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# THE ECONOMIC PERFORMANCE ANALYSIS OF THE ALGERIAN OLIVE OIL SECTOR: COMPETITIVENESS AND PROSPECTS

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**Abstract:**
The analysis of the economic performance of the local olive sector requires crucial importance, particularly with the trends of entering international olive oil markets. And with the hegemony of Mediterranean countries in the production and export of this product, competition has arisen between these countries to monopolize significant shares of the market. In this regard, our study focused on the level analysis of the competitiveness of local production in terms of production costs by comparing it with the costs of other Mediterranean countries. This analysis demonstrated the poor economic performance of the local sector, particularly in terms of production costs. The potential of olive growing, particularly in terms of space and favorable climate, with good governance of the value chain, can bring it to high levels of competitiveness.
**Key words:** analysis, performance, competitiveness, olive oil sector, cost.

## 1. Introduction

In Algeria, olive cultivation represents the most widespread fruit farming. It is one of the countries in the Mediterranean region whose climatic conditions favor olive cultivation. By the end of the 1960s, Algeria produced high-quality oil that was exported to France, Belgium, England, Germany, and others. However, this ancient expertise faced challenges in the late 1970s due to the competition from rapidly produced sunflower, soybean, and rapeseed oil in significant quantities. Abandoned for many decades, olive trees suffered from the repercussions of terrorism and the neglect of public authorities. Yields were poor, olive oil became increasingly scarce, and the prices set by producers were exorbitant and exceeded tolerable levels.

Nevertheless, the olive sector managed to restart in the late 1990s (Ait Mouloud, 2014), thanks to a new vision for agricultural and rural development that established a new model for financing the agricultural and rural economy. This vision centered on the National Program for Agricultural and Rural Development (PNDAR). Launched in 2000, its objective was to address various difficulties encountered in the agricultural sector and to create an alternative for agricultural

development (BOURI, Chouaki 2011). This plan primarily aimed at increasing national olive production through annual plantations, establishing processing units, support institutes, new forms of organizing activities, etc. The implementation of these actions involved the engagement of local stakeholders in the valorization process (Lachibi, 2019). By 2019, the agricultural land dedicated to olive cultivation had reached nearly 500,000 hectares nationwide since 1999.

Due to its adaptation to the country's agro-climatic context, the olive tree is one of the crops that can significantly contribute to diversifying the economy, currently reliant mainly on oil exports. However, this sector hasn't sufficiently capitalized on the opportunity to upgrade itself through the coverage of export quotas to Europe, as provided by association agreements. This commercial opportunity could have served as an economic lever for various agricultural and agri-food sectors in an intensely competitive European market by placing different olive products.

The international olive environment is dominated by about ten major exporting countries, undergoing institutional changes driven notably by health regulations, the proliferation of standards and geographical indications, and the increasing demands of large-scale distribution. Thus, beyond price factors, competitiveness becomes imperative for any olive enterprise, failing which it risks being excluded from an increasingly demanding international market. The Algerian olive sector possesses significant advantages and has benefitted from an investment support program in recent years. However, stakeholders must embark on an extensive restructuring program to meet the requirements of the global market (Melkhir et al., 2013).

## 2. Material and Methods

### 2.1. Approach and Competitiveness in the Olive Industry:

Our study adopts a value-chain approach focusing on two segments of the olive sector: production and processing. The value-chain approach is relatively recent in economic studies; this type of analysis began gaining traction in agricultural economics and was extensively used in a product-oriented approach in the 1970s.

The value chain is defined as the entirety comprised of the agents or groups of agents involved in an agri-food product (or group of products), from its production to its consumption, and the relationships they maintain. Agents are defined based on their technological expertise, economic dimensions, coordination or independence regarding information and decision-making, access to capital, techniques, information, etc. (Derbal, 2008).

It can also be defined as a constructed system of agents and operations contributing to the production, transformation, and distribution of a product, along with the relationships among them and with the rest of the world.

This definition implies:

- Non-linear causality with feedback loops.
- Consideration of a sequence of exchanges and flows.
- Strong attention to technologies and trades.
- Strong attention to actors' strategies.

Studying the value chain helps identify strengths and weaknesses, enabling the establishment of policies and actions to reinforce positive aspects and eliminate constraints hindering the favorable evolution of the activity.

Additionally, analyzing the value chain highlights the cost progression, action by action, to determine the formation of the final price. Thus, it enables an accounting analysis of the system and profitability calculation. It serves as a tool for a comprehensive or partial financial assessment of a product (Noelle, 1997).

**2.2. Competitiveness: Concept and Determinants**

Griffon defines competitiveness as "the ability to offer products with unit costs lower than market prices and lower than those of competing sectors in a sustainable manner." In a strict sense, it corresponds to the ability to maintain or gain market share (Griffon, M., 1994). Laure Latruffe (2010) indicates that competitiveness is highlighted by performance indicators such as cost superiority, profitability, productivity, and efficiency.

Depending on the chosen theoretical approaches (Porterian, Institutional, Industrial Economics, resource and competence-based approaches, etc.), several factors can influence the competitiveness of a sector. The existence of an institutional climate favorable to improving productivity and quality is thus seen as a prerequisite for a sector's competitiveness (Griffon, 2004). According to Karry et al. (2000), "the ability of olive farms to remain competitive is essentially determined by the possibility of reducing production costs.

Olive growers are therefore compelled to produce at the lowest cost to maintain an advantage in production. While production cost alone cannot determine the competitiveness of olive oil, it nonetheless constitutes an indispensable element that requires precise evaluation (Karray et al., 2000).

Indeed, understanding production costs is useful for several reasons:

- It helps gauge the competitiveness of the sector.
- It provides insights into the sensitivity of different agricultural methods to changes in agricultural policy, particularly when production costs are linked to prices.

There are other factors determining competitiveness, such as taste quality, origin at the national and regional level, labels, geographical indications, and the country of origin's image in international markets (Boudi, 2012).

The bibliographic section focused on gathering essential data for a brief analysis of the global and Algerian olive oil industry, followed by a more detailed exploration at the Jijel province level. The field investigation involved conducting a survey within the Jijel province, specifically targeting the Taher municipality, a region with high potential in olive cultivation. The survey encompassed 20 olive farming operations.

Our aim through this inquiry was to evaluate the production cost and the total cost per liter of olive oil, determining the profitability level for olive growers. Additionally, we sought to address and assess the competitive position of the olive oil sector in the studied region and within Algeria.

## 3. Results and discussions

Our sample comprised 20 farms, primarily family-owned, with production primarily intended for self-consumption. These farms are located in the Taher municipality within the Jijel province, chosen specifically for its olive cultivation potential.

### 3.1. Characteristics

#### 3.1.1. Age of Farmers

**Table1. Distribution of farms based on the age of the farmer.**

| Age Bracket | Number of Farms | Percentage (%) |
|---|---|---|
| [40-50[ | 04 | 20% |
| [50-60[ | 08 | 40% |
| [60 and above | 08 | 40% |

In the table below, it can be observed that the majority of farmers are over 50 years old, with 40% surpassing 60 years. The younger generation tends to forgo labor-intensive work, preferring activities that yield quicker profits.

#### 3.1.2. Level of Education

**Table2. Distribution of agricultural farms based on the educational level of farmers**

| Level of Education | Number of Farms | Percentage (%) |
|---|---|---|
| **Non-Schooled** | 07 | 35% |
| **Primary** | 04 | 20% |
| **Secondary** | 05 | 25% |
| **High School** | 03 | 15% |
| **University** | 01 | 5% |

In the surveyed farms, the educational level of the majority of farmers is relatively low, comprising 45% (primary and secondary education) and 35% with no formal education, as depicted in the table above. However, revitalizing olive production requires a certain level of education.

#### 3.1.3. Farmer's Occupation:

**Table3. Distribution of farms based on the occupation of farmers**

| Type of Activity | Number of Farms | Percentage(%) |
|---|---|---|
| **Agriculture** | 04 | 20 |
| **Other Activities** | 16 | 80 |

The above table indicates that 80% of the farmers engage in additional activities, suggesting that their livelihood is not solely reliant on the profitability of this cultivation.

#### 3.1.4. Labor Force

**Table4. Distribution of labor force based on the type of labor.**

| **Labor Force** | **Family-based** | | **Seasonal Both Types** | | **Both Types** | |
|---|---|---|---|---|---|---|
| **Hectares of Agricultural Land (ha)** | **Number of Farms** | **%** | **Number of Farms** | **%** | **Number of Farms** | % |
| [1,5[ | 10 | 50% | - | - | - | - |
| [5,10[ | 05 | 25% | 02 | 10% | 03 | 15% |
| Total | 15 | 75% | 02 | 10% | 03 | 15% |

According to the table above, it's noticeable that both types of labor force, family-based and seasonal, are utilized by agricultural farms.

Observations include:

• 3 farms, accounting for 15%, utilize both types of labor force.

• 10% of farms employ seasonal labor, typically when the farmer owns a large number of trees, extensive olive groves, or has significant resources.

• Family-based labor is present in 75% of surveyed farms, particularly those with land areas smaller than 5 hectares. Harvesting is usually partially or entirely managed by the farmer and their family.

**3.1.5. Legal Status**

**Table5. Distribution of farms based on legal status**

| **Legal Status** | **Number of Farms** | **Percentage** |
|---|---|---|
| **Leased Land from Individuals** | 00 | 0 |
| **Private Land** | 20 | 100 |

According to the table above, all the surveyed farms are privately owned.

**3.1.6. Farm Size**

**Table6. Distribution of farms based on Agricultural Land Area (ha)**

| **Agricultural Land Area (ha)** | **Number of Farms** | **Percentage** |
|---|---|---|
| [0-5[ | 14 | 70 |
| [5-10[ | 04 | 20 |
| Above of 10 | 02 | 10 |

Analysis of the distribution of surveyed farms based on Agricultural Land Area (ha) reveals that the majority of farms (70%) have land areas less than 5 hectares. This situation arises from the fact that all the surveyed farms are concentrated within the hands of small private farmers.

### 3.1.7. Orchard Age:

**Table7. Distribution of farms based on Orchard Age**

| Age Bracket | Number of Farms | Percentage |
|---|---|---|
| **Less than 100 years** | 06 | 30 |
| **100 years and above** | 14 | 70 |

The olive trees in the surveyed farms exhibit an aging phenomenon, with 70% of them being over a century old. While the longevity of olive trees is legendary, beyond 50 years of cultivation, irregular production intensifies, and the profitability of the crop becomes unpredictable.

### 3.1.8. Storage and Transport of Olives

Immediate transport of olives to the mills is necessary. The most suitable means for transporting olives are open wooden crates, or even plastic ones, allowing air circulation to prevent detrimental heating caused by fruit catabolic activity. These crates limit the olive layers, reducing the risk of crushing and serving as an ideal means for temporary storage before milling. Conversely, transporting olives in jute sacks or flour sacks is less suitable, inevitably causing injuries to the drupes, especially when overly ripe. This mode of transport initiates biological processes leading to the degradation of oil quality (Argenson et al., 1999).

Regarding storage, all surveyed farms store their olives in plastic bags, with storage duration varying between one day and one week. Some farmers store their olives until the end of the harvest for later processing, resulting in obtaining acidic oil. These oils are characterized by a high acidity index, meeting the "cultural" taste of Algerian consumers but excluding them from international standards and preferences, especially those of European consumers.

### 3.1.9. Production

The total olive production and yields per hectare for each farm are presented in the following table:

From the table, it's evident that olive production varies from one farm to another, possibly due to differences in the number of trees per farm, varying agricultural practices, and the age of orchards.

According to olive growers' statements, this year's olive yield is low compared to the previous season due to unfavorable weather conditions affecting flowering and fruit set, coupled with attacks from the olive fruit fly, causing fruit drop, exacerbated by a lack of maintenance work.

Notably, Farm No. 2's olive production is only one quintal, attributed to neglect, with all trees being a century old or more, coupled with a lack of cultivation practices. Conversely, Farm No. 6, having fewer trees than Farm No. 2, records higher olive production, attributed to comprehensive agricultural practices including pruning, fertilization, plowing, and irrigation.

From the table, the average oil yield is 16 liters per quintal, while the average olive yield stands at 6.025 quintals per hectare.

### 3.2. Cost of Production

The cost of producing a liter of olive oil encompasses all production and transformation expenses. It encompasses both direct and indirect costs, fixed (structural) and variable (operational or functioning), related to production and distribution.

For the olive growers in the Taher municipality, distribution costs are negligible as there is no established distribution network, and the oil is typically sold directly by the producer. Production costs are entirely variable; the olive farms are fully amortized. The production costs identified and considered in our surveys with olive growers include:

- Plowing costs (Ch.L)
- Olive tree pruning costs (Ch.T)
- Olive harvesting costs (Ch.R)
- Olive transportation costs (ChTrs)
- Olive pressing/milling costs (Ch.Tri)

Therefore, the formula used to determine this cost is as follows:

Cost of production in Dinar per liter (DA/L) = Sum of production costs / Total oil production

Let's calculate the total production cost per liter of olive oil based on the estimated charges for different activities:

**3.2.1. Plowing Costs:**

According to olive growers' statements, the average plowing cost amounts to 1500 DA per hour. Plowing occurs every two years using mechanized traction. On average, it takes about 7 to 8 hours to plow one hectare of olive orchard. This expense roughly equates to 12,000 DA per hectare over two years, divided by 2 for a single year:

Taking the first farm as an example:

(1.5 * 12,000) / 2 = 9000 DA

**3.2.2. Pruning Costs:**

Pruning is typically done by the olive growers themselves or their family members and might not incur specific expenses.

**3.2.3. Transportation Costs:**

These costs vary based on distance. While some oil mills handle transportation, most olive growers cover these expenses themselves.

**3.2.3. Harvesting Costs:**

During harvest time, family labor is commonly utilized. If seasonal labor is employed, the daily wage is 1500 DA, as per our survey.

**3.2.4. Processing Costs:**

The cost of processing or milling differs depending on the production and the oil mill. From our survey, we found that the remuneration for milling can be in cash, typically around 1000 DA per quintal of olives milled, or through a share of oil where the miller takes 1 liter from every 4 liters produced. However, almost all olive growers reportedly paid milling charges in cash.

**3.2.5. Depreciation Charges:**

These were not considered as most orchards are over 100 years old.

By collating these estimated charges, a formula for calculating the cost for each farm can be derived and presented as follows:

CP =(12 000*S)/2 + (1500*Nbr wf *Nwd) + (1000*Nbr Qx)

Ch.L Ch.R Ch.Tri

S: Surface in hectares;

Nbr wf: Number of workforce;

Nwd: Number of working days;

Nbr Qx: Number of quintals of olives;

Taking the first farm as an example:

Olive orchard area of the farm: 1.5 hectares

Number of workforce: 1 worker

Number of working days: 20 days

Number of quintals of olives: 3 quintals

Oil production: 60 liters

CP = (12,000 * 1.5) / 2 + (1,500 * 1 * 20) + (1,000 * 3) = 42,000 DA

Cost of production: 42,000 / 60 = 700 DA

**Table8.** Summary of various expenses and cost of olive oil production for olive growers

| N° | Labour Cost (DA) | Trituration Cost (DA) | Workforce Cost (DA) | Total Charges (DA) | Oil Production (L) | Cost of Production (DA/L) |
|---|---|---|---|---|---|---|
| 1 | 9000 | 3000 | 30 000 | 42 000 | 60 | 700 |
| 2 | 12 000 | 1000 | 15 000 | 28 000 | 17 | 1647 |
| 3 | 15 000 | 5000 | 22 500 | 42 500 | 60 | 708,3 |
| 4 | 9000 | 20 000 | 90 000 | 11 9000 | 280 | 425 |
| 5 | 12 000 | 5000 | 45 000 | 62 000 | 100 | 620 |
| 6 | 6000 | 5000 | 45 000 | 56 000 | 50 | 1120 |
| 7 | 3000 | 3000 | 22 500 | 28 500 | 30 | 950 |
| 8 | 9000 | 8000 | 45 000 | 62 000 | 120 | 516,6 |
| 9 | 3600 | 2500 | 22 500 | 28 600 | 43 | 665,1 |
| 10 | 12 000 | 10 000 | 90 000 | 11 2000 | 170 | 658,8 |
| 11 | 12 000 | 30 000 | 15 0000 | 19 2000 | 480 | 400 |
| 12 | 7500 | 6000 | 45 000 | 58 500 | 96 | 609,3 |
| 13 | 3000 | 2500 | 22 500 | 28 000 | 50 | 560 |
| 14 | 18 000 | 7000 | 60 000 | 85 000 | 119 | 714,2 |
| 15 | 12 000 | 6000 | 45 000 | 63 000 | 102 | 617,6 |
| 16 | 12 000 | 8000 | 60 000 | 80 000 | 136 | 529,4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 17 | 1500 | 2000 | 22 500 | 26 000 | 34 | 764,7 |
| 18 | 6000 | 15 000 | 90 000 | 11 1000 | 255 | 414,1 |
| 19 | 7500 | 10 000 | 67 500 | 85 000 | 130 | 653,8 |
| 20 | 2400 | 4000 | 22 500 | 28 900 | 64 | 451,5 |

Source: Survey Data, 2021

From the table, it can be observed that the cost of production is relatively high because the most significant charge in the cost component is the labor cost. However, this cost is covered by family labor for almost all of our sample; therefore, this charge isn't actually disbursed by the olive growers. The calculated average cost of production per liter of olive oil in our sample is approximately 297 DA/l.

It's also noticeable that the highest cost of production is attributed to farm No. 2, with a value of 1647 DA, where the oil production is only 17 liters. This is due to the age of the orchard, which exceeds a century, and the absence of cultural practices by the olive grower, such as pruning, resulting in low olive production and consequently low oil yield.

On the other hand, the lowest cost of production is attributed to farm No. 9, at 400 DA, with an oil production of 480 liters.

Secondly, using the following simple formula, we were able to determine the cost of producing one quintal of olives by the olive growers.

Cost of producing one quintal of olives DA/ql = Total charges DA/ Olive production Qx

The table allowed us to assess the average cost of producing one quintal of olives after crushing at 9041 DA/ql.

According to the table, we notice that the cost of producing one quintal of olives for this year was 9041 DA/ql. Labor costs contribute the most to the cost structure. Therefore, it's important to note that this cost significantly decreases when the labor used is family labor and not remunerated.

**3.2.6. Analysis of unit margins among olive growers**

After determining the cost of producing one liter of olive oil at the production level and analyzing the functioning of agricultural farms, the notion of profitability emerges, closely linked to the cost, which indeed corresponds to the difference between revenues and costs, thus the calculation of the unit margin.

The formula applied to calculate the unit margin generated is as follows:

Unit margin DA/l = Selling price DA/l - Cost of production DA/l

Sales that were not carried out by most olive growers could have generated net margins that could be estimated based on the quantities produced by each producer.

During the olive season 2019-2020, the selling price was set at 750 DA/liter. This price remained consistent throughout the commune, whether the olives were crushed in traditional, modern, or semi-modern mills. No differentiation based on milling methods or cultivation methods was made. This price could increase by up to 250 DA when the product is sold by private individuals.

The price of olive oil varies from year to year, experiencing increases of at least 50 DA from one campaign to another.

The difference between the selling price of a liter of olive oil in the market estimated at 750 DA (according to olive growers' statements) and its average cost of production gives us the average profit margin per liter.

Considering an average cost of production of 686 DA, despite the insufficiency of cultural maintenance work on the olive orchards, there is an average profit margin of 64 DA.

Therefore, adherence to the technical process and the rehabilitation of orchards will undoubtedly yield better income, potentially doubling or tripling current returns.

### 3.3. Determination of Olive Oil Competitiveness

The cost of production is the primary determinant of a product's competitiveness in the market. The survey results demonstrate that the cost of production for a liter of olive oil among the olive growers in our sample is 686 DA/l.

To express this cost in DA/Kg, a simple formula is applied:

The cost per kilogram (Kg) = cost per liter (DA/l) / Density of one liter of olive oil (Kg/l)

The density is 0.92 Kg/l. By applying the formula, we obtain a cost equal to 746 DA/Kg, which is about 4.6 €/kg.

For comparison, we'll refer to the production costs in the main olive oil-producing countries globally:

- In Spain, the production price stood at €2.08/kg during the third week of February 2020, marking a 21% decrease from the same period in the last campaign (IOOC, 2020).
- Italy reported a production price of €3.1/kg during the third week of February 2020 (IOOC, 2020). In October 2020, the production price was €4.05/kg (ISMEA, 2020).
- Greece and Tunisia registered production costs of €2.94/kg and €2.28/kg, respectively (ISMEA, 2020).

Our assessment regarding competitiveness focused on pricing determinants (thus costs). It turns out that Algerian olive oil is not competitive because its production cost is higher than the production costs in the main producing countries. Building on the survey results from (Melkhir et al., 2013), it appears that Algerian olive oil would only be competitive for 5% of the farms (95% of the farms have a production cost higher than 3 euros per kg). This would apply only to the farms with the best-maintained orchards. The aging of olive orchards, inadequate technical practices (lack of irrigation, maintenance, and soil work due to rugged terrain, as well as the absence of pruning) results in low production and therefore high production costs, making them non-competitive, especially for small extensively managed farms that are not properly maintained.

## 4. Conclusion

Since 2001, the National Agricultural and Rural Development Plan (P.N.D.A.R) followed by the Agricultural and Rural Renewal Policy have facilitated the implementation of new support mechanisms for the development of major agri-food sectors, aimed at significantly improving the country's food security. Among the sectors receiving financial and technical support is olive growing, which currently represents 4% of the arable land and 40% of the total orchard area.

Olive oil in Algeria is becoming a luxury food item, consumed well albeit in moderation in recent years due to the consistent increase in its selling price over time, coupled with a decline in the population's purchasing power.

Based on this observation, our objective was to provide an insight into the economic profitability of the sector by determining the cost of producing a liter of olive oil within the olive-growing sphere, drawn from a survey conducted in the Jijel province, which is significant in olive oil production.

The analysis of agricultural practices in these farms revealed heterogeneity and limited utilization of these practices, predominance of traditional production systems with very low density per hectare. Most orchards are neglected except during harvest periods. There is a lack of various maintenance actions; vital operations like regeneration and fruiting pruning, essential in olive cultivation, are either absent or poorly executed; fertilization is not adequately practiced, and ignorance regarding olive enemies and the lack of phytosanitary treatment prevail. The age of orchards has surpassed a century, resulting in low yields for such types of farms.

Agricultural production cost data is scarce in Algeria. The only available information is related to standardized technical sheets produced by specialized technical institutes. The one concerning olive growing is issued by the Institute of Fruit Arboriculture and Vine (ITAFV). These technical sheets provide a single production cost that does not consider the particularities of production systems or regional specificities. The evolution of production costs indicated by these technical sheets from one year to another does not reflect changes in agricultural practices but solely changes in production factor prices.

Based on the economic analysis indicators used in this study, namely:

- The cost of production: we have found that Algerian olive oil produced in smaller, less maintained farms is not competitive, with a production cost exceeding €4/kg compared to other producer countries where this cost does not exceed €3.5/kg.

The unit cost of olive oil production is mainly determined by olive yield, which significantly varies based on soil conditions, climatic factors, plantation age, and olive tree management practices.

To improve the olive industry, increase production, and achieve competitive production costs, improving production systems is essential. Supporting and guiding local producers and industry professionals to enhance their expertise and master the production processes for better product quality is crucial. Educating and training producers in the field will also play a vital role in this improvement process.

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