

## THE AGRICULTURAL SECTOR AS AN ALTERNATIVE TO ACHIEVE ECONOMIC DIVERSIFICATION IN ALGERIA DURING THE PERIOD (2000-2022)

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### 1. Abstract

*This study aims to analyze the potential of the agricultural sector in Algeria as an alternative to achieve economic diversification. Using a descriptive analytical approach, the report presents the current state of the sector and its impact on economic indicators from 2000 to 2022. The findings highlight the underutilization of Algeria's agricultural capabilities and propose mechanisms for reform.*

**Keywords:** Agricultural sector, economic diversification, Algeria

### 2. 1. Introduction

The agricultural sector in Algeria holds promise as a means of economic diversification, aligning with the priority of low- and middle-income economies. Africa is home to eight of the world's least economically diversified countries, and by understanding the various dimensions of diversification, Algeria can capitalize on this for economic growth. The historical context of Algerian agriculture offers insight into its potential for expansion, and the current state of the sector demonstrates its significant contributions to both employment and GDP. Despite inadequate investment in agricultural infrastructure and reliance on imports for food security, there is an opportunity for organic farming and agroecology. Government policies, access to finance for farmers, and sustainable farming practices are mechanisms that can enhance agricultural capabilities. Collaboration with international partners for modernization efforts holds potential for advancement in Algerian agriculture. Supportive measures from state, private entities, and financial institutions are crucial for successful implementation despite challenges such as governance and corruption. By addressing these factors, Algeria can harness the potential of its agricultural sector as a key driver of economic diversification. See references: [6], [12] p. 1-5.

### 3. 2. Overview of the agricultural sector in Algeria

#### 3.2 2.1. Historical background of Algerian agriculture

The agricultural sector in Algeria boasts a deep-rooted historical background and has been the subject of various ambitious agricultural policies since 1963. These policies were designed to enhance food security, prioritize agricultural branches, and reclaim land. Despite the financial prosperity that has enabled substantial investments in the agricultural sector, there are persistent challenges in achieving sustainable development and improving livelihoods for the rural

population. The historical evolution of Algerian agriculture reflects a transition from large landholdings to a more equitable distribution, with initiatives aimed at promoting rural development and providing support to small-scale farmers. The sector has witnessed positive growth in agricultural production, productivity, and expansion of irrigated land. However, there are ongoing difficulties in attaining food security and sustainable development.

In the post-colonial era, North African countries concentrated on modernizing the agricultural sector while maintaining large farms, often through state administration or highly centralized cooperatives. This approach resulted in an emphasis on mechanization, commercial and export agriculture, with continued reliance on cash crops for exports.

In summary, Algerian agriculture has undergone significant transformations over the years, from agrarian reforms following independence to more recent policies focused on enhancing food security and rural development. These efforts have produced positive outcomes in terms of increased production and productivity but have also brought to light ongoing challenges related to sustainable development and livelihood improvement for the rural population. See references: [2], [5] p. 31-35.

### 3.3 2.2. Current state of the agricultural sector

Algeria's agricultural sector is a blend of historical agricultural policies and contemporary challenges. Since 1963, Algeria has implemented ambitious agricultural policies aimed at improving food security and developing priority agricultural branches. These policies have injected significant funds into the sector, leading to positive growth in agricultural production and productivity.

Following the country's independence in 1962, Algeria underwent significant transformations in land distribution and ownership through agrarian reforms. Large land holdings were restricted, and lands previously held by colonists were redistributed to war veterans and productive peasant cooperatives, promoting rural development by providing access to land for small-scale and landless farmers.

Algeria has experienced rapid growth in strategic agricultural branches such as cereals, milk, and potatoes. The expansion of productive capacities, including a doubling of irrigated land over the last decade, has played a crucial role in boosting agricultural output.

Agriculture continues to play a significant role in the Algerian economy, contributing to the country's GDP and offering employment opportunities for millions of rural people. Despite challenges such as limited investment in agricultural infrastructure and reliance on imports for food security, Algeria has seen positive growth in agricultural production.

In summary, while Algeria's agricultural sector has historically faced challenges and continues to grapple with modern issues like climate change and water shortages, it remains a vital component of the country's economy. Reforms focusing on sustainable farming practices and improving access to finance for farmers will be crucial for harnessing Algeria's agricultural capabilities. See references: [2], [5] p. 31-35.

#### 4. 3. Economic indicators and the agricultural sector

##### 4.2 3.1. GDP contribution of agriculture

The agricultural landscape in Algeria has been a major driver of the country's economy, with the World Bank reporting that it contributed about 30% to the GDP between 2010 and 2018. This percentage is notably higher than the regional average of 22% in the Middle East and North Africa. The estimated value of the sector exceeds 10,000 billion Algerian dinars, corresponding to over 100 billion US dollars, posing a significant barrier to national production diversification and development.

Beyond its economic impact, agriculture also plays a critical role in generating employment, particularly for women and unskilled youth who are vulnerable to economic and social disruptions. The sector has been heavily impacted by the COVID-19 pandemic, leaving workers at risk of losing their income without adequate social protection. Furthermore, dependence on food imports for security poses economic stability risks, exacerbated by limited investment in agricultural infrastructure and the effects of climate change on farming.

Despite these challenges, there is potential for organic farming and agroecology to contribute to diversification within Algeria's agricultural sector. Government policies supporting sustainable farming practices and improved access to finance for farmers can play a vital role in addressing these issues. Collaboration with international partners on modernization efforts is also crucial for providing support.

In conclusion, while Algeria's agricultural sector makes significant contributions to GDP and employment generation, it faces various obstacles that limit its potential for economic diversification. Overcoming these challenges will require cooperation from state entities, private organizations, financial institutions, and international partners. See references: [5] p. 36-40, [7] p. 6-10, [11].

Feature	Cluster										
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	
Prevalence of undernourishment (%)	-2.30	0.04	-2.08	-1.03	-2.09	-1.27	-0.54	0.25	-0.60	3.84	5.77
Arable land per capita (ha)	-2.88	-1.87	-2.75	-2.48	-2.22	-1.02	11.9	0.49	0.47	-0.03	0.39
Share of agriculture in GDP (%)	-2.93	-2.41	-2.65	-2.71	-1.75	-0.56	0.89	0.34	-0.52	10.6	1.65
Percentage of arable land equipped for irrigation (%)	4.96	3.01	-0.79	1.15	0.63	3.29	-3.00	-2.86	-1.38	-2.96	-2.05

Agri-food trade balance per capita (USD)	-7.88	-1.11	-7.31	-4.34	5.51	1.91	5.79	1.6	1.95	2.03	1.87
Value of net capital stock per 1 ha of arable land (USD)	9.73	-2.17	6.84	-1.60	6.27	-2.72	-3.51	-3.35	-2.87	-3.52	-3.11
Gap between the food production growth rate and the population growth rate (percentage points)	-8.05	-4.76	4.23	1.02	1.64	2.58	1.59	-0.48	2.81	0.07	-0.66

Table 1: Values of measure of differences between means of characteristics describing the agricultural sector and the undernourishment scale in the set of selected developing countries and clusters (Ward's method). (source: reference [9])

Cluster	Countries	Improvement Strategies											
			4	5	6	7	8	9	10	11			
I	United Arab Emirates, Kuwait	X	X							X	X	X	
II	Oman, Saudi Arabia, Lebanon, Jordan, Iraq	X	X					X			X		X
III	French Polynesia, Brunei Darussalam	X		X	X	X						X	
IV	New Caledonia, Trinidad and Tobago, Mauritius, Djibouti, Barbados	X		X		X					X		X
V	Malaysia, Costa Rica				X				X	X	X		

VI	Turkmenistan, Kyrgyzstan, Iran, Suriname, Georgia, Sao Tome and Principe, Egypt, Ecuador, Chile, Uzbekistan, Nepal, Colombia, Sri Lanka, China, Peru, Vietnam, Bangladesh, Armenia	X				X		X		X		X
VII	Niger, Paraguay, Argentina					X	X					X
VIII	Mauritania, Gambia, Nigeria, Malawi, Ethiopia, Mali, Togo, Burkina Faso, Senegal, Guinea, Cameroon, Benin, Ghana, Fiji, Belize, Gabon, Lesotho, Panama, Cabo Verde, Honduras, Eswatini, Cote d'Ivoire, Botswana, Timor-Leste, Angola					X	X					X

IX	Lao People's Democratic Republic, Myanmar, Cambodia, Guyana, Thailand, Nicaragua, Bolivia, Indonesia, India, Philippines, Guatemala, Jamaica, Dominican Republic, Mongolia, El Salvador, Dominica, Mexico, Tunisia, Morocco, Algeria					X	X	X					X
X	Liberia, Sierra Leone, Guinea-Bissau					X	X						X
XI	Haiti, Zimbabwe, Zambia, Congo, Central African Republic, Uganda, Madagascar, United Republic of Tanzania, Mozambique, Rwanda, Kenya, Chad, Yemen, Pakistan, Afghanistan					X	X			X			X

Table 2: Recommendations on strategies for food security improvement in identified clusters. (source: reference [9])

### 4.3 3.2. Employment in the agricultural sector

The agricultural industry in Algeria has a major influence on the country's employment landscape. It is estimated that around 30% of the formal economy in Algeria is reliant on the agricultural sector, making it a crucial source of jobs for many Algerians. A significant portion of the population, including women and unskilled youth, are employed in this sector, with unskilled youth accounting for approximately 20% of the country's unemployed youth. This makes them particularly susceptible to economic and social shocks. The COVID-19 pandemic has further

worsened the situation for workers in this sector, as they are at a heightened risk of losing their income without any access to social protection.

Additionally, the agri-food industry represents 6.5% of total employment in Algeria, with 164,900 people working in this sector as of 2022. Employment in this sector is primarily concentrated in rural and coastal communities where alternative economic opportunities are limited. The output generated by the primary sector and its associated secondary processing sector also has significant ripple effects on the economy.

While the government's efforts to combat corruption and implement market-based economic reforms have been crucial in supporting the growth and diversification of the agricultural sector, more investment is required to enhance agricultural infrastructure and promote sustainable farming practices. It is also imperative to improve access to finance for farmers and promote organic farming and agroecology to fully utilize Algeria's agricultural potential. Enhancing market access can contribute to improving economic viability and resilience for primary producers within the agri-food sector.

In conclusion, despite challenges such as limited investment in infrastructure and reliance on food imports for security, there are opportunities for reform and growth through sustainable practices and improved market access within the agricultural sector. See references: [5] p. 36-40, [7] p. 6-10.

#### 4.4 3.3. Trade balance of agricultural products

The trade balance of agricultural products serves as a vital gauge of the overall performance of Algeria's agricultural sector. It is crucial to examine the dynamics of import and export to grasp the economic impact. Import tariffs play a pivotal role in regulating the influx of agricultural imports into a country. The substantial surge in agricultural imports has a detrimental effect on agricultural performance, which is why many nations impose tariffs to curb imports.

The rise in total imports is projected to outpace the growth in exports and agricultural value-added (AVA), resulting in a decline in the actual trade balance. Therefore, it is imperative for Algeria to prudently manage its import tariffs to ensure they have a positive influence on the overall performance of the agricultural sector.

Moreover, it is essential to take into account the repercussions of international trade policies and agreements on Algeria's trade balance for agricultural products. The nation must remain vigilant against potential exploitative trade agreements that could perpetuate disparities in wages and exploitation of surplus value for the benefit of other countries.

In conclusion, comprehending and managing Algeria's trade balance for agricultural products is crucial for optimizing the economic diversification potential of the agricultural sector. Diligent management of import tariffs, along with vigilance regarding international trade policies and agreements, are indispensable for ensuring sustainable growth and development in Algerian agriculture. See references: [4] p. 21-25, [11].

Type	Source
Agricultural value added (AVA)	FAO ( <a href="http://www.fao.org/faostat/en/#data/MK">http://www.fao.org/faostat/en/#data/MK</a> )
Exchange rates	FAO ( <a href="http://www.fao.org/faostat/en/#data/PE">http://www.fao.org/faostat/en/#data/PE</a> )
Total foreign direct investment (FDI) inflows	FAO ( <a href="http://www.fao.org/faostat/en/#data/FDI">http://www.fao.org/faostat/en/#data/FDI</a> )
Total agricultural export values	WTO ( <a href="https://data.wto.org/">https://data.wto.org/</a> )
Average agricultural import duties	WTO ( <a href="https://data.wto.org/">https://data.wto.org/</a> )
Nitrogen fertilizer imports	FAO ( <a href="http://www.fao.org/faostat/en/#data/RFB">http://www.fao.org/faostat/en/#data/RFB</a> )

Table 3: Types and sources of data in this study. (source: reference [11])

Damage costs	China <sup>1</sup>	Germany	UK	USA
1. Drinking water treatment costs	nd	104	215	1059
2. Health costs to humans (farmers, farm workers, rural residents, food consumers)	500–1300	17	2 <sup>2</sup>	157
3. Pollution incidents in watercourses, fish deaths, monitoring costs and revenue losses in aquaculture and fishing industries	nd	60	7	153
4. Negative effects on on- and off-farm biodiversity (fish, beneficial insects, wildlife, bees, domestic pets)	200–500	10	75	331
5. Negative effects on climate from energy costs of manufacture of pesticides	148	4	3	55
TOTALS	848–1948	195	302	1755

Table 4: Cost category framework for assessing full costs of pesticide use (million US \$ per year, 2000). (source: reference [3])

#### 5. 4. Challenges and opportunities for agricultural diversification

##### 5.2 4.1. Limited investment in agricultural infrastructure

Insufficient investment in the agricultural infrastructure of Algeria has posed a significant barrier to the sector's expansion and diversification. The adoption of neoliberal policies in the 1980s led to the state retreating from natural resource management, allowing private investors to obtain more resources, particularly in vast desert areas. This resulted in a rise in agricultural product prices due to the prolonged liberalization of production inputs. Additionally, state support for agricultural

inputs was completely eliminated following an agreement with the IMF in 1994, resulting in a lack of financial assistance for farmers.

To tackle these challenges and capitalize on the agricultural potential for economic diversification, it is crucial to prioritize the reform of agricultural policies. This entails gradually phasing out price support and input subsidies while replacing them with direct income support that causes fewer distortions. Moreover, there is a necessity to make substantial investments in enhancing both soft and hard infrastructure for the agricultural sector. This includes bolstering research and extensions, irrigation, land registry, financing, and transport infrastructure, all of which are vital for agriculture's growth.

The implementation of these reforms may lead to job losses in agriculture, potentially causing social tensions. Therefore, it is imperative that these reforms are accompanied by robust social protection programs to alleviate the cost of economic adjustment and provide support to the impoverished and vulnerable segments of society.

In conclusion, addressing the limited investment in agricultural infrastructure demands a comprehensive approach that distinguishes food security policy from agricultural policy while concurrently investing in critical infrastructure and putting into effect social protection programs to ensure a successful transition towards a more competitive and diversified agricultural sector. See references: [2], [8] p. 11-15.

### 5.3 4.2. Dependence on imports for food security

Algeria's heavy reliance on food imports has raised significant concerns regarding food security, as the agricultural sector can only meet 55% of the population's food needs. This shortage is especially evident in essential foods like soft wheat, semolina, milk, cooking oils, sugar, and tomatoes. Moreover, Algeria is one of the leading importers of cereals and milk worldwide. The challenges to achieving food security are exacerbated by rapid population growth, increased household spending on food, and declining revenues from oil and gas. The limited availability of arable land, along with environmental factors such as drought and desertification, and unsustainable use of scarce resources all hinder the growth of the agricultural sector. These constraints not only limit the sector's productivity but also its ability to decrease the food import expenditure. See references: [2], [5] p. 31-35, [11].

### 5.4 4.3. Climate change and its impact on agriculture

The MENA region, which includes Algeria, is confronting substantial obstacles in the agricultural sector attributed to climate change. Factors such as land and water scarcity, erosion, and unsustainable farming practices make agricultural activities quite challenging. Moreover, it is projected that the region will experience increased temperatures and reduced precipitation in the future due to climate change, posing a threat to agricultural productivity and food security.

In the case of Algeria, the agricultural sector is affected by environmental pressures stemming from the expansion of agricultural areas into pasture land and native forests. The considerable increase in the use of agro-chemicals has raised concerns about their impact on water, air quality,

and human health. Furthermore, the rising use of fertilizers has raised concerns about nutrient imbalances and potential runoff issues if not managed properly.

It is evident that climate change has placed significant strain on agriculture in Algeria and throughout the MENA region. It is crucial for policymakers to address these challenges to ensure sustainable agricultural practices and secure food production for the future. See references: [2], [10].

<b>Organizations</b>	<b>Geographical area of work</b>
The North African Network for Food Sovereignty	North Africa
Alexandria Research Centre for Adaptation to Climate Change (ARCA)	A government institution in Egypt
Organic Agriculture Association	Egypt
Fayoum Agro Organic Development Association (FAODA)	Fayoum, Egypt
The Integral Development Action of Minia	Province of Minia, south of Egypt
Egyptian Association for Sustainable Agriculture	Province of Asyut, south of Egypt
Arid Regions Institute	A government institution in Tunisia
Observatory of Food Sovereignty and the Environment (OSAE)	Tunisia
Shapes and Oasis Colours Association (AFCO)	Chenini Oasis, south of Tunisia
Torba Association	Algeria
Pedagogical Ecological Farm	Zéralda region, Algeria
Network of Agro-ecological Initiatives in Morocco (RIAM)	Morocco
Worm-breeding groups – producing worm-based organic fertilizers	Egypt, Tunisia, Morocco, Algeria
Agricultural cooperatives	Egypt, Tunisia, Morocco, Algeria
Peasant/agricultural trade unions	Egypt, Tunisia, Morocco, Algeria
Food baskets linking consumers and producers (linking farmers to consumers in cities)	Egypt, Tunisia, Morocco, Algeria
Local agricultural markets	Egypt, Tunisia, Morocco, Algeria
Agricultural women workers’ trade unions	Tunisia, Morocco

Table 5: Examples of initiatives supporting eco-regenerative agriculture in North Africa (source: reference [2])

Country	Latest Year (M kg) in Descending Order	Changes in Pesticide Use over an Approximate 20 Year Period (% change)			Data Period		
		Insecticides	Herbicides	Fungicides			
OECD							
USA	386	101%	88%	95%	43%	1990–07	
Italy	63	74%	93%	96%	69%	1990–11	
France	62	62%	10%	64%	64%	1990–10	
Canada	54	172%	103%	171%	335%	1990–08	
Japan	52	68%	74%	102%	54%	2000–11	
Spain	40	94%	147%	69%	96%	1990–10	
Germany	37	113%	71%	102%	95%	1990–11	
UK	16	56%	44%	41%	82%	1990–11	
Netherlands	8	99%	53%	80%	88%	1990–10	
Denmark	4	79%	15%	112%	37%	1990–11	
Sweden	1.8	90%	60%	120%	33%	1990–11	
Latin America							
Argentina	265	815%	593%	1190%	378%	1993–11	
Brazil	76	298%	302%	312%	303%	1991–01	
Chile	23	263%	349%	228%	201%	1990–11	
Asia							
China	1806	246%	nd	nd	nd	1991–12	
Thailand	87	395%	184%	642%	143%	1993–11	
India	40	47%	31%	95%	100%	1991–10	

Bangladesh	34	489%	2110%	9500%	801%	1990–10
Turkey	33	139%	70%	101%	460%	1990–11
Vietnam	19	76%	57%	97%	151%	1994–01
Pakistan	12	129%	148%	42%	51%	1990–01
Sri Lanka	1.3	91%	137%	54%	112%	1991–11
Africa						
South Africa	27	154%	159%	134%	179%	1994–00
Ghana	15	1683%	591%	5936%	2064%	1995–09
Cameroon	11	766%	582%	1620%	587%	1990–11
Algeria	4	34%	28%	229%	28%	1990–09
Ethiopia	4	1256%	465%	2380%	413%	1995–10
Kenya	1.6	44%	27%	64%	47%	1994–01
Burkina Faso	0.8	4800%	662%	24800%	nd	1992–11

Table 6: Country level agricultural pesticide use (1990 to latest data: 2007-2012). (source: reference [3])

#### 5.5 4.4. Potential for organic farming and agroecology

In summary, Algeria has a great opportunity to delve into organic farming and agroecology as a means of diversifying its economy. Drawing from successful practices in North Africa and incorporating insights from other areas into its agricultural reform policies and strategies, Algeria can maximize the potential of these capabilities. See references: [2], [3], [4] p. 96-100.

Category	Practices
<b>Soil management, soil improvement and carbon sequestration</b>	No-till farming Crop rotation (alternating cereals with leguminous crops) Diversity of crop compositions in farms Unprocessed organic fertilizers Processed organic fertilizers (compost) Liquid organic fertilizers (compost tea) Organic worm-based fertilizers (vermicompost) Liquid worm-based organic fertilizers (vermicompost tea)
<b>Water resource management</b>	Khattaras, Foggaras, cisterns (al-Majel) in Morocco, Algeria and Tunisia, respectively Bridges (Tunisia) Growing country-specific varieties Night irrigation (Egypt) Crop condensation North African oases three levels farming system
<b>Energy saving</b>	Manual labour Use of animals Flow irrigation Night irrigation Solar irrigation
<b>Environmental landscape management and wildlife control</b>	Ecological traps Manual collection of grass Multiplying varieties and not planting the same crops in the same plot of land
<b>Sustainable agricultural production</b>	Terrace cultivation (mountainous regions of Morocco and Algeria) Oases systems Mixed agro-pastoral systems

Seed sovereignty	Seed self-production Municipal/domestic seed usage
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Table 7: Selected practices of eco-regenerative agriculture in North Africa (source: reference [2])

Onion-shallot IPM package, Tamil Nadu	Tomato IPM package, East Africa
<ul style="list-style-type: none"> <li>● Healthy seed-bulb selection</li> <li>● Seed treatment with neem biopesticide</li> <li>● Soil applications of <i>Pseudomonas</i> and <i>Trichoderma</i> biopesticides</li> <li>● Cultivation of barrier crops of maize</li> <li>● Sticky traps and pheromone sprays</li> <li>● Spray applications of biopesticides</li> <li>● Last resort: synthetic pesticides</li> </ul>	<ul style="list-style-type: none"> <li>● Soil preparation with <i>Trichoderma</i>, neem cake and VAM</li> <li>● Seed selection</li> <li>● Seed treatment</li> <li>● Seedling nursery and grafting</li> <li>● Rogueing weeds within 45 days</li> <li>● Neem or mustard oil cake in soil</li> <li>● Mulching of soil</li> <li>● Sticky traps and pheromone sprays</li> <li>● Host free period</li> <li>● Staking of plants</li> <li>● Biological control with parasitoids <i>Trichogramma</i> and <i>Brancon</i> spp.</li> </ul>

Table 8: Components of two IPM packages for onion-shallots in India and green tomatoes in East Africa. (source: reference [3])

## 6. 5. Mechanisms for reform and harnessing agricultural capabilities

### 6.2 5.1. Government policies to support agriculture

To put it simply, Algeria has an incredible opportunity to explore organic farming and agroecology as a way to broaden its economy. By drawing inspiration from successful approaches in North Africa and integrating insights from other regions into its agricultural reform policies and strategies, Algeria can fully utilize the potential of these capabilities.

Government initiatives aimed at supporting agriculture in Algeria play a critical role in ensuring food security, poverty reduction, and enhancing the overall well-being of the population. One of the primary efforts is the provision of subsidies and grants to farmers to boost agricultural productivity. These subsidies can be allocated for the purchase of agricultural inputs such as seeds, fertilizers, and machinery, as well as financial assistance to offset production costs. This not only

motivates farmers to invest in their crops but also helps stabilize food prices for consumers. Another crucial element of government support is the implementation of agricultural extension services. These services offer farmers access to valuable information, training, and technology to enhance their farming practices. By disseminating knowledge about modern agricultural techniques, pest management, and crop rotation, extension services contribute to improving productivity and sustainability in the agricultural sector.

Furthermore, research and development initiatives are integral components of government policies to support agriculture. Through investment in scientific research, governments can develop new crop varieties that are better suited to local conditions, improve irrigation techniques for water conservation, and find solutions to mitigate the impacts of climate change on agriculture. Additionally, research efforts can focus on promoting organic farming and agroecology practices that prioritize environmental sustainability.

In conclusion, government policies aimed at supporting agriculture through subsidies and grants for farmers, agricultural extension services, and research and development initiatives are crucial for promoting economic diversification in Algeria's agricultural sector. These measures not only contribute to increasing productivity but also address challenges such as food security, climate change impacts, and sustainability. See references: [9], [15].

### 6.3 5.2. Enhancing access to finance for farmers

Facilitating financial access for farmers is crucial to promoting the economic diversification of Algeria's agricultural sector. Implementing microcredit programs can be instrumental in providing much-needed financial assistance to small-scale farmers who often lack access to conventional banking services. These programs can empower farmers to embrace modern farming techniques, acquire high-quality seeds and equipment, and expand their agricultural operations.

Agricultural insurance schemes represent another pivotal aspect of enhancing financial access for farmers. Such schemes can serve as a safety net for farmers in the event of unforeseen circumstances like natural disasters, crop failures, or market price fluctuations. By mitigating risks, agricultural insurance can incentivize farmers to take calculated risks, invest in new ventures, and adopt innovative agricultural practices.

Beyond microcredit programs and agricultural insurance schemes, there is a demand for the restructuring of the legal and institutional frameworks for microfinance to better align with the specific requirements of the agriculture sector. Simplifying bureaucratic procedures and enhancing the efficiency of public administration are also crucial steps in improving financial access for farmers. This includes initiatives to revitalize public administration within the agriculture sector and facilitate risk management in agriculture.

It is evident that enhancing financial access for farmers is essential for driving economic diversification in Algeria's agricultural sector. By providing financial support and mechanisms for risk mitigation, farmers can be empowered to invest in sustainable farming practices, embrace modern technologies, and make significant contributions to the overall economic diversification efforts within the country. See reference [8] p. 11-15.

#### 6.4 5.3. Promoting sustainable farming practices

Fostering sustainable agriculture is essential for the agricultural sector in Algeria to flourish and effectively contribute to economic diversification. One strategy to accomplish this is by embracing agroecological and regenerative farming practices. These methods encompass soil management, soil enhancement, and carbon sequestration techniques such as no-till farming, crop rotation, and the utilization of diverse crop compositions. Additionally, utilizing unprocessed organic fertilizers, compost, and compost tea can improve soil fertility and promote sustainable agriculture.

Effective water resource management also plays a vital role in sustainable farming practices. In Algeria, traditional water collection methods like Khattaras, Foggaras, and cisterns have been utilized for centuries and continue to be relevant in conserving water for agriculture. Furthermore, integrating energy-efficient techniques such as solar irrigation can contribute to sustainable agricultural production.

In addition to these practices, promoting agri-tourism can provide an avenue for income diversification for farmers in Algeria. By opening their farms to tourists and offering experiences related to agricultural activities such as farm stays, tours, or educational workshops on sustainable farming practices, farmers can generate additional revenue while also raising awareness about the significance of sustainable agriculture.

The implementation of these sustainable farming practices will necessitate supportive measures from various stakeholders including government policies that endorse agroecology and regenerative agriculture. Moreover, ensuring access to financing for farmers to invest in sustainable farming methods will be essential for successful adoption. Collaborating with international partners on modernization efforts can also offer valuable knowledge exchange and resources for promoting sustainable agriculture in Algeria.

In essence, the promotion of sustainable farming practices in Algeria will not only contribute to economic diversification but also aid in preserving natural resources and ensuring food security for future generations. See references: [2], [9].

- Each FFS consists of a group of 25–30 farmers, working in small sub-groups of about five each. The training is field-based and season-long, usually meeting once per week.
- The season starts and ends with a “ballot box” pretest and post-test respectively to assess trainees’ progress.
- Each FFS has one training field, divided into two parts; one IPM-managed (management decisions decided on by the group, not a fixed formula), the other with a conventional treatment regime, either as recommended by the agricultural extension service or through consensus of what farmers feel to be the usual practice for their area.
- In the mornings, the trainees go into the field in groups of five to make careful observations on growing stage and condition of crop plants, weather, pests and beneficial insects, diseases, soil and water conditions. Interesting specimens are collected, put into plastic bags and brought back for identification and further observation.
- On returning from the field to the meeting site (usually near the field, under a tree or other shelter), drawings are made of the crop plant which depict plant condition, pests and natural enemies weeds, water, and anything else worth noting. A conclusion about the status of the crop and possible management interventions is drawn by each sub-group and written down under the drawing (agro-ecosystem analysis).
- Each subgroup presents its results and conclusions for discussion to the entire group. As well as in the preceding field observations, the trainers remain as much as possible in the background, avoiding lecturing, not answering questions directly, but stimulating farmer to think for themselves.
- Special subjects are introduced in the training, including maintenance of “insect zoos” where observations are made on pests, beneficial insects, and their interactions. Other subjects include leaf removal experiments to assess pest compensatory abilities, life cycles of pests and diseases (and in recent years the expansion of topics away from just IPM).
- Socio-dynamic exercises serve to strengthen group bonding in the interest of post-FFS farmer to farmer dissemination.

Table 9: The principal elements of farmer field schools (FFS). Source:.. (source: reference [3])

## 7. 6. Scope for collaboration with international partners on modernization efforts.

Engaging in partnerships with international organizations is vital for the modernization of Algeria's agricultural industry. The World Bank Group has already been involved in joint investments in food and energy, aiming to develop a productive, environmentally friendly, resilient, and inclusive agriculture sector. These efforts include initiatives to enhance food security for millions of farmers in Africa through IFC's Global Food Security Platform. Moreover, there are projects focused on providing alternatives to expensive and polluting fossil fuels through Decentralized Renewable Energy solutions. The World Bank is also backing the establishment of solar-powered cold storage and irrigation systems in countries like Rwanda, Gambia, and Nigeria. These collaborative

endeavors illustrate the potential for international partnerships to contribute to the modernization of Algeria's agricultural sector.

Furthermore, achieving diversification goals requires cooperation between development partners and international organizations. This involves addressing infrastructure limitations that increase trade and logistics costs in conjunction with reforms that reduce trade barriers and promote competition among service providers along trade-related infrastructure. Effective collaboration is also crucial for addressing governance constraints, political economy limitations, labor market policies, access to finance, and disaster assistance related to climate change.

In addition to these measures, developing countries should focus on investments in human capital and technologies (R&D), ensure foreign investors collaborate with local agricultural firms, increase agricultural exports, and create a conducive economic system. This underscores the significance of comprehensive collaboration between Algeria and international partners to drive the modernization efforts in the agricultural sector.

The impacts of economic globalization on agricultural value-added (AVA) in developing countries should be taken into account during collaboration with international partners. While economic globalization can have positive impacts by increasing AVA through FDI inflows and agricultural export values, its implementation must pay attention to achieving sustainable development goals. Therefore, collaboration with international partners should prioritize sustainable practices that enhance AVA while mitigating environmental damage caused by globalization.

Overall, Algeria has ample room for collaboration with international partners on modernization efforts for its agricultural sector. By leveraging existing global initiatives and focusing on sustainable practices through collaborative measures outlined above, Algeria can harness its agricultural capabilities for economic diversification. See references: [11], [12] p. 1-5, [14] p. 21-25.

## **8. 7. Supportive measures required from state, private entities, financial institutions, etc.**

In order to promote the diversification of Algeria's agricultural sector, it is imperative for the government, private companies, and financial institutions to work together on several key initiatives. The first priority is to address the incentive structure within the country. This involves creating a favorable environment for agricultural exports and reducing entry barriers such as tariffs and non-tariff barriers. It is crucial to ensure that the incentive framework supports and encourages agricultural diversification rather than hindering it.

Furthermore, close collaboration with the private sector, both domestic and foreign, is essential. This partnership can provide valuable insights into potential opportunities for economic diversification, identify existing obstacles that impede progress, and develop concrete actions and policies to overcome these challenges. Additionally, government interventions can include engaging in dialogue with private sector stakeholders to sustain interventions over time and mitigate the risk of capture and rent-seeking behavior.

Cooperation between development partners and international organizations is also vital in

supporting a diversification strategy. This partnership can address infrastructure constraints that increase trade and logistics costs while reducing trade barriers to enhance competition among service providers along trade-related infrastructure. Effective implementation of reforms requires a thorough assessment of governance restrictions and political economy constraints.

Moreover, access to finance and labor market policies are critical elements for efficient resource reallocation across sectors or firms. Strengthening access to education, markets, and finance can enable informal sector workers and enterprises to reach a sufficient level of productivity to catch up with the formal sector.

Overall, supportive measures from state entities, private businesses, and financial institutions are essential for successful agricultural diversification in Algeria. Collaboration with international organizations, addressing governance restrictions, facilitating access to finance for farmers, promoting sustainable farming practices are all necessary components of an effective support system for agricultural diversification efforts. See reference [12] p. 16-20.

### **9. 8. Implementation challenges such as governance, corruption, etc.**

Algeria's pursuit of economic diversification is met with several obstacles, particularly in the realms of governance and corruption. The country's economy has long relied on hydrocarbons, with oil making up 98% of exports and 40-45% of GDP. This heavy dependence on a single sector exposes the economy to the volatility of global oil prices. However, attempts to broaden the economy have been hindered by various factors.

A significant challenge lies in the absence of a clear economic vision and consistent regulations, creating a perception of commercial risk for foreign investors. The 49/51 law, mandating majority Algerian ownership of most businesses, further complicates the investment landscape. Furthermore, corruption within customs systems, bureaucracy, and administration remains a pervasive issue that discourages foreign investment.

The informal economy also poses a challenge to economic diversification efforts, controlling a substantial portion of the consumer goods market and flooding it with cheap and counterfeit goods that hinder genuine products' competitiveness. Widespread corruption within the administration further exacerbates informal sector dominance.

Addressing these challenges will necessitate comprehensive reforms to fortify the legislative framework, restructure the administration, and enhance cooperation and data exchange between state institutions. Additionally, there is a need for initiatives to integrate informal economic activities into the formal economy through flexible procedures and measures that support investment while combating illegal activities.

In conclusion, addressing governance and corruption challenges is essential for successful economic diversification in Algeria. Reforms must center on establishing a more transparent and stable business environment to attract foreign investment and foster growth across multiple sectors. See references: [1], [5] p. 41-45, [13] p. 1-5.

Measure	Year	Index/Rank	Website Address
<b>TI Corruption Perceptions Index</b>	2020	104 of 180	<a href="http://www.transparency.org/research/cpi/overview">http://www.transparency.org/research/cpi/overview</a>
<b>World Bank's Doing Business Report</b>	2020	157 of 190	<a href="http://www.doingbusiness.org/en/rankings">http://www.doingbusiness.org/en/rankings</a>
<b>Global Innovation Index</b>	2020	121 of 131	<a href="https://www.globalinnovationindex.org/analysis-indicator">https://www.globalinnovationindex.org/analysis-indicator</a>
<b>U.S. FDI in partner country (\$M USD, historical stock positions)</b>	2019	\$2.7 billion	<a href="https://apps.bea.gov/international/factsheet/">https://apps.bea.gov/international/factsheet/</a>
<b>World Bank GNI per capita</b>	2019	\$4,010	<a href="http://data.worldbank.org/indicator/NY.GNP.PCAP.CD">http://data.worldbank.org/indicator/NY.GNP.PCAP.CD</a>

Table 10: Key Metrics and Rankings (source: reference [1])

## 10. 9. Conclusion

In conclusion, the agricultural sector in Algeria is facing a myriad of challenges and opportunities for economic diversification. The historical context of Algerian agriculture has greatly influenced the current state of the sector, which grapples with inadequate investment in agricultural infrastructure and reliance on imports for food security. The looming threat of climate change adds to the complexity, but there is potential for organic farming and agroecology to mitigate these challenges.

Government policies aimed at supporting agriculture, coupled with improved access to finance for farmers and the promotion of sustainable farming practices, are pivotal tools for reform and harnessing agricultural potential. Furthermore, collaboration with international partners for modernization efforts can further bolster the diversification of Algeria's agricultural sector.

Successful implementation of these reforms will depend on supportive measures from state and private entities, financial institutions, and other stakeholders. Additionally, addressing governance and corruption issues will be critical for the effective diversification of the agricultural sector.

In summary, the agricultural sector presents significant potential as an avenue for economic diversification in Algeria. Through comprehensive reforms and collaborative efforts to address

challenges and capitalize on opportunities, Algeria can strengthen its agricultural sector and contribute to overall economic development. See reference [2].

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