- Serve as an advisor to producers/processors by proposing packaging adapted to their products for the market for which they are intended

12.2 AU NIVEAU DES PRODUCTEURS ET TRANSFORMATEURS DES PRODUITS LOCAUX

- Know your product and its characteristics
- To master its production or transformation process
- Be informed and trained on food regulations
- Respect regulations (implement a quality approach, implement a hygiene policy, be up to date on documentation, labeling and traceability, protect and respect regulations, check that food packaging respects the environment, be attentive to the storage of goods, packaging and transport, ensure quality control)
- Be informed about packaging regulations and innovations
- Have knowledge or training in production/processing technologies
- Be trained on packaging in the (quality and products for which they are intended)
- Communicate well with your packaging supplier so that he can help you choose the right packaging for your product
- Grouping together to pool needs in order to have a minimum quantity of packaging orders (impact on the cost which will be reduced)
- Mutualize the requests to have a critical and important volume (quantity) which can interest the packaging manufacturers; which gives them a greater negotiation capacity
- Negotiate directly with producers and avoid intermediaries (to eliminate additional charges on the price of packaging)

12.3 AU NIVEAU DES FABRICANTS D'EMBALLAGES ET PRODUCTEURS/TRANSFORMATEURS

- Hold meetings to learn about available packaging and new developments
- Approach the authorities for lower taxes on imported packaging materials

12.4 AU NIVEAU DES STRUCTURES D'APPUI

- Facilitate dialogue and meetings between producers/processors of local products and packaging suppliers of the companies to be supported
- Organize training on packaging and its environment: trends and new developments, standards
Introduce in the higher schools, the training of packaging executives.

13. RECOMMENDATION

The problem of packaging is real. For more than 15 years, studies conducted on the packaging sector in Senegal have reached the same conclusions and recommendations.

Their implementation should pass by the creation of a TECHNICAL CENTER OF PACKAGING AND PACKAGING IN SENEGAL (like Tunisia and Morocco).

The cooperation between Senegal and Finland, which we hope will develop with the opening of the diplomatic mission, will have to integrate this vital preoccupation of the Senegalese industry, especially that of the agri-food industry, by taking into account the necessary environmental responsibility. This is an imperative necessity with regard to the impact of plastic packaging and other non-recyclable containers which constitute a real scourge in our countries.

The installation of Finnish SMEs in this field is highly desirable because of a national and West African market in constant growth.

The presence of Finnish companies could help disseminate good industrial and environmental practices in packaging, particularly for food products, which can then open up large export markets: the problem of packaging is a major constraint to their competitiveness.

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