



INITIATIVE ON  
Agroecology

# UPGRADED BUSINESS MODEL INTEGRATING AGROECOLOGICAL PRINCIPLES

## *Olive Growers' in Elles Community, Northwest Tunisia*

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The main goal of this report is to investigate the prospects within local value chains by integrating agroecological principles into business models. The specific case study focuses on the olive oil value chain within the Elles community, situated in the Northwest region of Tunisia. An exhaustive analysis of pertinent stakeholders was conducted, complemented by the adaptation of a customized business model canvas tailored to the regional context. This investigation culminated in the identification of key insights and recommendations, leading to the development of an enhanced plan and a proposed framework for a novel business model with agroecological principles.

Results showed that embedding agroecological principles within the business model will help upgrade this latter, fostering the transition towards agroecology. Transitioning to agroecology in Tunisia requires innovative financial mechanisms that align public policies, private sector investments, and farmer capacities to promote sustainable practices. The cost-benefit analysis of the investment projects associated with the upgraded business model integrating agroecological principles demonstrates their profitability based on key financial indicators such as the Internal Rate of Return (IRR) and Net Present Value (NPV). Sensitivity analysis reveals that the profitability of these projects could increase significantly under an optimistic scenario.

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# Terminology and Acronyms

<b>ALL</b>	Agroecological Living Labs
<b>APIA</b>	Agricultural Investment Promotion Agency
<b>B-ACT</b>	Business Agroecology Criteria Tool
<b>BFPME</b>	Small and Medium Enterprise Finance Bank
<b>BM</b>	Business Models
<b>BMC</b>	Business Model Canvas
<b>BNA</b>	National Agricultural Bank
<b>BS</b>	Solidarity Bank
<b>CDO</b>	Controlled Designation of Origin
<b>CEPEX</b>	Center for the Promotion of Exports
<b>CRDA</b>	Regional Commission for Agricultural Development
<b>CTV</b>	Territorial Extension Unit
<b>DGPA</b>	General Directorate of Agricultural Production
<b>GDA</b>	Agricultural Development Group
<b>Ha</b>	Hectares
<b>HLPE</b>	High-Level Panel of Experts for Food Security and Nutrition
<b>ICARDA</b>	International Center for Agricultural Research in the Dry Areas
<b>INNORPI</b>	National Institute for Standardization and Industrial Property
<b>INRAT</b>	National Institute of Agronomic Research of Tunisia
<b>IO</b>	The Olive Institute
<b>KII</b>	Key Informant Interviews
<b>NGO</b>	Non-Governmental Organization
<b>ODNO</b>	Office of the North West Development
<b>OEP</b>	Office of Livestock and Pasture
<b>ONH</b>	The National Olive Oil Office
<b>PACKTEC</b>	Technical Center for Packaging and Conditioning
<b>SDG</b>	United Nations Sustainable Development Goals
<b>SMSA</b>	Mutual Society for Agricultural Services
<b>TND</b>	Tunisian Dinar
<b>UTAP</b>	Tunisian Union of Agriculture and Fisheries
<b>UTICA</b>	Tunisian Union of Industry, Commerce and Crafts
<b>VC</b>	Value Chain

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## 1. Introduction

As part of the CGIAR initiative "*Transformational Agroecology across Food, Land, and Water Systems*," this study aims to explore opportunities for co-developing and enhancing business models within specific value chains by incorporating the High-Level Panel of Experts for Food Security and Nutrition (HLPE) agroecological principles. Focused on the agricultural and food value chains in the Northwest region of Tunisia, this research involves a comprehensive assessment integrating rapid value chain analysis and agroecological evaluation.

Recent research has underscored the pivotal role of business models (BM) advocating for agroecological practices in preserving and fortifying biodiversity, ecosystem services, and adaptive capacity to climate change. Such models also empower small-scale producers while maintaining economic viability, supporting resilient and diversified production systems.

This research endeavours to contrast conventional business models against agroecological business models, specifically evaluating their effectiveness within a designated value chain. Embedding agroecological principles into a business framework requires a rapid assessment of the value chain, utilizing the established Agroecological Living Labs (ALL).

Within the scope of WP3 activities, multiple workshops were conducted to pinpoint the predominant local value chain adaptable to an innovative agroecological business model. Consequently, the olive oil Value Chain (VC) in El Kef governorate in the North-West region of Tunisia was selected due to its potential for resource efficiency enhancement, particularly in reducing input use and exploiting by-products (such as olive water, leaves, and branches). The olive oil VC demonstrates considerable potential for agroecological enhancement, notably in bolstering soil fertility, fostering biodiversity, harnessing synergy through by-products, and promoting economic diversification.

The current business model of the olive farmers was analysed, focusing on its agroecological performance. Leveraging the insights gained from this analysis, stakeholders were engaged in workshops to craft an upgraded plan for a new business model.

The envisioned objective of this agroecological business model centers on incentivizing olive growers to produce labelled olive oil, thereby augmenting their income, improving livelihoods, and establishing a value system that emphasizes geographical origin. Business models play a crucial role in propelling and expanding agroecological innovations, providing essential frameworks for their adoption and integration into the agricultural sector.

The methodology employed in this study encompasses a rapid value chain assessment within the ALL, Key Informant Interviews (KII), workshops involving local stakeholders, and a comprehensive review of secondary data sources.

## 2. Objectives of the study

During the project's initial phase, the team identified key value chains in Tunisia that held promise for integrating agroecological principles. This involved a participatory approach encompassing all stakeholders within the value chain, achieved through a synthesis of secondary data, on-site assessments, interactive discussions at living labs through on-site surveys and engaged collaboration with relevant stakeholders. At first, two localities were chosen to study their existing business models "Elles" and "Hammam Bayadha" in the North-West region of Tunisia. Then, a selection and validation of olive oil value chain integrating agroecological practices was done leading to Elles community.

Indeed, evaluation efforts conducted during a workshop in El Kef, October 2023, involving key stakeholders, revealed that the olive oil value chain held significant potential for the integration of agroecological principles, particularly in El Sers region of El Kef governorate. The opportunity to establish a new agroecological business model centered around the production of labelled olive oil in this region paved the way for the selection of olive growers from Elles community. The objective being to enhance their revenues, improve livelihoods, and establish a value system that encompasses the importance of land.



The team conducted a thorough assessment of the current business model utilized by the region's olive farmers, scrutinizing its agroecological performance. Subsequently, the global objective of this study is to develop an upgraded business model for olive growers integrating agroecological principles in Elles Community. The specific objectives are presented as follow:

- Identification of components of the current business model of olive growers' group that represent challenges and opportunities for agroecological transitions.
- Agroecological assessment applied to olive growers' group
- Identification of specific actions or modifications in the business model that could lead to support agroecological transitions.
- Co-design of new business model among trading partners, that incorporate agroecological principles and support the proposed agroecological transition.
- Analysis of financial mechanisms currently functioning in the agriculture sector in terms of their role in limiting or supporting agroecological transitions.
- Cost-benefit analyses (CBA) and financial assessment of new investments projects related to the upgraded business model.

### **3.Methodology**

This study analyses the potential agroecological business models within the chosen localities to ultimately increase the farmers' livelihoods. The data used for this report is based on the workshops held in El kef with the main stakeholders of the olive oil value chain, on surveys done on the field with the farmers and a workshop held at the Olive institute in Tunis for the upgraded business model.

#### **3.1.Study area**

The study focuses on Elles community situated within the El Sers region in El Kef Governorate. Tunisia is divided into 24 administrative governorates; El Kef is located in the North-West of Tunisia (Figure 1), the agricultural lands are vast and fertile (491,000 hectares) and the hydraulic resources are abundant (349 million m<sup>3</sup> mobilized by several dams and lakes). This allowed the governorate to contribute to national agricultural production by 12% for cereals, 8.4% for forest products, 6.8% for red meat and 3.4% for milk production (ODNO, 2020). The active population working in the agriculture and fishing sector represents approximately 14.6% of the total active population (ODNO, 2017).

Kef Governorate is divided into 12 delegations (Figure 2). El Sers delegation is located about thirty kilometers east of Kef with 9 municipalities including Elles community which was selected as the key region for the olive oil business model. The economic activity of El Sers is mainly based on agriculture with a total agricultural area of 43,500 Ha: 36,400 Ha of cultivated land (cereals, legumes, olive trees and other trees) 1,700 Ha of pastures and 1,900 Ha of forests (CRDA, 2020). The irrigated area covers a total of 3,424 Ha. The predominantly rainfed nature of the region exposes various crops to significant climatic risks, impacting their yields and production. The substantial variability in climate, especially rainfall patterns, directly affects the crop yields.

The livestock sector holds a crucial position in El Sers' regional economy, contributing to 10% of the governorate's demand for meat and dairy products. The governorate focuses on three primary animal farming sectors: raising ruminants (sheep, goats, and cattle), poultry farming, and beekeeping.

Olive growing in El Sers constitutes the main activity of a diverse range of production structures, mostly private, small, and family type. 92% of the area intended for arboriculture is occupied by olive trees with an area of around 6,305 Ha (12% of the olive-growing area in the governorate), planted at an average density of 300 plants per hectare, and produces 11% of oil olives and 17% of table olives in the governorate (CRDA Kef, ODNO, 2020).

The production system integrates olive trees with fodder or legume crops like faba beans. These plots typically feature 2 to 3 different types of plant associations, including hedges or naturally occurring vegetation. While fodder stands out as the predominant association in this area, some systems also include various types of fruit trees, such as figs or almond trees.

El Sers region hosts several oil mills, vital hubs in the olive oil production chain. These mills serve as pivotal centers where harvested olives undergo meticulous processing to extract the prized olive oil. There are 3 traditional mills with 20 tons storage capacity and one modern mill with 70 tons storage. These mills play a crucial role in the local economy, preserving the region's rich heritage of olive cultivation while contributing significantly to Tunisia's olive oil industry.



**Figure 1. Kef governorate location in Tunisia**



**Figure 2.Elles community in El Sers region. Source: Gifex.com, 2023.**

### 3.2.The methodological approach

The methodological approach adopted begins by employing a business model canvas, followed by the application of an agroecological performance assessment tool (B-ACT). The business model canvas (BMC) acts as a strategic blueprint illustrating any business model through nine fundamental elements: key partners, activities, resources, value propositions, customer relationships, channels, customer segments, cost structure, and revenue streams.

The business model for the olive oil value chain in Elles community was identified after a workshop that was held with the relevant stakeholders of the value chain (Figure 3). At this stage, it has been observed that the olive growers in Elles region have not yet formed an association. However, a plan has been initiated by research institutions (IO, INRAT) and development institutions (ICARDA, CRDA) to organize them and establish a shared business model. In this context, utilizing the BMC and B-ACT analysis will facilitate an agroecological performance assessment of a representative olive farm, drawing on the collective input provided by farmers during the workshop.

Given the short olive oil value chain currently operating between olive producers and consumers, along with the limited information on other stakeholders such as actors such as mills; oil traders, or exporters (including their specific activities, costs, revenues, etc.), no business model analysis was conducted for these actors. The recommendations and upgrading plan of the business model presented in the later section will include more information on these value chain activities as they would be integrated in the new business model.



**Figure 3. Workshop involving all the stakeholders in Elles community (10<sup>th</sup> October 2023, El Kef)**

### 3.2.1. Business model canvas

A business model is a framework that outlines how a company creates, delivers, and captures value (Osterwalder and Pigneur, 2010). It describes the fundamental aspects of how a business operates and generates revenue. Business models can vary widely depending on the industry, market, and specific goals of the company. They are also identified as a reflection on the implemented strategy, enabling the evaluation of outcomes and benefits (Johnson et al., 2008 cited by Murray and Scuotto, 2015).

According to Murray and Scuotto (2015), business models serve as effective roadmaps for understanding how to generate value, address consumers' needs, leverage external opportunities, determine necessary resources, generate revenue, and forecast short, medium, and long-term outcomes. Additionally, a business model is viewed as an assessment of implemented strategies to evaluate results and advantages (Johnson et al., 2008). In the organizational context, the market is perceived as a testing ground where entrepreneurs, their teams, and stakeholders embrace a trial-and-error approach. Some scholars posit that entrepreneurs articulate their business vision, mission, values, and revenue plans as a foundational statement (Trimmer, 1998; Stewart and Zhao, 2000; Afuah, 2004; Brousseau and Penard, 2006) or through a pre-planned theoretical model (George and Bock, 2009; Seelos and Mair, 2007; Osterwalder, 2004; Osterwalder, Pigneur, and Tucci, 2005; Amit and Zott, 2001; Afuah and Tucci, 2001). This conceptual framework, referred to as the business model, elucidates various phases of managing a business (Applegate, 2000; Weill and Vitale, 2001; Dubosson-Torbay, Osterwalder, and Pigneur, 2002; Morris, Schindehutte, and Allen, 2005; Shafer, Smith, and Linder, 2005).

By using the BMC, farmers will be able to map their business pathway (Osterwalder 2004; Teece, 2009; Osterwalder and Pigneur 2011). There are nine key components commonly found in business models (Figure 4):

**Value Proposition:** This is the core offering that a business provides to its customers. It explains why customers should choose the company's products or services over those of other competitors.

**Customer Segments:** Identifying and understanding the specific groups of customers that the business aims to serve. This involves defining the characteristics, needs, and behaviours of the target audience.

**Channels:** The methods and channels through which the business delivers its products or services to customers. This could include physical stores, online platforms, direct sales, partnerships, etc.

**Customer Relationships:** Describe the type of relationship a company establishes with its customers. This could be through personal assistance, self-service, automated service, or community engagement.

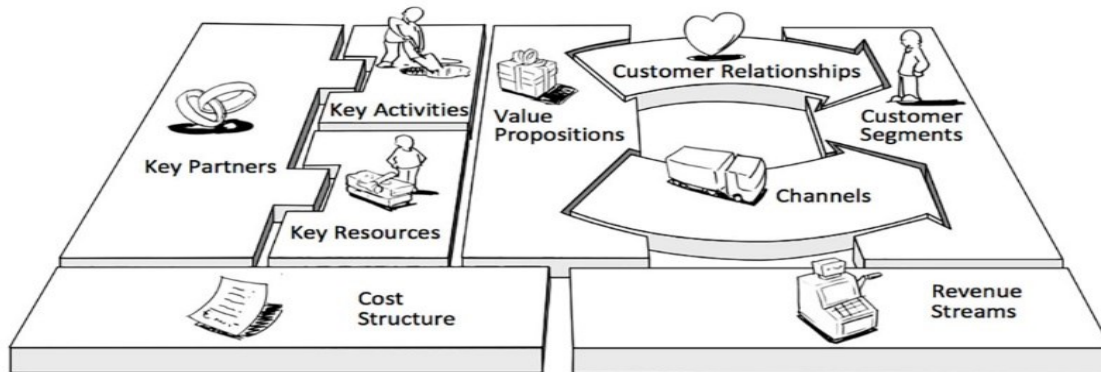
**Revenue Streams:** The ways in which the business earns money. This could involve one-time sales, recurring subscriptions, licensing fees, advertising, or other revenue sources.

**Key Resources:** The essential assets, people, and infrastructure required to deliver the value proposition, reach customers, and operate effectively.

**Key Activities:** The critical tasks and operations that the business must perform to create and deliver value. This can include production, marketing, distribution, and customer support.

Key Partnerships: Collaborations with other businesses, suppliers, or organizations that help the company operate more efficiently or access new markets and resources.

Cost Structure: The costs associated with running the business, including fixed and variable costs. Understanding the cost structure is crucial for determining profitability.



**Figure 4. Business Model Canvas. Adapted from “Business model generation” Alexander Osterwalder, Wiley 2012. Licensed under a Creative Commons Attribution-ShareAlike 3.0 Unported License.**

### 3.2.2. Business Agroecology Criteria Tool (B-ACT)

Over recent years, a growing number of researchers and organizations have engaged in tracking funding directed towards agroecology. They analyze development aid, climate finance, and research to contribute to transforming food systems into more agroecological models, aligning with efforts to achieve sustainable development goals (DeLonge et al., 2016). Amid these studies, a methodological query emerged: what determines a project's degree of agroecology? Essentially, what conditions classify a funding source as supportive of agroecology?

In this context, Biovision, an independent non-profit foundation, advocates for agroecology's role in fostering sustainable food systems. Often, entrepreneurs, project leaders, and initiative overseers lack clarity on how their projects or business models correspond with the 13 principles of agroecology. To streamline their assessments and fortify the presence of agroecology, Biovision has introduced the Business Agroecology Criteria Tool (B-ACT [agroecology-pool.org](http://agroecology-pool.org)).

This tool helps to evaluate and identify inspiring and promising agroecological businesses that contribute to sustainable food systems. This tool guides users through a series of questions to determine the extent to which each of the 13 agroecological principles (HLPE, 2019) is reflected in the company's direct and indirect activities (Figure 5).

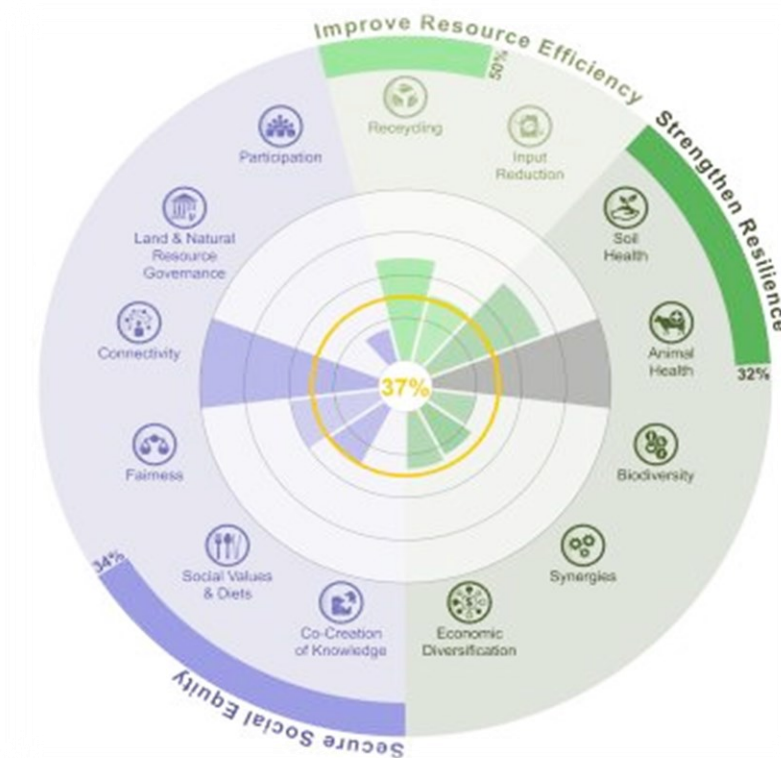
Running the Business Agroecology Criteria Tool involves a systematic evaluation of agricultural practices against a set of agroecological principles. This comprehensive tool assesses the integration of agroecological elements within a business model. It begins with gathering data on the agricultural activities and then proceeds to measure their alignment with the defined agroecological principles. The tool considers various aspects such as resource use efficiency, ecological balance, biodiversity conservation, and socio-economic impacts. By applying this tool, businesses gain insights into their current practices' adherence to agroecological principles and can identify areas for improvement or enhancement. This approach aids in fostering sustainable agricultural practices, promoting resilience, and enhancing the overall ecological and socio-economic performance of the business.

The B-ACT can be used as a self-assessment or external assessment tool. It can also either evaluate existing businesses or support the development of more agroecological business plans. The main target groups are: Donors, Investors, Civil Society Entrepreneurs, Farmers, Organizations, and Policy makers. The B-ACT assessment currently includes:

- The agroecology score: This involves measuring alignment with 13 agroecology principles.



- United Nations Sustainable Development Goals (SDGs) Alignment: Highlights which SDGs the company is working towards and to what extent.
- Agroecological Improvement Suggestions: Suggests how a business can improve the lowest rated agroecological principles.
- Selection question: identify all practices and activities that directly conflict with agroecological principles.
- Question of impact: measuring the impact of companies on carbon, water, biodiversity, soil health, economic and social indicators.
- Systemic Potential Score: Measures a company's potential to create systemic impact.



**Figure 5. Example of B-ACT results: illustration of the enterprise's alignment with the 13 principles of agroecology and the 3 operational principles of sustainable food systems**

## 4. Results

### 4.1. Business model analysis results

The participatory approach used in the workshop on October 10<sup>th</sup>, 2023, engaged all stakeholders within Elles' olive oil value chain to pinpoint the olive growers' current business model. Through a meticulous assessment of each element comprising the business model canvas, a comprehensive understanding of its block structure was achieved, allowing a thorough diagnosis (Figure 6). This modified Business Model Canvas is tailored to address the distinctive components and various stakeholders essential to the olive oil value chain in Elles community within El Sers region. It offers a comprehensive overview of the dynamics associated with this specific context.

#### 4.1.1. Value proposition

The value proposition of the olive oil business model in Elles community lies in the creation of high-quality olive oil, potentially organic or sustainably produced, boasting health benefits, unique taste profiles, and adherence to specific regional or traditional standards, appealing to discerning consumers.

Olive growers in Elles are dedicated to delivering an exceptional quality of olive oil to their loyal clientele. They capitalize on the unique characteristics of Elles region to promote their high-quality product. Indeed, nestled in the mountainous terrain of El Kef governorate, Elles, an ancient Roman village, benefits from climatic conditions and geographical features that inherently contribute to superior olive oil production.

This region exclusively cultivates ten local olive varieties, lending a distinct aroma to Elles' olive oil. Alongside the presence of ancient olive trees and ancestral freshwater irrigation systems, Elles ensures consistent and reliable production for its growers. The expertise; passed down through generations among these growers; significantly contributes to the exceptional quality of the olive oil.

Their approach embraces environmentally conscious practices, including composting for land enrichment, traditional harvesting techniques, and a commitment to agroecological methods, avoiding pesticides and mechanization. Additionally, most growers process their olives using traditional oil mills (cold press), ensuring the production of premium-grade virgin and extra-virgin olive oil.

#### **4.1.2. Key partnerships**

The olive oil value chain in Tunisia involves a network of key partners including olive farmers, suppliers of agricultural inputs like fertilizers, equipment manufacturers, packaging suppliers, distributors, and retailers. In Elles community, these collaborators are integral to the successful functioning of the olive oil value chain:

- Input providers: Various suppliers within Elles community offer agricultural machinery and equipment (such as stainless-steel tanks, irrigation systems, etc.) to support olive growers. Mabrouka Company was cited as one of the most important input providers. Since its establishment in 1994, this company has been supplying olive growers with high-quality plants and services, maintaining stringent standards.
- The Regional Agricultural Development Commission (CRDA) in El Kef governorate stands as the primary government body organizing training sessions for olive growers on topics such as water conservation, pruning, harvesting, and more. Additionally, it facilitates administrative services for farmers. Training sessions provided by development agents like CRDA play a pivotal role in imparting crucial knowledge on olive tree management, including pruning and harvesting techniques.
- The Olive Institute (IO): This research institute conducts experiments on innovative farm-level technologies and disseminates agroecological practices, such as intercropping or composting, within the scope of its research projects. Collaboration with esteemed agricultural research institutions like the Olive Institute encourages the adoption of agroecological innovations, while a supportive Elles community fosters solidarity, addressing technical and economic challenges collectively.
- The National Olive Oil Office (ONH) operates as a public industrial and commercial establishment. Its primary missions involve supervising and supporting olive growers to enhance productivity, promoting the quality of Tunisian olive oil, facilitating export development, and regulating the domestic market. This entity significantly influences olive growers by endorsing Elles olive oil in foreign markets.
- The Northwest Cluster of Olive Oil is a Non-Governmental Organization established in January 2016, uniting stakeholders across the olive oil value chain, olive oil mills and conditioning units in the Northwest region of Tunisia. This organization plays a crucial role for Elles olive growers by offering support in by-products recycling, quality control, supply chain management, financial accessibility, marketing strategies, and business governance.
- Enda Tamweel is a Tunisian micro-finance company established by the non-governmental organization Enda inter-arabe, a pioneer in Tunisia's micro-finance sector. Enda Tamweel focuses on fostering financial inclusion among vulnerable populations, specifically targeting women and young individuals. Certain olive growers obtain credits from Enda Tamweel, albeit with relatively high interest rates.
- The Agricultural Investment Promotion Agency (APIA) is a public institution, established in 1983, tasked with the primary mission of encouraging private investment in agriculture, fisheries and related services.

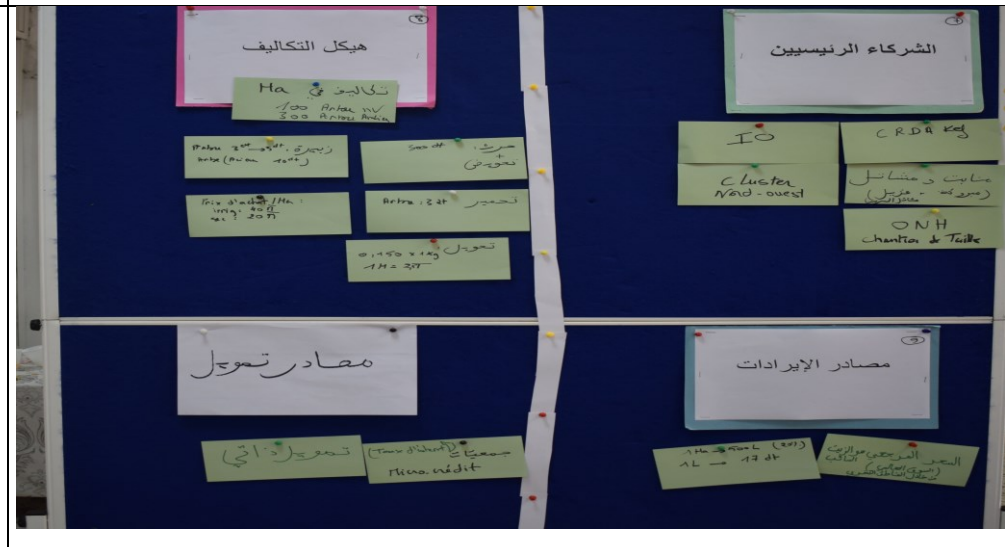
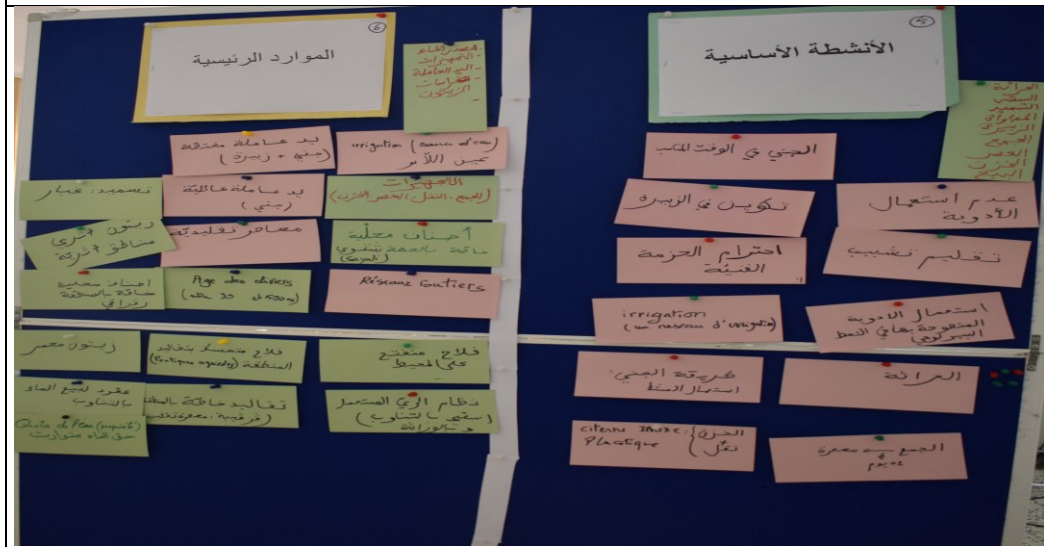
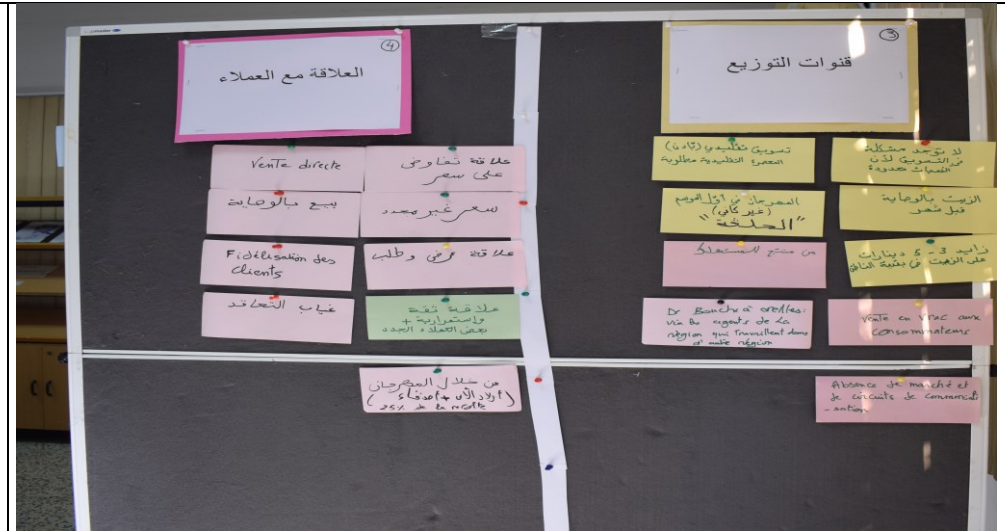
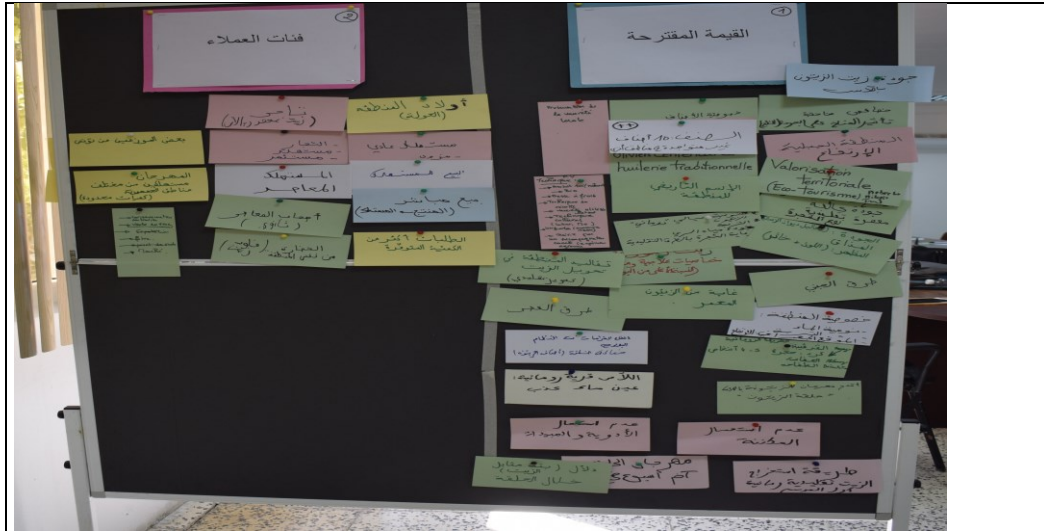


Figure 6. Olive growers' business model results obtained from the workshop held in El Kef, October 2023

### **4.1.3.Key activities**

In this current business model, the analysis is limited to the typical business model of an olive farmer, where the farm is the unit of analysis. Elles olive grower primarily engages in olive production and olive oil trade. At the production level, his core activities involve soil preparation, tree pruning, parcel irrigation, organic fertilization, and manual harvesting, emphasizing pesticide-free practices and avoiding mechanization. For processing, this grower opts for traditional oil mills to preserve olive oil quality. In general, the olive grower markets his olive oil production but in rare cases he can sell his olives to the oil mills. This marketing strategy centers on direct sales to customers, particularly loyal buyers, during the olive oil production season.

Within Elles community, olive growers exchange vital information on climate alerts, input prices, labor availability, and input availability. They actively interact with research institutions to share good practices and agroecological methods, aiming for higher-quality olive oil production. Additionally, a group of Elles olive growers is promoting awareness among farmers about the benefits of establishing an olive oil cooperative and labeling Elles olive oil.

### **4.1.4.Key resources**

The olive oil business model of Elles growers thrives on several crucial resources and advantages. These include the bioclimatic advantage offered by the mountainous environment, creating an ideal setting for cultivating olive trees. Growers enrich the fertile soil through dedicated organic fertilization methods, complemented by access to freshwater via an ancient irrigation system. Indigenous olive tree varieties, such as Chetwi and Ragragui, unique to the area, contribute significantly, alongside productive century-old olive trees with historical roots dating back to Roman times. The community benefits from proximity to essential agricultural services like oil mills and suppliers, supported by well-maintained infrastructure such as roads and storage facilities. The availability of the family members and skilled labor within the community, coupled with family financial support for investing in olive tree production activities, further bolsters the industry.

A baseline survey conducted in 2023 as part of the Agroecology project, involving around ten olive growers in Elles region, revealed that the average farm size is approximately 3 hectares, predominantly dedicated to olive cultivation. While some growers also engage in the cultivation of barley and oats for livestock feed, only one farmer employs intercropping techniques. The predominant practice among olive growers involves the utilization of local varieties in their agricultural systems. In terms of livestock activities, nearly 78% of farmers possess small ruminants, averaging around 15 animals per farmer, while 67% engage in dairy cattle breeding, with an average of 2 dairy cows per farmer. Access to water emerges as a significant challenge for olive growers in Elles region, with only about 33% and 22% having access to natural water sources (such as rivers, dams, or hill lakes) and private wells, respectively.

Regarding agricultural assets, the farmers have limited equipment ownership. Some possess water pumps (33%), milking machines (22%), tractor plows (11%), and hydraulic equipment like sprinklers or drip systems (11%), along with wheelbarrows (11%). Additionally, 11% of farmers have storage sheds for agricultural products, while 73% have livestock stables. Furthermore, 33% of farmers have means of transportation, such as cars or bikes.

### **4.1.5. Customer relationships**

El Hilga Festival serves as the primary communication platform for Elles' olive growers, holding a distinguished status among consumers in the Northwestern region of Tunisia. The growers maintain strong relationships with their customers, rooted in trust and loyalty. As there is not a standardized olive oil market within Elles community, growers prioritize cash transactions. They first serve their loyal buyers before expanding sales to other customers.

Transactions with local intermediaries are purely commercial and lack formal contracts. The pricing of Elles' olive oil results from negotiations between producers and buyers, considering factors like quantity, customer type (e.g., oil mills, loyal consumers, grocers, visitors), production costs, and overall production volume.

### **4.1.6.Channels**

Distribution channels for olive oil encompass a range of avenues, including local markets, supermarkets, online sales platforms, wholesalers, and potential export channels. Moreover, promotional channels such as social media, websites, and potential participation in trade shows or events are utilized to bolster visibility.



In the case of Elles olive oil, the marketing channels are notably concise due to limited product supply against soaring demand. Most sales predominantly occur within the local community itself. Direct sales are prevalent, involving face-to-face transactions with festival visitors, loyal customers, neighbors, and even extended family members. Local oil mills also serve as significant buyers.

Indirect sales cater to potential buyers from other regions, particularly urban areas, attracted by the widespread acclaim of Elles' high-quality olive oil through word-of-mouth recommendations. Occasionally, local intermediaries or exporters engage in bulk purchases of Elles' olive oil for resale in distant markets, although such transactions remain infrequent.

#### 4.1.7. Customer segments

Elles' esteemed olive oil reputation has drawn a diverse range of customers, despite individual growers managing relatively small-scale lands of less than 5 hectares each. These growers supply modest quantities of olive oil to various customer types and buyers. Their primary distribution channels involve supplying bulk quantities to local or regional consumers, packaged in plastic bottles ranging from 1 to 15 liters. Additionally, some growers occasionally sell their olive production to the region's four prominent oil mills: Jawadi, Almoualim, Tbarsok, and Dogga.

El Hilga festival, held at the start of the olive harvesting season, serves as a platform where stakeholders identify potential customers among attendees. Other customer segments recognized by stakeholders include restaurants, grocery stores, and sporadic engagement with exporters. Despite the diverse customer base, it's noteworthy that Elles' olive oil typically commands a premium price, approximately 10% higher than the prices of olive oil from neighboring regions.

#### 4.1.8. Cost structure

An understanding of the cost structure is critical, encompassing expenses related to cultivation (seeds, fertilizers, labor) and processing. The cost structure of the olive oil per hectare in Elles community is presented in Table 1 below.

**Table 1. The cost structure of the olive oil production per hectare**

<b>Olive oil activities</b>	<b>Average Cost/Ha (USD)</b>	<b>Percentage</b>
<b>Plowing cost</b>	96.77	8.45%
<b>Pruning cost</b>	161.29	13.9%
<b>Preparation land for irrigation</b>	96.77	8.45%
<b>Irrigation</b>	161.29	13.9%
<b>Rejuvenation plants</b>	19.35	1.7%
<b>Bags for transport</b>	16.12	1.4%
<b>Labor cost for olive harvest</b>	483.87	41.8%
<b>Processing for an olive oil production of 2.5 tons per hectare</b>	120.96	10.5%
<b>Total</b>	<b>1,156.45</b>	<b>100%</b>

**Source: Own elaboration, 2023**

#### 4.1.9. Revenues streams

Within the Business Model Canvas, the revenue structure intricately outlines the diverse income sources of a business, covering pricing strategies, payment approaches, and overarching methodologies for revenue growth. In Elles' olive oil business, primary revenue streams derive from olive oil sales. These sales span direct transactions with loyal customers, neighboring communities, and local oil mills, occasionally extending to intermediaries or exporters. The revenue model relies on pricing strategies, leveraging the region's esteemed reputation for premium-quality olive oil to command higher market prices.

Despite the modest revenue from bulk olive oil sales due to small-scale individual transactions and lack of product valorization (like quality labeling), Elles' olive oil was priced at USD5.48 per liter in the previous agricultural season, marking a US 0.64 difference compared to other regions. This pricing structure impacts the average gross revenue per hectare for an olive grower, ranging between USD1,233.87 and USD2,056.45.

#### 4.1.10. Conclusion

The comprehensive assessment of Elles' olive grower business model, employing a participatory approach among stakeholders, offered a profound understanding of the current business model. The thorough evaluation of each element within the adapted Business Model Canvas distinctly represented the intricate dynamics and unique characteristics integral to Elles community. Key partnerships within this olive oil value chain, spanning input providers, Mabrouka Company, CRDA, Olive Institute, National Olive Oil Office, Northwest Cluster of Olive Oil, Enda Tamweel, and Agricultural Investment Promotion Agency, played significant roles, influencing various facets from supply to finance.

Essential activities, including olive cultivation, processing, marketing, and community information exchange, formed the backbone of the olive oil value chain, emphasizing environmentally conscious practices and traditional methods. The business model thrived on invaluable resources such as the bioclimatic advantage, fertile soil, indigenous olive tree varieties, historical olive trees, essential infrastructure, collaborative partnerships, and community support.

The current business reveals several various weaknesses, including limited technical skills among olive growers, insufficient knowledge and expertise in compost production, pruning, and irrigation techniques, low olive tree productivity and the absence of collective initiatives like a farmers' association to promote Elles olive oil. Additional challenges include water management conflicts among olive growers, the lack of a designation of origin for Elles olive oil, reliance on individual marketing strategies for olive oil sales, and minimal involvement of olive growers in policy-making processes.

Diverse opportunities exist for the new business model of Elles olive growers such as the adoption of agroecological practices, the establishment of a farmers' association (SMSA or GDA) to enhance value addition and creation among farmers, establishing a Controlled of Designation of Origin olive oil, and developing products for higher-value markets.

The core value proposition revolved around the creation of high-quality olive oil, deeply rooted in the unique features of Elles region, offering health benefits, distinct taste, and adherence to regional standards. Strong customer relationships, concise distribution channels, and diverse customer segments, including local buyers and occasional exporters, were essential elements in the value chain. Understanding the cost structure per hectare and diverse revenue streams underscored the financial aspects, with the potential for growth through product valorization, niche market exploration, and agroecological innovations. These findings collectively illuminate opportunities for further enhancing revenue streams and solidifying the value proposition for Elles' olive oil. The nine blocks of the business model canvas for the olive oil in Elles community are summarized in Table 2.

**Table 2. Current business model canvas for olive oil in Elles community**

Key partnerships		Key activities	Value proposition	Customer relationships	Customers segments																													
<p><b>Public:</b></p> <ul style="list-style-type: none"> <li>•CRDA Kef</li> <li>•Olive Institute</li> <li>•The National Oil Office</li> <li>•APIA</li> </ul> <p><b>Private:</b></p> <ul style="list-style-type: none"> <li>•Northwest Cluster of olive oil</li> <li>•Inputs providers: agricultural machinery</li> <li>•Mabrouka Company: high quality standards plants and services.</li> <li>•Enda Tamweel: Credits</li> </ul>	<p><b>Producing the olives:</b> preparation of soil, pruning of trees, irrigating the parcel, fertilizing with organic matter and manual harvesting</p> <p><b>Processing:</b> Oil mill with traditional system</p> <p><b>Trading:</b> Direct sale for the local customers</p>	<ul style="list-style-type: none"> <li>•High quality olive oil.</li> <li>•Ten local varieties are only cultivated in this area, specific aroma for the olive oil in Elles.</li> <li>•Presence of ancestral irrigation system of fresh water: stability of production</li> <li>•Traditional oil mill (cold press): good quality of the olive oil</li> </ul>	<ul style="list-style-type: none"> <li>•Relationships between olive growers and customers are based on trust and loyalty.</li> <li>•Olive growers prefer to sell his olive oil in cash.</li> <li>•Transactions are totally commercial and non-contractual.</li> </ul>	<ul style="list-style-type: none"> <li>•Local or regional consumers: in bulk in different packaging</li> <li>•Traditional oil mill</li> <li>•Visitors to El Hilga festival</li> <li>•Restaurants, grocery store and in rare cases the exporters.</li> </ul>																														
	Key resources		Channels																															
	<ul style="list-style-type: none"> <li>•Special bioclimate, Mountainous zone</li> <li>•Traditions specific to the region</li> <li>•Fertile soil, Olive dating from Roman times</li> <li>•Variety specific to the area</li> <li>•Skilled labor and family labor</li> <li>•Financial family support, Solidarity</li> <li>•Water resources, Good Infrastructure</li> <li>•Proximity of agricultural services</li> </ul>	<ul style="list-style-type: none"> <li>•Short marketing channels; Direct sales to consumers (festival Elhilga).</li> <li>•Loyal buyers, neighbors, oil mills and extended family members</li> <li>•Word of mouth via agents in the region</li> <li>•Local intermediaries or exporters can buy the olive oil of Elles in bulk to resell it packaged in other markets.</li> </ul>																																
Cost structure			Revenue streams																															
	<table border="1"> <thead> <tr> <th>Olive oil activities</th> <th>Average cost/ha/USD</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td><b>Plowing cost</b></td> <td>96.77</td> <td>8.45%</td> </tr> <tr> <td><b>Pruning cost</b></td> <td>161.29</td> <td>13.9%</td> </tr> <tr> <td><b>Preparation land for irrigation</b></td> <td>96.77</td> <td>8.45%</td> </tr> <tr> <td><b>Irrigation</b></td> <td>16.29</td> <td>13.9%</td> </tr> <tr> <td><b>Rejuvenation plants</b></td> <td>19.35</td> <td>1.7%</td> </tr> <tr> <td><b>Bags for transport</b></td> <td>16.12</td> <td>1.4%</td> </tr> <tr> <td><b>Labor cost for olive Harvest</b></td> <td>483.87</td> <td>41.8%</td> </tr> <tr> <td><b>Processing for an olive oil production of 2.5</b></td> <td>120.96</td> <td>10.5%</td> </tr> <tr> <td><b>Total</b></td> <td>1,156.45</td> <td>100%</td> </tr> </tbody> </table>	Olive oil activities	Average cost/ha/USD	Percentage	<b>Plowing cost</b>	96.77	8.45%	<b>Pruning cost</b>	161.29	13.9%	<b>Preparation land for irrigation</b>	96.77	8.45%	<b>Irrigation</b>	16.29	13.9%	<b>Rejuvenation plants</b>	19.35	1.7%	<b>Bags for transport</b>	16.12	1.4%	<b>Labor cost for olive Harvest</b>	483.87	41.8%	<b>Processing for an olive oil production of 2.5</b>	120.96	10.5%	<b>Total</b>	1,156.45	100%	<ul style="list-style-type: none"> <li>•The price is always set by the price of olive oil in bulk.</li> <li>•Sale to consumers: 1L= USD5.48 (always USD0.64 higher than in other regions)</li> <li>•The average gross revenue of olive grower per one hectare of olive tree is between USD 1,233.87 and USD2,056.45.</li> </ul>		
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**Source: Own elaboration, 2023**

## **4.2. B-ACT applied to olive growers' group**

The agroecological assessment will be conducted on a group of olive growers during the preparation phase for creating an association, with support from ICARDA. This assessment will focus on the group's current farming practices and collective activities.

### **4.2.1. Olive growers' vision, mission, and key activities (B-ACT)**

#### **4.2.1.1. Vision**

The vision represents the collective aspirations of olive growers, fostering a commitment to sustainable agricultural practices that serve as the cornerstone for consistent, top-tier production while maintaining a harmonious coexistence with the environment. Moreover, it strives for financial sustainability by not only maximizing profits but also ensuring a stable and reliable income source for growers. Furthermore, the vision champions innovation in value addition, seeking to harness the full potential of by-products to minimize waste and extract additional value. Additionally, it aims to broaden the scope of clientele, diversifying the customer base to encompass both local and global markets, fostering a broader market reach and resilience. Lastly, it ambitiously sets sights on international horizons, aiming to penetrate and thrive in export markets, amplifying the recognition and marketability of the region's esteemed olive produce on a global scale.

#### **4.2.1.2. Mission**

The mission outlines the actions and strategies employed by olive growers to fulfil their vision. For instance, one mission could involve producing distinct local virgin and extra virgin olive oils renowned in both national and global markets. Alternatively, another mission might revolve around fostering a culture of knowledge sharing in best agricultural practices by developing a comprehensive technological package. This latter could include meticulous ploughing, strategic pruning techniques, optimized irrigation methodologies, organic fertilization strategies, meticulous harvesting approaches, innovative natural fertilization, and pest control methods.

These methodologies aim not only to ensure the continuity of production but also to fortify sustainable agricultural practices specifically tailored to the distinctive landscape and conditions of Elles region. This mission seeks to establish a resilient framework for ongoing sustainable production, underpinning the growers' commitment to long-term environmental preservation and agricultural excellence.

#### **4.2.1.3. Key commercial activity:**

The category selected for income generation among olive growers in Elles region is "Trade of agricultural products." Four predefined statements in the "About the company" tab have been identified to depict the farmers' commercial and agroecological strategy. Below, practical examples illustrate how these statements are applied to production:

##### **A. Leveraging olive oil production**

Olive growers focus on elevating the value of the region's olive oil production. They utilize indigenous varieties and distinct aromas specific to the territory, employing a dedicated technological package to achieve a Controlled Designation of Origin (CDO). This strategy is expected to unlock export opportunities and raise the value of the produced olive oil.

##### **B. Diversifying products**

Olive growers diversify their product portfolio by repurposing residues and by-products. For instance, green waste from olive tree pruning in Elles serves as fodder and biochar, addressing scarcity in fodder resources and high fuel costs. In addition, olive growers will diversify their products (one liter bottle, 500 ml bottle, etc.) and channels (supermarkets, exports, specialized stores, etc.).

##### **C. Establishing supportive networks**

To sustain and expand commercial activities, olive growers form information networks. Initiatives include establishing a farmer's association (SMSA) to secure a CDO, adhering to specific agroecological principles, organizing festivals dedicated to the product, and meeting international bottling standards for export.

#### **D. Upholding traditional values**

Olive growers build upon existing practices while respecting established traditions within the food system. This approach ensures continuity and respects existing values, norms, and beliefs while enhancing the overall value proposition.

Five key activities have been identified in addition to the main income-generating activity of olive growers, namely:

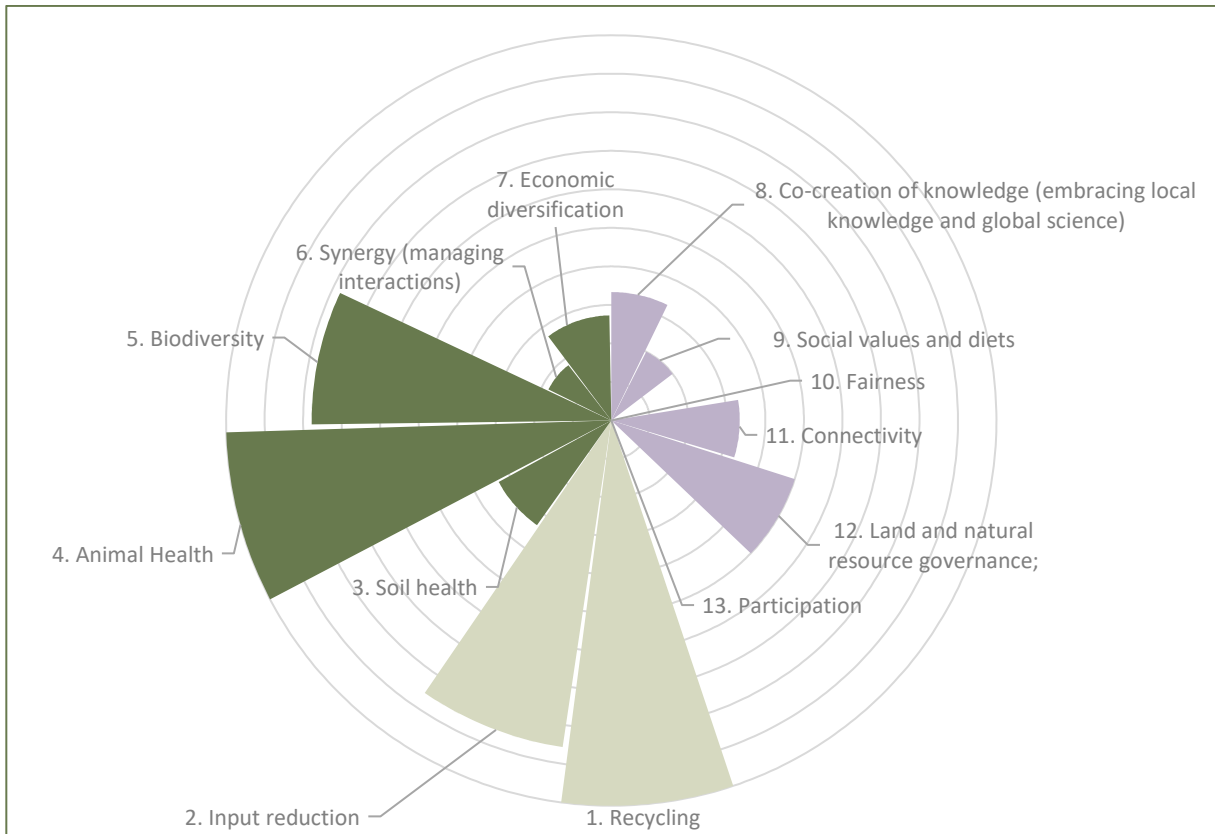
- i. Community Empowerment (SMSA, Cooperatives) as a prospective activity: Strengthening the farmers' association significantly enhances the community's well-being. Knowledge exchange among Elles' olive growers facilitates their organization into cooperatives (SMSA, GDA). Group organization streamlines input supply and product marketing.
- ii. Agricultural production: Serving as the primary income source for olive growers in Elles region.
- iii. Processing and Storage of agricultural products: Ensuring proper storage of olives is crucial for obtaining high-quality oils, preserving the oil's organoleptic and aromatic qualities.
- iv. Harvest Synchronization: Olive growers in Elles endeavor to align their harvest with available processing units, which must adhere to specific criteria (e.g., crushing temperature of 27°C) to ensure the final product's quality (olive oil).
- v. Research and development: Olive growers actively engage in agroecological practices, collaborating closely with research institutions (such as the Olive Institute) and actively participating in workshops and training sessions.

#### **4.2.2. Agroecological diagnosis (B-ACT)**

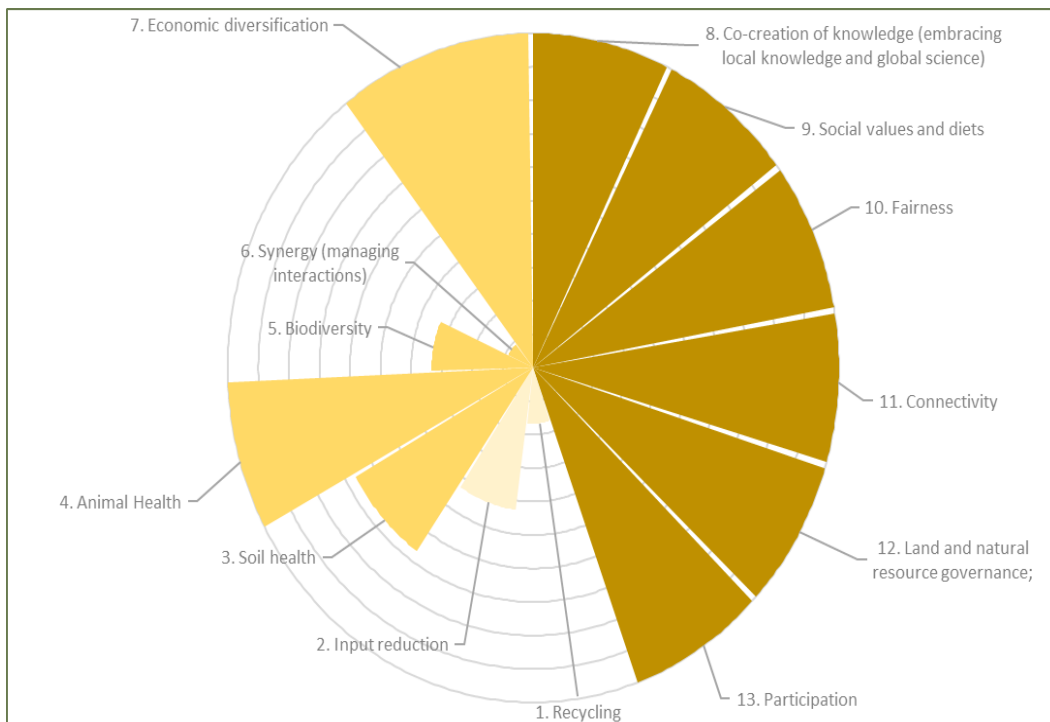
The B-ACT assessment on the group of olive producers revealed a high overall agroecological performance among the farmers. Specifically, it showed a substantial alignment, meeting 92.9% of the agroecological criteria related to improving resource efficiency (covering principles 1 and 2). However, the evaluation indicated that the adherence to principles focused on strengthening resilience (encompassing principles 3 to 7) and securing social equity (including principles 8 to 13) was comparatively lower, meeting 51.3% and 22.8% of the respective criteria.

The findings indicate that six principles specifically, co-creation of knowledge, social value and diets, fairness, connectivity, land and natural resource governance, and participation—are somewhat in line with HLPE (2019) agroecological principles within the existing business model, but hold significant promise for greater alignment with these principles in an enhanced business model. Conversely, four principles—recycling, input reduction, animal health, and biodiversity—demonstrate the strongest alignment with HLPE (2019) agroecological principles in the current business model.

Additionally, the diagnosis identified key target groups, including farmer households and their immediate environment on a small scale, national entrepreneurs involved in processing, trading, and retailing of agricultural products also on a small scale, and consumers on a medium scale. The level to which individual criteria were fulfilled and their potential impact is visually presented in the accompanying radar diagrams (Figure 7 and 8).



**Figure 7. Business model's current alignment with HLPE (2019) agroecological principles. Source: B-ACT tool**



**Figure 8. Business model's potential alignment with HLPE (2019) agroecological principles. Source: B-ACT tool**

### **4.2.3. Agroecological assessment of the olive growers' group (B-ACT)**

#### **4.2.3.1. Recycling**

The olive growers in the Elles region exhibit significant potential for recycling activities, yet the adoption rate of such practices remains low. Several weaknesses have been identified, including insufficient knowledge and expertise in compost production, inadequate machinery for composting, and the absence of a mixed farming system. However, the introduction of biochar technology by the Agroecology Initiative presents a crucial opportunity for Elles' olive growers. This technology promises to enhance soil fertility, improve soil and nutrient retention, and bolster the resilience of olive trees against pests and diseases. Biochar, derived from organic materials such as agricultural waste, wood chips, or biomass through a process known as pyrolysis, undergoes heating in the absence of oxygen, transforming it into a carbon-rich substance with myriad benefits.

Olive growers in Elles region not only produce olive processing industry staples like oils, vegetable oils, and pomace but also derive additional by-products from post-harvest tree pruning and uprooting. These by-products include leaves and large wood. In Elles, the green waste generated from annual or biennial olive tree pruning holds significant importance. When managed efficiently, this waste serves as a crucial source of fodder and energy (biochar), especially in areas where fodder is scarce and fuel costs are high. However, the viability of collecting and transporting this biomass depends on factors such as proximity to usage locations, associated costs, and technical feasibility.

Olive growers extend their recycling efforts beyond just pruning products, engaging in various soil-enriching practices. They actively substitute synthetic fertilizers with alternative amendments like compost, manure, and cow dung. Additionally, they employ strategies such as utilizing cover crops or allowing other plants to decompose in fields, effectively lessening their dependence on synthetic fertilizers while augmenting nitrogen fixation and nutrient availability, especially leveraging legumes. By implementing reduced or no tillage methods and cultivating deep-rooted plants, they strive to boost soil carbon stock. Moreover, these growers ingeniously utilize olive oil wastewater as a source of fertilizer, enhancing soil fertility through innovative agricultural practices.

#### **4.2.3.2. Input reduction**

The olive tree, known for its low maintenance requirements, inspires olive growers to pursue cost-effective strategies aimed at cutting production expenses. In the current business model, the olive growers implement methods to reduce water consumption, utilizing tank irrigation and strategic systems to curtail losses while maintaining or increasing yields. In addition, they limited the use of pesticides, herbicides, fungicides, insecticides, and fumigants.

Many opportunities are identified for olive growers to reduce input and enhance efficiency in their operations. Firstly, employing advanced monitoring and precision agriculture techniques, coupled with improved plant varieties and vaccines, can significantly decrease reliance on pesticides and antibiotics. Secondly, implementing legumes for nitrogen fixation presents an opportunity to reduce dependence on synthetic fertilizers. Additionally, adopting strategies to minimize waste across harvesting, processing, storage, and post-harvest stages is crucial. Mechanized harvesting equipment and precision technologies can enhance efficiency and reduce losses, while upgrading milling equipment and implementing separation technologies can maximize oil extraction efficiency and minimize waste.

Exploring ways to utilize by-products like olive pomace for biofuels, animal feed, or compost can further reduce overall waste. Controlled atmosphere storage and airtight containers can prolong shelf life and prevent spoilage, while rapid cooling technologies and establishing a cold chain network can preserve freshness and quality during transportation. Lastly, deploying sensor technologies and quality assurance systems for monitoring and maintaining product integrity throughout the production and supply chain is essential.

By integrating these improvements, olive producers can effectively reduce losses and waste, leading to increased efficiency and sustainability in their operations.

#### **4.2.3.3. Soil health**

To enhance soil fertility, olive growers integrate in their current business model organic matter such as cow dung into their soil, creating nutrient-rich compost. Olive cultivation not only acts as a soil-fixing crop, curbing erosion, but also uplifts overall soil quality.



Moreover, there are various commendable practices to preserve soil health that olive growers can adopt: embracing reduced tillage to minimize soil disturbance and maintain soil structure; cultivating cover crops tailored to reduce erosion, enhance soil conditions, and increase organic matter; implementing improved grazing management strategies for better soil quality and higher forage yield; and introducing intercropping methods alongside olive trees to maximize agricultural benefits and foster a more diverse and balanced farming system.

#### **4.2.3.4. Animal health**

Almost less than fifty percent of Elles 'olive growers had a mixed production system based particularly on sheep with a small animal size (Less than 15 animals an average). Livestock breeding is a costly activity for these farmers in the region. In the current business model, the olive tree by-products serve as crucial livestock feed for olive growers especially in dry period. Olive leaves and branches are highly valued as forage for ruminants, especially in maintenance and low-production systems due to their suitability as a substantial feed source. These components contain long fibers but may require additional nitrogen and phosphorus supplementation. Additionally, the olive tree acts as a source of nourishment for bees and can serve as shelter for various animals.

#### **4.2.3.5. Biodiversity**

In Elles, farmers adopt a diverse agricultural system that combines both plant cultivation and trees, integrating traditional crops with olive farming. Placing trees near intercrops allows them to indirectly benefit from the care given to surrounding vegetation, including weeding and fertilization. Intercropping not only enhances soil microbial biomass and nitrogen levels but also enables trees' roots to recover a significant portion of fertilizer residues, boosting their mineral nutrition. A Elles region, Olive Institute promote the intercropping crops such Vetch (*Vicia sativa*), Sulla (*Hedysarum coronarium*) to increase farmer income and improve soil fertility.

To maintain the diversity of local olive trees, farmers actively promote the development of indigenous and organic plants. They employ traditional selection methods and introduce crops specifically adapted to the region's unique environmental conditions. This comprehensive approach enhances the resilience and sustainability of Elles' agricultural system.

#### **4.2.3.6. Synergy**

In Elles region, the olive production system diversifies by incorporating fruit trees (such as pistachio, almond, or aromatic and medicinal plants) alongside layered forage crops that thrive in similar climatic conditions. These collaborative plantings between different crops can be advantageous, aiding in water retention and soil conservation. Additionally, they serve as a valuable fodder source for livestock.

Some opportunities are identified in the current business model. The adoption of organic and low-input farming practices in olive production offers numerous benefits, including environmental sustainability, improved soil health, and enhanced product quality. By adopting these organic and low-input farming practices, olive producers can reduce their environmental footprint, enhance biodiversity, and produce high-quality olive products while maintaining the long-term health and productivity of their orchards.

#### **4.2.3.7. Economic diversification**

The primary source of revenue for Elles olive growers is agriculture, with a particular focus on the sale of olives and olive oil. However, the current business model in the Elles region indicates a limited diversification of agricultural activities among these growers. While a few olive growers operate mixed systems involving sheep (both goat and lamb), and some engage in intercropping with cereals or forages to broaden their revenue streams, such practices remain relatively uncommon.

Apart from farming, additional income streams for olive growers often include financial support from family members employed in urban areas, particularly in tourism or construction sectors. Furthermore, elderly olive growers sometimes rely on government pensions, albeit at low levels. Moreover, there are occasional instances of olive growers pursuing commercial ventures such as small grocery stores within the region.



Faced with economic challenges and heightened global competition, promoting local products presents a significant economic opportunity for vulnerable regions. The consumption of olive oil has notably surged due to the rediscovery of its health benefits and unique taste. In response, Elles' olive growers aim to carve a niche market by highlighting top-tier quality and a robust regional identity, achieved through protected designations of origin for their olive oil. This strategic approach allows their products to command prices exceeding local market values by over 20%.

Furthermore, apart from olive oil production, olive growers seek to establish a system to repurpose olive waste into valuable by-products, thereby generating additional income. Recognizing the value of these by-products should be a priority for policymakers, as it not only adds value (through water conservation, alternative energy sources, etc.) but also creates job opportunities and contributes to environmental protection.

#### **4.2.3.8. Co-creation of knowledge**

In Elles region, a rich repository of ancient knowledge and traditional practices encompasses various aspects of harvesting, selecting cost-effective oil varieties, and comprehending the oil extraction process. These practices, crucial for sustainability, should be widely disseminated. However, olive growers have highlighted a lack of agricultural extension services, mainly due to the closure of the extension unit in the region. Additionally, they express concerns about the lack of innovation in production methods. In the current business model, the olive growers co-create and share knowledge especially through an informal meeting with farmers in the local market or in the cafes.

The urgency to transition toward producing higher-quality olive oil emphasizes the need for innovative production and storage techniques. Initiatives like the agroecology project present opportunities to enhance agricultural extension services by fostering collaboration between government institutions (CRDA, CTV) and initiative partners (IO, INRAT, ICARDA). These partners are actively establishing demonstration plots and composting units. Notably, farmers play a pivotal role in this initiative, engaging in collaborative knowledge sharing through a specific participatory research approach. Moreover, the olive growers aim to establish an agricultural association (SMSA) to introduce innovation and facilitate knowledge exchange among fellow farmers.

#### **4.2.3.9. Social values and diets**

The revived enthusiasm for olive oil distinctly reflects the local commitment to promote this product and foster improved collective cooperation among all the stakeholders involved in its production. The olive growers in the region genuinely aspire to showcase the unique local and heritage features of their orchards and the produced oil. They are actively working together to organize themselves and highlight their strengths. Some producers are striving to distinguish their oil by labelling it as originating from Elles (Elles olive oil), even though it is not yet certified; this recognition holds significance in marketing.

Furthermore, the Chetwi and Regragui olive varieties, boasting exceptional potential in Elles region, yield high-quality olive oil with an outstanding taste profile. This superior quality acts as a significant asset in establishing a specific designation of origin. These designations not only enrich the olive oil sector but also boost tourism, contributing to regional development. This accomplishment partly arises from collective initiatives that centre around shared recognition and craftsmanship.

#### **4.2.3.10. Fairness**

Olive growers heavily depend on family labour in their olive production system. Skilled workers, particularly those engaged in tree pruning, receive payment based on the specific tasks performed, usually in accordance with prevailing market labour rates. Unfortunately, this setup does not afford access to social and health security benefits. In the existing business model, olive growers sell their olive oil in bulk to loyal clients, capturing the essence of its value. The selling prices of Elles olive oil are generally 10% higher than those of other regions. However, in neighbouring regions, some olive growers sell their olive oil under the informal denomination of 'Elles' to extract greater value from their products.

In the Elles region, small olive growers often resort to renting equipment required for various tasks such as plowing, planting, irrigation, pruning, and harvesting. Input suppliers leverage their negotiating power, occasionally leading to rental prices that olive growers, especially during specific periods like the beginning or end of the season, may deem high. In contrast, large olive growers typically possess their own equipment and may rent it out to smaller farmers after using it, typically at fixed hourly rates. Occasionally, preferential rates may be extended to olive growers based on factors such as loyalty and informal relationships.

In Elles community, significant financial assistance for olive growers during emergencies or in the event of a death primarily stems from their extensive family networks and neighbours. These support networks have been crucial during the pandemic, aiding in acquiring essential food items and medicines. Additionally, they offer financial assistance to olive growers for their children's educational activities.

In a bid to strengthen their collective influence and bolster capacity development, olive growers aspire to form a farmers' association. This association's primary goals include fostering collaboration among farmers, empowering them, and advocating for labour and land rights within the community.

#### **4.2.3.11. Connectivity**

The main avenue for marketing among olive growers in Elles involves direct cash sales within the local community. Moreover, the Olive Oil Festival serves as a fantastic platform for these growers to showcase their olive oil and connect with diverse customer segments. The opportunities of the current business model for the olive growers are to form a farmers' association encompassing olive processing, establish a controlled designation of origin for their olive products, initiate a modern sales outlet within the association, and introduce specially packaged bottles catering to a high-quality olive oil niche market. This olive growers' initiative will lead to the creation of a sophisticated new product addressed to a specific category of Tunisian consumers.

#### **4.2.3.12. Land and natural resource governance**

Olive growers in Elles region have expressed deep concerns about the impact of climate change on land and natural resources. Nestled in a mountainous area, these farmers underscore issues such as erosion, soil degradation, and water scarcity. They actively collaborate with local government initiatives and partake in sustainability programs to address these challenges. A national strategy has been put in place to safeguard biodiversity and promote forest conservation, aligning with their efforts. Furthermore, some farmers participate in a public program incentivizing the rejuvenation of olive trees in vulnerable regions.

In line with the agroecology project, olive growers aim to embrace an agricultural system that prioritizes sustainability while conserving land and natural resources. Their goal is to establish a farming approach that not only tackles the impacts of climate change but also contributes to the overall well-being of communities in the Elles region.

#### **4.2.3.13. Participation**

In the current business model, the olive growers in Elles are officially represented nationally by the Farmer's Union (UTAP). However, there is a gap in how the Farmer's Union addresses the concerns of farmers in this community. Particularly for small farmers, those in Elles have limited involvement in decision-making processes, decentralized governance, or local food system management. Some olive growers participate individually in regional commissions or local committees.

The main opportunity of the business model is the establishment of the olive oil association for olive growers to enhance their influence. The aim is to actively engage in shaping decisions related to the regional development plan, encompassing agriculture, transportation, investment, and feeding programs. Their collective goal is to bolster their voice and contribute to more effective decision-making processes that advance the community's development.

### 4.3. Co-design and capacity building for an upgraded business model

The business model diagnostic allowed the identification of the main challenges and bottlenecks faced by the community of olive farmers in Elles, with regards to their business performance and to the integration of agroecological principles. We used the results of the diagnostic to inform and guide a workshop with all the relevant stakeholders, with the objective of co-designing a new business model that addresses some of the challenges and harnesses the regional strengths and opportunities. The process and results of this activity is presented below:

A collaborative workshop convened in June 2023 engaged all stakeholders to co-design an agroecological innovation package for Elles community. Outcomes highlighted critical agricultural challenges, including the closure of the agricultural extension unit, a notable decline in olive yields, aging olive trees, and issues with erosion and water management, encompassing both availability and maintenance concerns. From the co-design process, two primary agroecological innovations emerged at the farm level: composting and intercropping, specifically with olive trees.

Various constraints were identified by olive growers hindering the adoption of these innovations, such as a shortage of labour for compost production and general olive tree farming, insufficient knowledge and expertise on compost production, pruning, and irrigation techniques, inadequate machinery for composting, and a lack of organized collaboration among farmers. In addition, olive growers identified opportunities along the stages of the olive oil value chain, such as the establishment of a farmers' association (SMSA) to enhance value addition and creation among farmers, obtain a CDO, and develop products for higher-value markets

The workshop's findings suggested a series of innovation-related actions linked to composting, including applying compost in demonstration plots to assess its impact on the region's olive groves, organizing training sessions on various agricultural practices, processing olive by-products on-site to create compost, formulating specifications mandating and overseeing agroecological practices, like using compost for olive trees, and establishing a local farmers' association (GDA/SMSA) to facilitate innovation introduction.

Olive growers anticipated multiple advantages upon embracing the agroecological innovation package. Their expectations encompassed gaining expertise in vital aspects like pruning, irrigation, compost production, and utilization, while aiming to enhance both the yield and quality of their olives and oil. They sought to promote soil health and reduce erosion, forging robust partnerships with public institutions (CTV and CRDA) and research entities (IO, INRAT, ICARDA) to enhance agricultural outreach. Additionally, they aimed to promote collaboration among local farmers through an SMSA/GDA, preserving and amplifying Elles' heritage, fostering economic and social development, attracting younger generations, and curbing migration. Moreover, they aspired to elevate the value of the region's olive oil, potentially securing a higher price by establishing a Controlled Designation of Origin (CDO) to augment incomes.

## 5. Highlights and recommendations

The analysis of the current business model for the stakeholders involved in Elles' olive oil production revealed both weaknesses and significant opportunities for growth and improvement. Understanding these points provides a foundation for enhancing the model's effectiveness.

The main weaknesses, opportunities and suggestions of the olive grower's current business model are summarized in the following Table.

**Table 3. Opportunities and suggestions for the current business model**

	<i>Weaknesses</i>	<i>Opportunities</i>	<i>Suggestions</i>	<i>Agroecological principles</i>
<b>Olive growers</b>	<i>Soil erosion</i>	<i>Preventing soil erosion</i>	<i>Intercropping with olive tree</i>	<i>Land and natural resource governance, Biodiversity, Soil health</i>
	<i>Low olive tree yields</i>	<i>Improving olive tree yields</i>	<i>Training days on pruning, irrigation, compost production, use of compost, etc.</i>	<i>Land and natural resource governance, Input reduction</i>
	<i>Soil degradation</i>	<i>Improve soil fertility</i>	<i>Application of the compost in demonstration plots to study its impact on the region's olive orchard</i>	<i>Recycling, Land and natural resource governance, Soil health</i>
	<i>Low valorization of the olive by-products</i>	<i>Synergy crop-livestock</i>	<i>Processing of olive by-products and on-site compost production</i>	<i>Recycling, Livestock health, Economic diversification, Synergy</i>
	<i>Olive growers lack organized associations.</i>	<i>Olive growers motivated to create an olive oil association.</i>	<i>Creating an SMSA for Elles olive growers</i>	<i>Synergy, Co-creation of knowledge, Participation, Social value and diets, Economic diversification, Fairness, Connectivity</i>
	<i>Low olive oil quality in the current business model (compared to the quality potential)</i>	<i>Great potential of improvement of olive oil quality</i>	<i>Olive Institute support to improve the olive oil quality.</i>	<i>Connectivity, Economic diversification, social values, and diets</i>
	<i>Low added value created compared to the quality potential of Elles olive oil</i>	<i>Value added creation (packaging, CDO, etc.)</i>	<i>Create a new product packaged and labelled with high quality olive oil.</i>	<i>Connectivity, Economic diversification, social values and diets</i>
	<i>Low valorization of Elles olive oil</i>	<i>High potential of Elles community in olive oil system (Roman site, mountain zone, Favorable bioclimatic condition, good reputation for olive oil production, etc.) Conservation and enhancement of Elles' heritage, greater economic and social development of the region, attracting young people and limiting migration</i>	<i>Establish a CDO Olive oil specifications in line with agroecological requirements</i>	<i>Co-creation of Knowledge, Participation, Fairness Social values and diets, Economic diversification, Connectivity</i>
	<i>Spot market (direct sale)</i>	<i>Joint sale of a new packaged and controlled olive oil product</i>	<i>Establishing a contemporary sales boutique within the association.</i>	<i>Connectivity, Social values and diets, Economic diversification, Fairness</i>
<b>Extension services</b>	<i>Lack of agricultural extension, Lack of know-how and knowledge necessary for the production and use of compost, pruning techniques, irrigation</i>	<i>Initiative agroecology project Common vision among all stakeholders to valorize Elles olive oil</i>	<i>Improvement of agricultural extension in the region. Living lab creation based on olive growers' association. Better involvement of public institutions (CTV and CRDA) through activities and partnerships with the research institutions involved (IO, INRAT)</i>	<i>Co-creation of knowledge, Social values and diets, Land and natural resource governance Input reduction, Recycling, biodiversity</i>
<b>Olive oil mill (processing)</b>	<i>The processing in the olive oil mills does not guarantee the requested quality of olive oil in case of the creation of controlled designation of origin (CDO)</i>	<i>Integration of the process level by the olive growers into the association</i>	<i>Purchase of machine for processing olives into oil Olive institute support</i>	<i>Economic diversification Connectivity</i>

**Source: Own elaboration, 2023**

The workshop findings from stakeholders in Elles' olive oil value chain highlight considerable potential for enhancing the current business model of olive growers. The key stakeholders, including research institutions, development agencies and farmers, advocate for the creation of a new agroecological business model by implementing the following activities:

1. **The formation of a farmers' association:** The ongoing establishment of this association requires robust support, especially from development agents in Elles community. This initiative directly influences various agroecological principles such as Synergy, Co-creation of knowledge, Participation, Social values and diets, Economic diversification, Fairness, and Connectivity.
2. **Increasing the adoption of agroecological practices in olive farms:** Specifically, focusing on composting and intercropping under the supervision of the Olive Institute. These innovations impact crucial agroecological practices including land and natural resource governance, Biodiversity, Soil health, recycling, Livestock health, Synergy, and Economic diversification.
3. **Integration of processing activity:** Olive growers, with technical support from the Olive Institute, are recommended to integrate processing activities into the olive oil association. This involves investing in small-scale machinery to ensure specified oil quality. This step influences agroecological principles such as Economic diversification, Co-creation of knowledge, and Connectivity.
4. **Establishment of Controlled Designation of Origin (CDO):** Implementing this initiative guarantees added value for the olive growers' association through the adoption of agroecological practices. The CDO brings benefits to Elles' community by enhancing heritage, promoting economic and social development, attracting young people, and limiting migration. It mainly impacts agroecological principles like Co-creation of Knowledge, Participation, Fairness, Social values and diets, Economic diversification, and Connectivity.
5. **Creation of a new olive oil product with modern packaging:** To target a niche market with higher added value, olive growers are advised to craft a sophisticated product with modern packaging, supported by technical expertise from the Olive Institute. This activity impacts agroecological principles such as connectivity, social values and diets, and economic diversification.
6. **Establishment of a contemporary sales boutique:** This initiative aims to enhance connectivity with customers and bolster communication strategies for new olive oil products. The creation of a modern retail space within the olive oil association predominantly impacts agroecological principles such as connectivity, social values and diets, economic diversification, and fairness.

## 6. Upgrading plan of the business model

The upgrading business plan emerged from collaborative efforts involving relevant stakeholders within Elles community's olive oil value chain. The main objective of this upgrading plan is to create a new olive oil product, meticulously controlled and packaged, tailored for Elles olive growers' association, firmly rooted in agroecological principles and practices (figure 9).

The upgrading plan's specific objectives entail multiple aspects: first, uniting olive growers under a cohesive olive growers' association to strengthen collaboration and unified efforts. Second, incorporating agroecological practices like composting and intercropping methods for sustainable cultivation. Third, seeking Controlled Designation of Origin status to highlight and protect the uniqueness of Elles' olive production. Fourth, integrating processing and modern packaging practices within the association to streamline production. Lastly, establishing a contemporary sales boutique within the growers' association to elevate marketing strategies and outreach.

The Upgrading Plan involves a spectrum of key actors, each contributing to various dimensions of the initiative. At the core are the olive growers' group, managing small-scale plots and employing modern farming techniques, while facing specific challenges in pruning practices and actively involving women in the harvest.

Supporting this group are multiple entities: CRDA Kef Governorate, providing training and administrative support; the Olive Institute (IO), focusing on research and agroecological practices; the National Oil Office (ONH), aiding in productivity enhancement, quality promotion, and export facilitation; the Northwest Cluster of Olive Oil, aiding in recycling, quality management, financial access, and marketing; APIA, advocating private investment in agriculture; INRAT and ICARDA, contributing to agronomic research; CEPEX, supporting export processes; DGPA and OEP, focusing on sustainable plant and livestock development; INNORPI, ensuring standardization and certification; SMSA Zitouna, having established a CDO with its expertise in CTV, facilitating extension programs; PACKTEC, providing packaging support; and various banks, including BNA, BS, Ezzitouna bank, and BFPME, offering financing options. Finally, Enda Tamweel, a micro-finance company, champions financial inclusion for vulnerable populations. Together, these actors bolster and fortify the operations of Elles' olive growers across the entire value chain.

### **6.1. Activity 1. Creation of the olive growers' association (SMSA)**

This initiative aims to form the olive growers' association (SMSA) in the first year of the upgraded plan, unifying a minimum of fifteen olive growers based on specific criteria like leadership qualities, education level, farm infrastructure including irrigated areas, and the potential to adopt agroecological practices. This careful selection ensures a cohesive association and strong engagement in the agroecological business model.

ICARDA will lead this endeavor, collaborating closely with the olive growers' group and an expert to facilitate the association's establishment. Research Institutions (IO and INRAT), development agencies (CRDA), and DGPA (General Directorate of Plant Production) will collectively support the implementation of this olive growers' association in Elles community.

There are three potential options for the olive growers' group to secure premises for the association. They can reclaim former SMSA premises in Elles community, engage with CRDA (public institution) to lease reasonably priced spaces, or, if feasible, one of the group members could offer premises at no cost. The estimated cost for this undertaking is approximately USD2,900.

### **6.2. Activity 2. Adoption of the agroecological practices**

This initiative spans the first and second years of the upgraded plan, focusing on introducing agroecological practices like intercropping and composting to Elles' olive growers. The Olive Institute will spearhead this effort in the community, supported by INRAT, CRDA, CTV (local extension services), financial institutions, Enda Tamweel and the Livestock and Pastures Office (OEP).

Procurement of equipment is necessary, including a shredder for tree debris, leaf removal tools, crates, and a harvesting machine for the olive growers' association, aimed at encouraging the adoption of agroecological practices. Furthermore, expert-led training sessions on these practices will be conducted for members of the olive growers' association. The estimated cost for this comprehensive activity is approximately USD19,871. The creation of SMSA can also offer olive growers benefits, potentially allowing them to obtain agricultural equipment at up to a 50% discount.

### **6.3. Activity 3. Creation of Controlled Designation of Origin (CDO)**

This endeavor spans the initial two years of the enhanced plan and aims to establish a CDO for Elles' olive oil. The Olive Institute and DGPA will lead the implementation, supported by CRDA, INNORPI (National Institute of Standardization and Industrial Property), the Olive Oil Cluster, and SMSA Zitouna.

An expert will compile all essential documentation and a comprehensive set of agroecological specifications necessary for establishing Elles CDO, collaborating closely with DGPA. Additionally, five open days will be organized, specifically targeting olive growers, to foster awareness and promote the production of controlled olive oil in Elles based on agroecological practices. The estimated cost for this activity is approximately USD2,810.



#### **6.4. Activity 4. Olive oil processing integration into the association**

This initiative will take place in the second and third years of the upgraded plan to incorporate olive processing within the association, ensuring top-tier olive oil extraction quality in Elles community. The Olive Institute will spearhead this within the olive oil association, helped by ONH (OIL National Office), CRDA, Bank, and DGPA. Initially, the premises will undergo renovation to meet stringent requirements like hygiene, space, and aeration, preparing the space for machine installation. Following this, essential machines such as the oil extraction machine, washing machine, olive-pomace pump, filter, settling tanks, and storage tanks will be procured. Moreover, specialized training sessions on olive processing will be conducted for association members, guaranteeing the high quality of the produced olive oil. Two employees will be hired for a brief 45-day period to oversee the olive-to-oil processing within the association. The estimated cost for this activity is approximately USD67,696.

As a first step towards the establishment of the processing plan and CDO, the Olive Institute conducted a hands-on demonstration day focused on producing high-quality extra virgin olive oil (Annex 1). This event, geared toward contributing to the roadmap for establishing a Geographical Indication label in Elles/Sers, took place on November 30<sup>th</sup>, 2023, at the Specialized Unit of Tunis. Olive growers and processors from Elles community were invited to the demonstration day.

#### **6.5. Activity 5. Olive oil conditioning within the olive growers' association**

Taking place in the second and third years, this activity aims to design modern packaging for the controlled olive oil produced by Elles olive growers' association. INRAT will lead this activity in collaboration with the olive growers' association, supported by IO, ONH, the Olive Oil Cluster, Bank, and PACKTEC (Technical Center for Packaging and Conditioning). The olive growers' association will acquire an olive oil filling machine, bottling equipment, bottles, caps, and bottle labels. Additionally, an expert designer will be hired to craft a visually appealing and creative design for the controlled extra virgin olive oil. The estimated cost for this activity is approximately 33,046USD.

The goal of the upgraded business model is to sell 8,000 bottles of packaged and controlled olive oil in the first year, aiming to reach 40,000 bottles within five years, aligned with the olive oil experts' assessments considering the characteristics of the olive growers' group and the national market for packaged olive oil products in Tunisia. This activity will be supported by actors such as North West Cluster, CEPEX and ONH.

#### **6.6. Activity 6. Olive oil marketing within the olive growers' association**

Scheduled for the third and fourth years of the plan, this activity focuses on establishing a modern sales boutique within the olive growers' association. ICARDA and INRAT will lead this endeavor, backed by IO, CEPEX, UTICA, the Olive Oil Cluster, and CRDA. This activity ensures robust connectivity between the olive growers' association and customers. The estimated cost for this activity is approximately USD 13,000, allocated as follows: USD 6,500 for renovating the showroom for the controlled olive oil bottles, USD 3,500 for employing a permanent seller in the modern sales boutiques, and USD 3,000 for potential participation in fairs and competitions featuring labeled and controlled olive oil bottles.

**Table 4.Objectives, actions, actors, and costs for the upgraded plan of the olive oil Elles business model**

Objectives	Actions	Estimated costs	Time frame	Responsible actors	Support actors
<b>Creation of an olive growers' association of 15 members at least in the first year selected according to specific criteria's (leadership, irrigated area, educated level, High potential to integrate agroecological practices, etc.)</b>	Expert fees to facilitate the creation of the SMSA	USD1,000	First year	ICARDA	IO
	Rental of association premises per year	USD1,600		Olive growers' group	INRAT DGPA CRDA
	Administrative fees for the creation of an SMSA (Insurance, fiscal fees etc.)	USD300			
<b>Adoption of the agroecological practices such as compost; pruning, intercropping, etc.</b>	One shredder for tree debris	USD6,000	First and second year	IO Olive growers' group	INRAT CRDA CTV OEP Banks Enda Tamweel
	Leaf removal equipment	USD3,225			
	100 crates	USD5,800			
	Harvesting machine	USD3,226			
	10 experts' trainings (agroecological practices)	USD1,620			
<b>Establishment of CDO</b>	Expert of CDO (preparation of the necessary documentation)	USD2,000	First and second year	IO DGPA Olive growers' group	CRDA INNORPI Olive oil cluster SMSA Zitouna at Teboursek
	5 experts open days on CDO	USD810			
<b>Processing the olives production into SMSA</b>	Renovation of the premises	USD22,580	Second year and third year	IO Olive growers' group	DGPA ONH CRDA Bank
	Oil extraction machine	USD24,835			
	Washing machine	USD4,560			
	Olive-pomace pump	USD2,960			
	Filter (20 plates)	USD1,550			
	2 Settling tanks	USD1,990			
	4 storage tanks (1000 liter for each)	USD6,630			
	Labor (2 employees for 45 days)	USD871			
	10 experts trainings	USD1,620			
<b>Conditioning the olive oil into SMSA</b> (8000 bottles of olive oil for the first year) (40000 bottles of olive oil after five years)	Olive oil Filling Machine Bottling	USD581	Second year and third year	INRAT Olive growers' group	Olive oil cluster DGPA PACKTEC ONH BANK
	8000 Bottles	USD20,645			
	8000 Caps	USD5,161			
	8000 bottle labels	USD5,161			
	Expert designer	USD1,500			
<b>Olive oil marketing into SMSA</b>	Showroom design	USD6,500	Third year and fourth year	ICARDA INRAT Olive growers' group	IO CEPEX UTICA Olive oil Cluster CRDA
	Labor (permanent employee)	USD3,500			
	Participation in fairs and competitions	USD3,000			
<b>Total</b>		USD139,225			

**Source: Own elaboration, 2023**

\*All the estimated costs are based on the expert consultations for the previous investments and the current change rate for the imported equipment (1 euro=3.42 TND; 1USD=3.10 TND).



The upgraded plan carries potential risks divided into two categories: internal and external. External risks encompass various factors affecting Elles' olive oil industry. These include natural risks like drought, erratic weather patterns, soil degradation, diseases, and pests, which the chosen olive growers address by relying on irrigation systems for stable production. Market risks arise from the volatile nature of the olive oil market, influenced by production seasonality, export market fluctuations, and escalating raw material and production costs, impacting even the bottled and labelled olive oil markets. Additionally, political, and institutional risks emerge from Tunisia's economic crisis, potentially affecting the olive oil sector through product inflation, Tunisian dinar depreciation, increased monetary interest rates among other factors.

Internal risks within Elles community encompass various factors that could impact the success of the new project. These risks include resistance among small olive growers towards change and collaborative efforts, leading to conflicts in leadership, trust issues, and representation within the SMSA. Additionally, the lack of practical business management experience among olive growers may impede effective technical and administrative management of the project, potentially devaluing the final product due to limited processing knowledge. High demand for olives from Elles poses supply-related challenges, while significant investments required for creating packaged olive oil products may strain financial resources, especially during economic crises with high-interest rates. Moreover, the cyclical nature of olive tree production and labour scarcity further present potential risks, demanding optimization of cultural practices and thoughtful labour management for project success.

## **7. New business model**

The upgraded plan introduces a novel business model aimed at enhancing the collective performance of the olive growers' association in their olive oil activities (Table 5 and Figure 11). The primary goal of this renewed business model is to craft controlled and packaged virgin and extra virgin olive oils, distinguishing themselves in both domestic and international markets through the integration of agroecological practices and principles. Additionally, the new iteration of the business model incorporates additional components focusing on governance, environmental considerations, and social benefits. The contribution of this new business model on the improvement of the agroecological principles is synthesized in Table 6.

### **7.1. Key partners**

Olive growers' key partners in Elles community can be listed as follows, along with the goods/services they provide:

#### **7.1.1. Public partners**

The Regional Agricultural Development Commission (CRDA) in the Kef governorate serves as a primary community partner, organizing vital training sessions for olive growers on essential practices like water conservation, pruning, and harvesting, while also providing crucial administrative support to farmers. The National Oil Office (ONH) operates as a significant public entity, overseeing and aiding olive growers in enhancing productivity, promoting Tunisian olive oil quality, facilitating export development, and regulating the domestic market. Their role in endorsing Elles' olive oil in foreign markets is particularly impactful for local growers. The Olive Institute (IO) conducts pioneering research on farm-level technologies and disseminates agroecological practices like intercropping and composting within various research projects. The Export Promotion Center (CEPEX) supports economic actors throughout their export processes, offering administrative and financial assistance, organizing promotional events, partnership meetings, and missions for market exploration. Additionally, the General Directorate of Plant Production (DGPA) focuses on fostering sustainable development within plant production. Meanwhile, the Institute of Agricultural Research of Tunisia (INRAT) remains a crucial public institution dedicated to agronomic research and falls under the Ministry of Agriculture's purview. Lastly, the Agricultural Investment Promotion Agency (APIA) aims to stimulate private investment in agriculture, fishing, and associated services within Tunisia.

### **7.1.2. Private partners**

Various input providers in Elles community offer agricultural machinery such as stainless-steel tanks and irrigation systems to support olive growers. Mabrouka Company has consistently provided olive growers with high-quality plants and services. Enda Tamweel specializes in fostering financial inclusion. Additionally, both public and private banks, including the National Agricultural Bank (BNA), Solidarity Bank (BS), Ezzitouna Bank, and the Financing Bank for Small and Medium-sized Enterprises (BFPME), offer diverse financing options, particularly supporting new investors across various sectors, notably in agriculture.

### **7.1.3. Development partners**

The Northwest Cluster of Olive Oil brings together industrial stakeholders within the olive oil value chain, encompassing olive oil mills and conditioning units in the Northwestern region of Tunisia. This entity plays a crucial role for Elles' olive growers by offering multifaceted support including assistance in by-product recycling, quality management, supply chain oversight, financial accessibility, strategic marketing, and governance in business operations. On the other hand, the International Center for Agricultural Research in the Dry Areas (ICARDA) is an international organization dedicated to over four decades of research-for-development, providing innovative agricultural solutions grounded in science to enhance livelihoods and build resilience among rural dryland communities.

## **7.2. Key activities**

### **7.2.1. At farm level**

The key activities at the farm level concern all the activities related to the preparation of soil, pruning of trees, irrigating the parcel, fertilizing with organic matter, and harvesting the olive trees. Additional agroecological practices will be incorporated into the olive production system, especially the intercropping, compost and rejuvenation pruning.

### **7.2.2. At the association level**

The integrated business model now encompasses every stage of packaged olive oil production within the association. This involves crucial activities like olive collection, transportation, storage, processing, oil preservation, conditioning, direct sales of controlled virgin and extra virgin olive oil to customers and exploring new market opportunities. Furthermore, the olive growers' association assumes responsibility for administrative tasks, store management, machinery upkeep, providing technical assistance, and fostering the skill development of its members.

## **7.3. Key resources**

The key resources integral to the new business plan operate at both the farm and community levels as well as within the association itself. At the farm and community level in Elles, crucial resources include the expansive olive groves hosting regional olive varieties, the adept knowledge of olive growers in minimizing inputs and employing pesticide-free practices, the diverse biodiversity indigenous to Elles region, the historical and efficient ancestral irrigation system, the untapped potential for ecotourism, existing infrastructure like transportation, roads, and storage facilities, and the presence of productive centenarian olive trees tracing back to Roman times. Meanwhile, at the association level, resources encompass substantial support from influential entities like OI, INRAT, ICARDA, and CRDA, as well as expert facilitation for establishing the SMSA. Additionally, expertise in preparing the necessary documentation for CDO, tailored training programs for the olive growers' association, vital machinery including oil extraction, composting, and harvesting machines, skilled labor, expert designers, storage tanks, and equipment for olive oil filling and bottling are pivotal resources contributing to the association's success. These resources, spanning from the community's rich heritage to the association's strategic partnerships and operational assets, collectively fortify the foundation for the olive oil industry's growth and sustainability in Elles.

## **7.4. Value proposition**

### ***To olive growers, members of the association***

The updated business model presents multiple advantages for olive growers affiliated with the olive oil association. By embracing agroecological practices, growers can fortify the sustainability of their olive production, countering erosion through methods like intercropping between trees and enhancing soil fertility with compost utilization. This adoption not only elevates tree yields but also boosts growers' income. The association extends invaluable guidance and services, offering access to specialized training from esteemed research institutes like OI or INRAT, NGO support, and extension services. Additionally, it facilitates improved access to credit for its members through diverse financial institutions. This new model further fosters social cohesion among olive growers within the association, fostering solidarity and dedication to elevating Elles olive oil through CDO. Moreover, the association's integration of various production stages—from collection to processing, packaging, and marketing—ensures top-tier quality, adds value at each phase, and reduces production costs by cutting out intermediaries.

### ***To Elles community***

The updated business model brings forth a chance for Elles community to elevate their olive oil production through the establishment of a CDO. This designation is open to all olive growers in Elles community, empowering them to enhance the value of their products. Furthermore, this CDO has the potential to serve as a catalyst in promoting ecotourism within the region.

### ***To customers***

The olive growers' association aims to provide customers with a consistent and reliable supply of controlled and packaged olive oil of exceptional quality. Additionally, the association commits to ensuring transparency and traceability in the production of the controlled and packaged olive oil from Elles community.

## **7.5. Customer relationships**

The updated business model will deepen the involvement of the olive growers' association in establishing a CDO for Elles community. This involves allocating responsibilities among association members, facilitating knowledge exchange and guidance for all members, fostering social unity through equitable access to association services, and more. Furthermore, this model will advocate for the utilization of contracts between the SMSA and olive growers in production, as well as between the SMSA and customers in marketing.

## **7.6. Channels**

The updated business model establishes a contemporary sales boutique within the association, fostering direct connections with customers at the community level. This local channel significantly amplifies the value creation within Elles community. Additionally, a separate marketing avenue targets the international market through collaborating with exporters to showcase Elles' CDO certified olive oil. Moreover, leveraging support from ONH and CEPEX, the olive growers' association can actively participate in trade fairs to explore and tap into new markets for their products. The association will oversee the collection of olives from its members and ensure the transportation of the gathered olives to the association's facilities.

## **7.7. Customers**

Within this updated business model, the intended customer base differs from the current approach. The focus on elevating the value of Elles association's olive oil through quality certification and innovative packaging appeals to a distinct clientele. This includes potential customers such as exporters, specialized traders like supermarkets, and discerning consumers seeking premium products that meet agroecological standards while embodying the unique essence of the local terrain.

## **7.8. Cost structure**

The cost of the upgraded plan of the business model is estimated at USD 139225 including:

- 2% for the creation of the SMSA,
- 14.3% for the adoption of the agroecological practices,
- 2% for the creation of the Controlled Designation of Origin,
- 48.6% for the integration of the olive oil processing,
- 23.7% for the integration of the olive oil conditioning,
- 9.3% for the integration of the olive oil marketing.

## **7.9. Revenue streams**

The revenue stream of the olive growers' association is generated through the sale of olives and packaged virgin and extra virgin olive oil, aligning with both national and international market dynamics. A premium, reflective of quality, is added to the selling price of olives, serving as a reward for olive growers who embrace agroecological practices. The integration of sustainable methods not only enhances the market value of olives but also contributes positively to the environment.

Additionally, the association seizes existing opportunities to diversify its revenue streams by offering various services to its members and the community, including oil storage, extraction, and training. This innovative business model significantly amplifies the value of Elles Olive Oil, exemplified by the sale of a 500 ml bottle of controlled olive oil at nearly USD 8. This strategic approach not only fosters economic growth for the association but also champions the production of high-quality and sustainable olive oil. More details on the CBA of the investment projects concerning the processing and packaging unit and the showroom are presented in the last section of this report.

## **7.10. Governance and people**

The olive growers' association's new business model functions on principles of democracy, fairness, and active participation, promoting collective leadership and engagement among community members, with a specific emphasis on involving women. The establishment of the Controlled Designation of Origin for Elles community olive oil significantly enhances their commitment to safeguarding their natural and cultural legacy. By empowering individuals within the community, especially women, the association fosters collective knowledge and creates avenues for commercialization, encouraging participation and involvement in its initiatives.

## **7.11. Environmental and social benefits**

The new business model brings forth significant environmental and social advantages across various levels: on the farm, within the community, and in society. Encouraging the adoption of agroecological practices within the community promises positive outcomes, including enhanced soil fertility, biodiversity preservation, reduced erosion, and mitigation of climate change impacts. Socially, the model showcases clear benefits through the establishment of social cohesion via the association and CDO, community empowerment through capacity-building initiatives like training and knowledge sharing, the creation of dignified livelihoods by adding value for small olive growers, fostering sovereignty and autonomy through access to association services and credit, job creation, and more.

**Table 5. New business model of the olive growers' association**

Key partners	Key resources	Value proposition	Relations	Customers
<p><b>Public partners</b> OI INRAT CRDA ONH CRDA DGPA APIA INNORPI CEPEX PACKTEC</p> <p><b>Private partners</b> Bank Mabrouka company, Input providers Enda Tamweel</p> <p><b>Development partners</b> ICARDA Olive Oil Cluster of North Ovest</p>	<p><b>At farm level and community</b> Olive groves in Elles community with typical varieties of the region Know-how of olive growers (inputs reduction, No use of pesticides) Biodiversity of Elles region Ancestral irrigated system Ecotourism Infrastructure: Transport, Road, Storage Olive: centenarian, dating from Roman times</p> <p><b>At association level</b> Support from the OI, INRAT, ICARDA, CRDA etc Expert to facilitate the creation of the SMSA Expert of AOC Trainings for olive growers' association Oil extraction machine Compost equipment Harvesting machine Expert designer Storage tanks Labors (employees) Olive oil Filling machines Bottling</p>	<p><b>To olive growers, members of the association</b> Access to SMSA advice and services Improve the sustainability of the olive farming system Improved productivity, Improved income Value added created at the different steps of the olive oil production system Premium quality of the olive oil Improved social cohesion within association Access to credit Niche market Economic diversification Job creation</p> <p><b>To Elles community</b> Controlled designation of origin Community engagement</p> <p><b>To customers</b> Regular supply Transparency and traceability Sales offers</p>	<p><b>At olives production level</b> Contract between the SMSA and the olives growers</p> <p><b>At olive growers' association</b> Improve olive growers' engagement into the association Planning and distribution of responsibilities between association members Sharing advice and knowledge for all adherents, Improving social cohesion through a fair access to association services,</p> <p><b>At marketing level</b> Contract between the SMSA and customers (supply, quality, price, others)</p>	<p>Modern sales boutique Specialized traders like supermarkets Exporters Discerning consumers seeking premium products adhering to agroecological standards and reflecting the essence of the local territory. Fairs Festivals</p>
	<b>Keys activities</b>	<b>Channels</b>	<b>Governance and people</b>	<b>Environmental and social benefits</b>

	<p><b>At farm level</b> All the agricultural activities related to the preparation of soil, pruning of trees, irrigating the parcel, fertilizing with organic matter and harvesting the olive trees. Additional agroecological practices will be incorporated into the olive production system especially the intercropping, compost and rejuvenation pruning.</p> <p><b>At the association level</b> Olive collection Transport Storage Processing the olives Conservation and conditioning of the olive oil Research of the new olive oil market. Administrative tasks management Selling store management Machine maintenance Technical assistance to the members Capacity building of their members.</p>	<p>Creation of a modern sales boutique into the association Selling in international markets via the exporters to promote Elles olive oil with CDO. Olive growers' association can actively engage in fairs with the backing of ONH and CEPEX to explore new markets for their products. Ensuring the transportation of the collected olives to the association.</p>	<p>Active engagement of the community members Preserve natural and cultural heritage Improve olive grower's participation in decision making Building knowledge through collective action Land and natural resource governance Improve inclusion and equality.</p>	<p>Improve biodiversity Improve soil health Climate change mitigation through agroecological practices Community cohesion Community empowerment Dignified livelihoods Job creation</p>
<b>Cost streams</b>		<b>Revenue streams</b>		
<p>The cost of the upgraded plan of the business model is estimated to USD 139225 including:</p> <ul style="list-style-type: none"> <li>▪2% for the creation of the SMSA,</li> <li>▪14.3% for the adoption of the agroecological practices,</li> <li>▪2% for the creation of Controlled Designation of Origin,</li> <li>▪48.6% for the integration of the olive oil processing,</li> <li>▪23.7% for the integration of the olive oil conditioning,</li> <li>▪9.3% for the integration of the olive oil marketing.</li> </ul>		<p>The olive growers' association derives its revenue from the sale of olives, as well as packaged virgin and extra virgin olive oil, in accordance with both national and international market trends. A quality premium is applied to the selling price of olives, rewarding olive growers who embrace agroecological practices. Existing opportunities to bolster its revenue by providing various services to its members and the community, such as oil storage, extraction, training, etc. The sale of a one-liter bottle of controlled olive oil at nearly USD10.</p>		

Source: Own elaboration, 2023



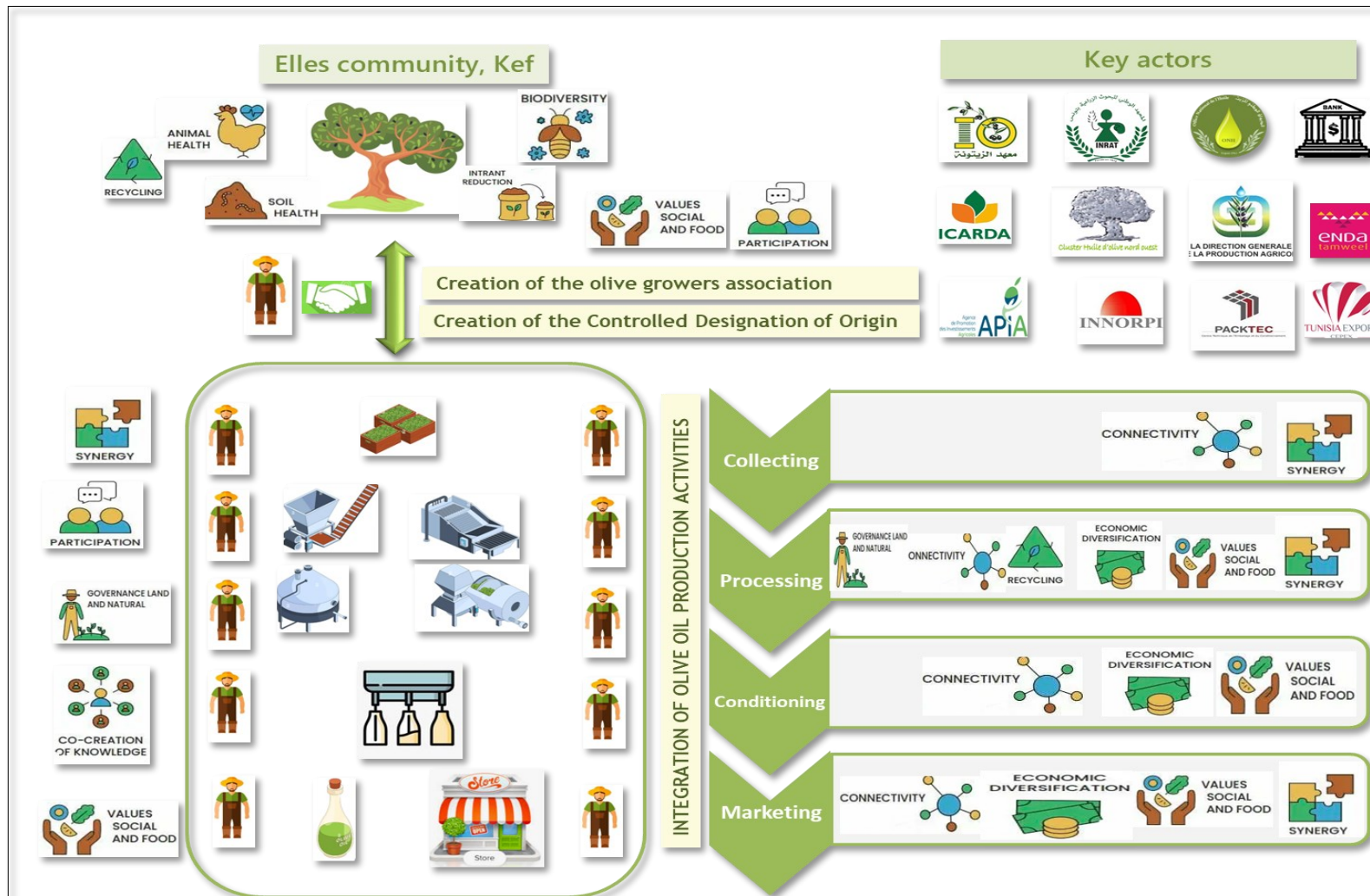


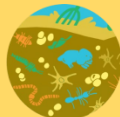





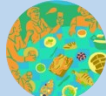








Figure 9. New business model for olive growers' in Elles community

**Table 6. Contribution of the new business model to promote the agroecological principles**

Agroecological principles		Contribution of the new business model to promote the agroecological principles
Recycling		Olive growers extend their recycling efforts beyond just pruning products, engaging in various soil-enriching practices. They actively substitute synthetic fertilizers with alternative amendments like compost, manure, and cow dung. Additionally, they employ strategies such as utilizing cover crops or allowing other plants to decompose in fields, effectively lessening their dependence on synthetic fertilizers while augmenting nitrogen fixation and nutrient availability, especially leveraging legumes. By implementing reduced or no tillage methods and cultivating deep-rooted plants, they strive to boost soil carbon stock. Moreover, these growers ingeniously utilize olive oil wastewater as a source of fertilizer, enhancing soil fertility through innovative agricultural practices
Input reduction		The olive tree, known for its low maintenance requirements, inspires olive growers to pursue cost-effective strategies aimed at cutting production expenses. These include implementing methods to reduce water consumption, utilizing tank irrigation and strategic systems to curtail losses while maintaining or increasing yields. Moreover, growers minimize the use of chemicals, such as pesticides and herbicides, opting for precise and limited applications when necessary.
Soil health		To enhance soil fertility, olive growers integrate organic matter such as cow dung into their soil, creating nutrient-rich compost. Olive cultivation not only acts as a soil-fixing crop, curbing erosion, but also uplifts overall soil quality. Additionally, they employ various commendable practices to preserve soil health: embracing reduced tillage to minimize soil disturbance and maintain soil structure; cultivating cover crops tailored to reduce erosion, enhance soil conditions, and increase organic matter; implementing improved grazing management strategies for better soil quality and higher forage yield; and introducing intercropping methods alongside olive trees to maximize agricultural benefits and foster a more diverse and balanced farming system.
Animal health		The olive tree by-products serve as crucial livestock feed for olive growers. Olive leaves and twigs are highly valued as forage for ruminants, especially in maintenance and low-production systems due to their suitability as a substantial feed source. These components contain long fibers but may require additional nitrogen and phosphorus supplementation. Additionally, the olive tree acts as a source of nourishment for bees and can serve as shelter for various animals.
Biodiversity		To maintain the diversity of local olive trees, farmers actively promote the development of indigenous and organic plants. They employ traditional selection methods and introduce crops specifically adapted to the region's unique environmental conditions. This comprehensive approach enhances the resilience and sustainability of Elles' agricultural system.
Synergy		In Elles region, the olive production system diversifies by incorporating fruit trees (such as pistachio, almond, or aromatic and medicinal plants) alongside layered forage crops that thrive in similar climatic conditions. These collaborative plantings between different crops can be advantageous, aiding in water retention and soil conservation. Additionally, they serve as a valuable fodder source for livestock.
Economic diversification		Apart from olive oil production, olive growers seek to establish a system to repurpose olive waste into valuable by-products, thereby generating additional income. Recognizing the value of these by-products should be a priority for policymakers, as it not only adds value (through water conservation, alternative energy sources, etc.) but also creates job opportunities and contributes to environmental protection.
Co-creation of knowledge		Initiatives like the Agroecology project present opportunities to enhance agricultural extension services by fostering collaboration between government institutions (CRDA, CTV) and initiative partners (IO, INRAT, ICARDA). These partners are actively establishing demonstration plots and composting units. Notably, farmers play a pivotal role in this initiative, engaging in collaborative knowledge sharing through a specific participatory research approach. Moreover, the olive growers aim to establish an agricultural association (SMSA) to introduce innovation and facilitate knowledge exchange among fellow farmers.



Social values and diets		The olive growers in the region genuinely aspire to showcase the unique local and heritage features of their orchards and the produced oil. They are actively working together to organize themselves and highlight their strengths. Some producers are striving to distinguish their oil by labeling it as originating from Elles (Elles olive oil), even though it is not yet certified; this recognition holds significance in marketing.
Fairness		In a bid to strengthen their collective influence and bolster capacity development, olive growers aspire to form a farmers' association. This association's primary goals include fostering collaboration among farmers, empowering them, and advocating for labour and land rights within the community.
Connectivity		The collective goal of the olive farmers is to create an association encompassing olive processing, establish a controlled designation of origin for their olive products, initiate a modern sales outlet within the association, and introduce specially packaged bottles catering to a high-quality olive oil niche market. This olive growers' initiative will lead to the creation of a sophisticated new product addressed to a specific category of Tunisian consumers.
Land and natural resource governance		Olive growers' association aim to embrace an agricultural system that prioritizes sustainability while conserving land and natural resources. Their goal is to establish a farming approach that not only tackles the impacts of climate change but also contributes to the overall well-being of Elles region.
Participation		The establishment of the olive oil association is a step towards enhancing the olive growers' influence. Their aim is to actively engage in shaping decisions related to the regional development plan, encompassing agriculture, transportation, investment, and feeding programs. Their collective goal is to bolster their voice and contribute to more effective decision-making processes that advance the community's development.
Governance and people		The olive growers' association's new business model functions on principles of democracy, fairness, and active participation, promoting collective leadership and engagement among community members, with a specific emphasis on involving women. The establishment of the Controlled Designation of Origin for Elles community olive oil significantly enhances their commitment to safeguarding their natural and cultural legacy. By empowering individuals within the community, especially women, the association fosters collective knowledge and creates avenues for commercialization, encouraging participation and involvement in its initiatives
Environmental and social benefits		The new business model brings forth significant environmental and social advantages across various levels; on the farm, within the community, and in society. Encouraging the adoption of agroecological practices within the community promises positive outcomes, including enhanced soil fertility, biodiversity preservation, reduced erosion, and mitigation of climate change impacts. Socially, the model showcases clear benefits through the establishment of social cohesion via the association and CDO, community empowerment through capacity-building initiatives like training and knowledge sharing, the creation of dignified livelihoods by adding value for small olive growers, fostering sovereignty and autonomy through access to association services and credit, job creation, and more.

Source: Own elaboration, 2023

## 8. Financial mechanisms in agriculture sector

The agricultural sector in Tunisia is crucial to the national economy, playing a vital role in wealth generation, food security, and employment. Despite its importance, the sector faces significant challenges, particularly in accessing adequate financing due to its high-risk nature, influenced by climate change, crop diseases, and market volatility. Financial institutions are often reluctant to provide credit, perceiving agriculture as a less secure investment, while many farmers, particularly younger ones and those from disadvantaged backgrounds, lack collateral and financial literacy, further limiting their access to funds.

In Tunisia, the agricultural sector is bolstered by diverse financial institutions, including public banks, microfinance organizations, and private investments, all working to tackle the specific challenges faced by farmers.

### 8.1. Banks credits

Tunisian banks provide agricultural credits, but these loans often come with strict conditions and high interest rates, making them unattractive for farmers. They typically require strong project plans and solid guarantees. The National Agricultural Bank is the first financial institution specific to the agricultural sector, it offers specialized credit lines for olive growers, including short-term loans for seasonal expenses and long-term loans for plantation and equipment. The Tunisian Solidarity Bank (BTS) plays a crucial role in monopolizing microcredit financing for local associations (Doligez et al., 2016).

#### 8.1.1. National Agricultural Bank (BNA)

The National Agricultural Bank or BNA is a public financial institution in Tunisia, founded on June 1, 1959, with the mission of supporting agricultural development through a range of products and services tailored to meet the needs of its clients. The bank offers preferential credit rates that range from an average money market rate (TMM) +2% to TMM+2.5% depending on the repayment period (See Table 7).

Under the framework of the Investment Law, the BNA outlines its general financing schemes for investment operations as follows:

- Equity Contribution: 30% to 40%
- Credit Financing: 60% to 70%

Additionally, the Investment Law stipulates the provision of bonuses that vary based on the category and type of investment, further incentivizing agricultural development and modernization efforts within the sector.

**Table 7. BNA type of credits**

Credit	Specificities	Refund amount	Repayment period	Grace period
<b>Campaign credits</b>	Campaign loans are short-term loans intended to finance agricultural campaign expenses.	The amount and repayment deadline are assessed for each speculation according to the campaign credit scale, taking into account the actualized costs and the sales period.	less than one year	There is no grace period. Generally, the credit is automatically reimbursed at the end of the agricultural season (July of each year)

<b>Investment credits</b>	Infrastructure & Operating Buildings	BNA provides credits intended to finance the following works: <ul style="list-style-type: none"> <li>- Operating buildings</li> <li>- Livestock buildings and their annexes</li> <li>- Rural housing</li> <li>- Development, renovation and extension of old farm buildings and agricultural tracks.</li> </ul>			
	Drilling creation	For deep water exploitation drilling projects (depth greater than 50 m)	The amount of the credit is calculated on the basis of an estimated quote which must not exceed the scale in force.	8 to 12 years old	1 to 4 years
	Creation of Surface Wells	To create a surface well (exploitation of surface water and infiltration water with a depth of less than 50 m)	The amount of the credit is calculated on the basis of an estimated quote not exceeding the scale in force.	8 to 12 years old	1 to 3 years
	Hydraulic equipment	The BNA offers a loan to finance hydraulic equipment which includes all the pumping and distribution equipment for irrigation water.	The amount of the credit is calculated on the basis of pro forma invoices meeting current standards.	3 to 7 years old	1 year
	Agricultural, Livestock & Equipment for Rolling Stock	BNA provides its customers with loans to finance the acquisition of agricultural equipment (agricultural tractors, cultivators, combine harvesters and all the accessories necessary for carrying out various agricultural tasks).	The amount of the credit is calculated on the basis of pro forma invoices meeting current standards.	3 to 7 years old	1 year
	Purchase of Land	BNA provides its customers with medium-term credit for the acquisition of agricultural land with a view to promoting a development and enhancement project.	The amount of the credit is calculated on the basis of a sales promise specifying the amount of the transaction. Financing Conditions	3 to 7 years old	
	Planting	BNA grants credit to finance the creation of all kinds of tree plantations including fodder shrubs.	The amount of the credit is calculated on the basis of an estimated quote not exceeding the scale in force.	8 to 12 years old	1 to 3 years
	Acquisition of livestock	BNA finances the acquisition of livestock (cattle, sheep, goats, poultry, beekeeping, etc. ).	The amount of the credit is calculated on the basis of pro forma invoices meeting current standards.	3 to 7 years old	1 year

BNA finances the acquisition of the calves and the expenses related to their feeding.	The amount of credit is calculated on the basis of current standards.	The credit is repayable in a single instalment at the end of the 3rd year.
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### 8.1.2. The Tunisian Solidarity Bank (BTS)

The Tunisian Solidarity Bank (BTS), established by the Tunisian government in 1997, provides financial support to young graduates of higher education and vocational training. Specializing in microfinance, it supports very small enterprises (VSEs) by offering financing solutions tailored to the requirements of young entrepreneurs. In addition to loans, the bank also offers support and training services aimed at enhancing the managerial and technical skills of its beneficiaries (See Table 2).

**Table 8. Type of agricultural credits from BTS**

Credits	Benefits	Investment	Refund	Grace period	Grant
<b>Agri_Invest</b>	No real guarantee required A fixed interest rate A grant can be up to 30% of the investment The technical study is carried out free of charge by the competent services of the Regional Agricultural Development Commissions (CRDA) or the Agricultural Investment Promotion Agency (APIA) A guarantee contribution of 1% (for the benefit of the National Guarantee Fund-FNG) A study commission of 2%	200000 DNT	7 years	12 months	Up to 30% of the investment
<b>Agri-Season</b>	Have working capital to start your agricultural campaign on time No real guarantee required A fixed interest rate (9-10%) per year A guarantee contribution of 1% (for the benefit of the National Guarantee Fund-FNG) A study commission of 2%	60000 DNT	1 year	12 months	

### 8.1.3. Small and Medium Enterprise Financing Bank (BFPME)

The BFPME facilitates financing for promoters by implementing a credit policy that evaluates projects using a comprehensive rating system (table 9). This system allows:

- To assess the managerial skills of the promoter and key team members, focusing on their motivation, dedication, training, professional experience and technical proficiency related to the project.
- To conduct a thorough analysis of the product or service's competitiveness through market and cost studies.
- To examine financial viability to ensure adequate cash flow to cover financial charges.

Financing access is further streamlined through tailored guarantee policies. The BFPME does not require external guarantees, relying instead on project-specific assets and the support of the Tunisian Guarantee Company (SOTUGAR), which covers 60 to 75% of the amount of the credit, including the coverage premium within the financing structure. Additional guarantee funds such as the Guarantee Fund for Cultural Industries, National Guarantee Fund, etc., also play a role.

This comprehensive approach applies to all stages of project initiation and expansion. Comprehensive support is provided to promoters at every stage of their project journey, ensuring they have the necessary resources and expertise to succeed. This begins with the identification of

viable business ideas, where potential opportunities are explored and evaluated. Following this, promoters receive assistance in the development of detailed business plans, which outline the strategic, operational, and financial aspects of their proposed ventures.

**Table 9. Medium- or Long-Term Credits from BFPME**

Beneficiaries	Funded actions	Terms of intervention	Repayment period	Grace period	Interest rate	Study Commission	Commitment Commission	Guarantee
<b>SMEs in creation whose investment cost is between 100 thousand and 15 million Tunisian dinars.</b>	Material Investment (land, building, equipment, machinery, office equipment, computer equipment, rolling stock, development, etc.) or intangible investment (software, marketing campaign, franchise, certification, staff training, goodwill, research and development unit, etc.).	Short - Middle- Long term in co-financing with one or more local banks.	-From the bank's own resources: between 5 and 10 years, depending on the profitability of the project  -On external line resources: according to the conditions of each line	A maximum of 3 years depending on the needs of each project	-TMM + 2% to 3.75% for the medium term ( 5 to 7 years)  -TMM + 2.25% to TMM + 4% for the long term ( 8 to 10 years)	1% flat of the credit amount	1% per year on the committed amount but not used	External guarantee required, particularly in the case where the premises which will house the SME's activity will be operated on the basis of a rental contract

Notes : TMM : money market rate

## 8.2. Microfinance Institutions

Microfinance institutions play an increasingly crucial role in supporting the agricultural sector by offering small loans with more flexible terms compared to traditional banks. These institutions mainly cater to farmers who are unable to access conventional financing. Since 2011, the microfinance landscape has expanded with new entrants and increased competition, though it continues to face challenges such as commercial pressures and a crisis with in local microcredit associations (Doligez et al., 2016). Organizations like ENDA-Inter-Arabe deliver essential services to smallholder farmers, fostering financial inclusion (Doligez et al., 2016).

### 8.2.1. ADVANS

Advans Tunisia, a member of the Advans group, is part of an international network of microfinance institutions that offers financial and non-financial services to micro, small and medium-sized enterprises (MSMEs) in developing countries and economies in transition.

Launched in March 2015, Advans has significantly expanded its network in urban, rural and semi-rural areas. Through inclusive and responsible microfinance, it aims to sustainably improve the quality of life of entrepreneurs in Tunisia. Advans offers different types of loans:

- Purchase of stocks: raw feed, compound feed, fertilizers, etc.
- Financing seasonal businesses: harvest, initial transfer...
- Acquisition of herds: cows, sheep...
- Purchase of equipment: milking machines, irrigation equipment, agricultural equipment, etc
- A loan for the benefit of the actors in the sector.
- To be able to apply for an agricultural loan, the borrower needs to be Tunisian, age between 18 and 66, have a commercial, craft or agricultural activity of at least 6 months of seniority, provide a second source of income as a guarantee, conduct its agricultural production in irrigated

conditions, have an activity other than plant production (livestock breeding, processing) and finally supporting documents for three months of agricultural income.

Concerning the case of olive production; the borrower needs to have a minimum of 500 olive trees in production (irrigated) with a secondary activity. The payment method involves loans ranging from 2,000 to 40,000 Tunisian Dinars, determined by specific eligibility criteria. The interest rate is set between 28% and 30%, as regulated by the Microfinance Control Authority (ACM). Borrowers can repay the loan over a maximum period of two years, with a specific two-year limit for investment purposes. Additionally, a 40-day grace period is offered before repayment begins. Loans are treated after one month of high production, with a caution requirement of 50% of the agricultural capital. The monthly payment is adjusted based on the farmer's financial situation, including existing debts and other commitments.

Regarding support and guidance, Advans Tunisia, in collaboration with technical and financial partners, implements coaching and support programs designed to enhance services for small economic actors and foster collaborative initiatives that optimize and promote their activities. Through these innovative, regionally and audience-specific programs, Advans Tunisia positions support as a key driver of community resilience, thereby contributing to inclusive and responsible economic growth. Training sessions are conducted at Advans premises, online, or through the most appropriate channels such as Messenger, WhatsApp, or phone calls. Specialized coaches provide tailored coaching, customized to meet the specific needs and activities of the participants.

Advans Tunisia offers a variety of training programs designed to support its clients' growth and development. These programs include financial education, communication techniques, and digital marketing. To further encourage client success, Advans provides grants based on specific criteria.

A key initiative is EL BEYA credit, which focuses on promoting gender inclusivity. This credit option allows clients with a minimum of two years of tenure and a solid payment history to access loans of up to 5,000 DT without requiring collateral, fostering financial independence and growth for eligible clients.

### **8.2.2. TAYSIR**

Taysir Microfinance stands as a pivotal initiative in advancing financial inclusion. Founded in 2013, this institution was created to meet the needs of marginalized communities, particularly those lacking access to conventional financial services. By providing small loans, Taysir empowers entrepreneurs and small businesses to expand their operations, fostering economic growth and empowerment. The institution offers various types of credits, with interest rates ranging from 28% to 30%, as determined by the Microfinance Control Authority (ACM).

These credit options are available to finance projects, funds, or stock needs. Intilaak credit offers amounts ranging from 500 DT to 3,000 DT, with a repayment period of up to 18 months. For larger needs, the Tanmia credit provides financing between 3,001 DT and 8,000 DT, with a repayment term extending to 36 months. If you require an even higher amount, the Tawfik credit supports loans from 8,001 DT to 20,000 DT, also with a repayment period of up to 36 months. Lastly, for substantial projects, the Tamayouz credit allows for financing between 20,001 DT and 40,000 DT, with an extended repayment term of up to 60 months.

Taysir provides non-financial support, training and advisory services to people wishing to create or develop their economic activities, particularly in rural areas. In addition, Taysir establishes partnerships with private operators; national and international development organizations; to enhance the support available to small economic players and to develop collaborative actions aimed at optimizing and promoting their activities.

Taysir "advises" offers comprehensive support and advice to participants, ensuring the effective progression of their projects by providing guidance on relevant management methods for sustainability and continuity. It fosters creativity, innovation, and motivation to undertake new

initiatives. Additionally, financial education programs are tailored to individual needs, equipping participants with essential tools for improved financial management and the skills required to control income, generate profits, and save effectively. Soft skills development is also a focus, enhancing interpersonal, logical, and communication abilities while promoting self-awareness to understand personal situations and drive progress. Participants will benefit from personalized coaching tailored to their specific needs, particularly those who face challenges with integration or skill acquisition, receiving assistance to boost their efficiency and navigate sensitive situations. Furthermore, the initiative encourages digital inclusion as a means of fostering socio-economic development, guiding participants into the digital realm and new technologies, such as mobile banking, while promoting project creation in the field of innovation.

### **8.2.3. ENDA Tamweel**

Enda Tamweel is a pioneering Tunisian microfinance company established in 1990 by the non-governmental organization Enda inter-arabe, becoming a leader in the sector since 1993. Its primary mission is to promote financial inclusion for vulnerable populations, particularly women and youth, while significantly contributing to the country's economic and social development by supporting micro-entrepreneurship and self-employment. With a network of 109 branches and five mobile counters, Enda Tamweel effectively serves all Tunisian governorates, with a particular focus on landlocked areas. The company offers various types of credit specifically for small-scale agriculture and livestock farming, designed to finance and develop existing agricultural projects. To qualify for these grants, applicants must be Tunisian nationals or hold a valid residence permit in Tunisia, be between 18 and 65 years old, and be full-time or part-time farmers or breeders living in the intervention zone. The interest rates for these credits are set between 26% and 30% by the Microfinance Control Authority (ACM).

Enda Tamweel offers various agricultural financing products tailored to different needs:

- "Mawasseem loan" is designed for small farmers, providing amounts ranging from 200 to 5,000 TND to support agricultural activities.
- "Mazraati credit" targets very small or micro-agricultural businesses with high development potential, offering financing between 6,000 and 20,000 TND.
- "Mostathmer Filehi" loan (ie agricultural investor) is intended for agricultural micro-entrepreneurs with significant development potential, aiming to promote agricultural investments in rural areas and cover substantial operational costs, with amounts ranging from 21,000 to 40,000 TND.

Enda Tamweel, in close synergy with its strategic partner Enda inter-arabe, addresses the financial and technical needs of vulnerable populations and low-income households, helping them enhance both business management and personal development. Through agricultural products, farmers and breeders gain access to extension services and technical training throughout the loan period, enabling them to improve their skills and expertise.

The Tunisian government, in partnership with international organizations, offers various subsidies and financial assistance to support farm modernization and improve productivity. Nonetheless, managing these subsidy programs can sometimes prove to be administratively challenging.

### **8.3. Agricultural Cooperatives**

Cooperatives are essential in providing financial support to farmers by allowing them to pool their resources and secure financing collectively. By working through cooperatives, farmers can benefit from more advantageous purchasing and selling conditions, along with more favorable credit terms (low interest rate around 2%).

#### 8.4. Financial mechanisms to fund agroecological transitions in Tunisia

Access to finance for the agricultural sector in Tunisia is a major challenge that requires tailored and innovative solutions to unlock its full potential. Although several financing instruments exist, their effectiveness will depend on an integrated approach that combines state support, the revitalization active participation of private actors, and the strengthening of farmers' capacities. Developing customized financial solutions, coupled with comprehensive financial education and support programs, is crucial to ensure that farmers—especially those managing small and medium-sized enterprises (SMEs)—have access to sustainable financing tailored to their specific needs, particularly in relation to sustainable production systems

Public policy reforms can support agroecological transitions by redirecting agricultural subsidies from chemical inputs toward sustainable practices, such as the use of organic fertilizers and conservation techniques. Additionally, tax incentives, including exemptions or reductions, can encourage farmers and agribusinesses to adopt and invest in agroecological methods, fostering a more sustainable agricultural sector.

Tunisia's transition to agroecology, a sustainable agricultural model that integrates ecological principles into farming, requires robust and innovative financial mechanisms. These mechanisms aim to address challenges such as limited public funding, climate change impacts, and the need for inclusive rural development. Key financial tools include:

- **National Budget Allocations:** The Tunisian government allocates funds to support agroecological initiatives through national rural development programs. These include subsidies for sustainable farming practices, capacity-building for farmers, and research on agroecological techniques.
- **International Development Aid:** Tunisia benefits from partnerships with international organizations and foreign governments. Programs like the ADAPT initiative, funded by the European Union, support ecological and sustainable production systems through grants and loans for private investment in agriculture and aquaculture.
- **Green Investment Funds:** Public-private partnerships are emerging to channel investments into green projects. Tunisia's alignment with global environmental initiatives, such as the Green Climate Fund (GCF), provides access to financing for climate-resilient agricultural practices.
- **Microfinance and Credit Schemes:** Rural and agricultural credit facilities, often supported by the government or NGOs, offer loans with favorable terms to smallholder farmers adopting sustainable practices. These credit schemes reduce barriers for resource-limited farmers to implement agroecological methods.
- **Carbon Markets and Payments for Ecosystem Services (PES):** Emerging mechanisms like carbon credits or PES schemes reward farmers for activities that sequester carbon or enhance ecosystem services, such as reforestation, agroforestry, or soil regeneration.
- **Private Sector and Impact Investment:** Encouraging private companies to invest in sustainable agriculture through incentives like tax benefits or co-financing opportunities. Impact investors, who prioritize social and environmental returns alongside financial gains, also contribute funding for agroecological projects.
- **Cooperative Financing Models:** Farmer cooperatives pool resources and access shared funding opportunities to implement sustainable practices, purchase eco-friendly equipment, and engage in collective marketing of agroecological products.



- **Crowdfunding and Community Initiatives:** Digital platforms and local networks mobilize small contributions from individuals to finance community-driven agroecological projects.

By diversifying and integrating these financial mechanisms, Tunisia can strengthen its capacity to support agroecological transitions, ensuring that such efforts are inclusive, sustainable, and scalable.

## 9. Cost benefit analysis of agroecological business models for olive production, processing and packaging unit and installation of a showroom

Conducting a Cost-Benefit Analysis (CBA) for an agroecological olive production farm involves a thorough evaluation of the costs and benefits to determine the economic feasibility and sustainability of the model compared to conventional cultivation. The goal is to assess the profitability and environmental impact of agroecological practices over a set period such as 10 years, using key financial indicators like the Internal Rate of Return (IRR) and the Net Present Value (NPV).

The methodology for conducting a Cost-Benefit Analysis (CBA) begins with defining the project scope and objectives. The project aims to integrate agroecological practices like intercropping and composting on one hectare of olive trees to produce high-quality olive oil for niche markets, with a 10-year duration. In this research, four investment projects related to olive production were analyzed using Cost-Benefit Analysis (CBA), based on assumptions tailored to the Elles community and the specific characteristics of the olive growers involved in the Agroecology project.

- The first CBA evaluated the project of establishing one irrigated hectare of olive orchard using agroecological practices including intercropping and composting,
- The second CBA analyzed the investment in introducing agroecological practices on a hectare of irrigated olive trees,
- The third CBA focused on the of constructing an olive oil processing and packaging unit for olive oil obtained from the agroecological orchard.
- The fourth CBA assessed the investment in building a showroom for selling the bottled olive oil.

The analysis incorporates the costs and benefits over the project's lifespan, accounting for both tangible and intangible factors, as well as opportunity costs and potential risks. To conduct the CBA, we start with the project description, the initial investments including equipment, layout and installation, and working capital. These investments are depreciated over 10 years. Operating expenses, including labor, irrigation, and composting are also calculated.

The financial scheme is also studied including the self-financing, subsidies and the contracted loans. Profitability is evaluated through financial metrics, including the internal rate of return (IRR) and the net present value (NPV) both indicating whether the project's long-term benefits justify the initial and ongoing costs. The payback period is also estimated and finally a sensitivity analysis is tested showing optimistic and conservative scenarios.

## 9.1. Cost-Benefit Analysis of the project “establishing one hectare of irrigated olive orchard using agroecological practices”

### 9.1.1. Project description

The investment project aims to establish a one-hectare irrigated olive orchard, incorporating agroecological practices such as intercropping, composting, and pruning. The project will comply with Controlled Designation of Origin requirements, including the selection of olive tree varieties, primarily Chetoui (80-90%) and indigenous varieties, as well as the use of compost. The olives produced through this project will be sold to a processing and packaging unit to create high-quality olive oil targeted at a niche market, packaged in 500 ml bottles.

The general assumptions for this investment project:

- The olive grower owns the land and has access to a reliable water source,
- The olive grower has sufficient knowledge of agroecological practices.
- A production contract is established with a processing and packaging unit, guaranteeing the purchase of the olive harvest

### 9.1.2. Investments and funding

The investment in establishing an olive orchard with agroecological practices includes 4 components (table 10))

- Equipment costs: Estimated at USD 6,000 covering one shredder for tree debris, leaf removal equipment, crates and a drip-irrigation system
- Layout and installation costs: Estimated at USD 1,000, including electrical connections
- Working capital: Estimated at USD 350 which is approximately 5% of the total investment.

**Table 10. Project Investment components**

Investment	Description	Estimated cost (USD)
<b>Layout and installation</b>	Electrical connections and related infrastructure	1,000
<b>Equipment</b>	One shredder for tree debris, leaf removal tools, crates, drip irrigation, etc.	6,000
<b>Working capital</b>	Estimated at 5% of total investment	350
<b>Total</b>		<b>7,350</b>

Each investment component has its own depreciation period and value, detailed in the table below. The costs for land, building, layout, installation and equipment are amortized over 10 years, which will be considered the project’s theoretical lifespan. The annual depreciation values per year for the project components is presented in the table 11.

**Table 11. Depreciation value of project components**

	Duration	Cost (USD)	Cost per year (USD)
<b>Layout and installation</b>	3	1,000	333
<b>Equipment</b>	10	6,000	600

The amortization cost ranges from USD 933 for the first three years to USD 600 for the period between the fourth and tenth year (Table 12).

**Table 12. Annual amortization cost of project investment components over 20 years (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20
<b>Layout and installation</b>	33	33	33																	
<b>Equipment</b>	60	60	60	60	60	60	60	60	60	60										
<b>Total</b>	93	93	93	60	60	60	60	60	60	60										

Y: year

### 9.1.3. Operating expenses

The operating expenses for the investment project are estimated at USD100 per year (table 13), primarily covering commitment fees to the olive grower's association (i.e. The farmers' association for water management).

**Table 13. Components of Operating expenses for the investment project (USD)**

Components	Description	Estimated annual cost (USD)
<b>Commitment fees</b>	Includes a commitment fee for the farmer's association	100
<b>Total</b>		100

### 9.1.4. Financing scheme

To initiate this project, the investor will need USD 350 in self-financing and a USD 5,000 loan. The government offers subsidies for this type of project totaling USD 2,000, specifically covering 50% of the cost of the drip irrigation system (table 14). While the total investment required is USD 7,350, the actual financial commitment, including the loan and self-financing, is USD 5,350. This allows the investor to contribute 27.5% less than the total required amount.

**Table 14. Financing scheme of the investment project**

	Total investment	Self-financing	Subsidies	Loan
<b>Cost (USD)</b>	USD7,350	USD350	USD2,000	USD5,000

### 9.1.5. Turnover

The revenue per hectare for the investment project is generated from the sale of olives (in kg) and intercropped productions such as Sulla and vetch (in bales). The total turnover ranges from USD 467 in the first year to a maximum of USD 8,667 in year nineteen (Table 15).

The general assumptions used to calculate the project's turnover are as follow:

- The average planting density is 200 trees per hectare in irrigated areas.
- The cruising year is the ninth year,
- Intercropped productions are measured in bales (biomass) rather than seeds, following the agroecological approach adopted in this investment project.
- The selling price of olives is estimated at USD1 per kg. The olive grower has a production contract with the investor's processing and packaging unit for olive oil.

### 9.1.6. Project Expenditures

The project expenditures for establishing one irrigated hectare of olive orchard using agroecological practices, such as intercropping and composting, are presented in Table 16. A 20-year investment period is deemed suitable for olive orchards, according to the Agroecology project expert. Total expenditures fluctuate significantly over this period, depending on the specific agricultural interventions required each year.

The general assumptions used to calculate the project expenditures are as follow:

- Expenditures are estimated for 200 olive trees under standard conditions (normal agricultural season).
- Unit prices for agricultural interventions are based on the most recent agricultural season (2023-2024).
- Homogeneous soil is assumed, requiring only a single sample for analysis.
- Selected varieties include Chetoui (80-90%) and local varieties (10-20%).
- Insecticide treatment is applied at least once per year.
- Phosphate mineral fertilizer (Super 45) is applied selectively for intercropping at a reasonable dose.
- Vetch and Sulla are selected as intercropping crops to produce biomass and improve soil fertility.

#### **9.1.7. Financial results**

The table 17 summarizes all the project's outcomes; including turnover, expenses, net results and annual revenue based on the various assumptions. At first glance, the project appears profitable, as it generates a positive net annual revenue of USD 171 starting from the third year. By the ninth year, the project will generate USD 4,785 in annual revenue for the investor. The loan repayment is set at USD 263 per year, with a grace period in the first year. This project is tax-exempt during its implementation.

**Table 15. Total turnover of the investment project (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20
Number of trees	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Olive trees Yield ( kg)	0	0	0	1,000	2,500	4,000	5,000	3,000	7,000	1,500	7,000	2,000	7,000	2,000	7,000	1,000	8,000	2,000	8,000	2,000
Olive Selling price (USD/kg)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
turnover from olive crop (USD)	0	0	0	1,000	2,500	4,000	5,000	3,000	7,000	1,500	7,000	2,000	7,000	2,000	7,000	1,000	5333	2,000	8,000	2,000
Intercropping production (bales)	200 (Vetch)	200 (Sulla)	200 (Sulla)	200 (Sulla)	200 (Vetch)	200 (Sulla)	200 (Sulla)	200 (Sulla)	200 (Vetch)	200 (Sulla)	200 (Sulla)	200 (Sulla)	200 (Vetch)	200 (Sulla)	200 (Sulla)	200 (Sulla)	200 (Vetch)	200 (Sulla)	200 (Sulla)	200 (Sulla)
Selling price (USD)	0.47	0.66	0.66	0.66	0.47	0.66	0.66	0.66	0.47	0.66	0.66	0.66	0.47	0.66	0.66	0.66	0.47	0.66	0.66	0.66
Turnover from intercropping crop (USD)	467	667	677	667	467	667	677	667	467	667	677	667	467	667	677	667	467	667	677	667
Total Turnover (USD)	467	667	677	1,667	2,967	4,667	5,677	3,667	7,467	2,167	7,677	2,667	7,467	2,667	7,677	1,667	5,800	2,667	8,677	2,667

**Table 16. Project expenses per hectare (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20
Olive orchard																				
<b>Plantation preparation</b>																				
Soil analysis	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Breaking up and sub-soiling	333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leveling	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marking and staking	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hole preparation	83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Purchase of seedlings (+ 2% surplus)	410	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planting and staking (purchase of stakes +labor)	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hoing (Labor)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<b>After plantation</b>																				
<b>Fertilization and Phytosanitary Treatment</b>																				
Compost	117	233	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350
Phosphoric acid	52	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
DAP (unit price per ton)	2	3	5	8	15	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Potassium sulfate	0	0	11	40	53	67	80	75	160	40	40	0	40	0	40	0	40	0	40	0
Boron (product purchase) starting from the 4th year	0	0	0	0	33	33	33	33	33	0	33	0	33	0	33	0	33	0	33	333
Boron (Labor)	0	0	0	0	27	27	27	27	27	0	27	0	27	0	27	0	27	0	27	267
Insecticide (product purchase)	17	17	17	17	17	17	17	17	17	0	17	0	17	0	17	0	17	0	17	0
Insecticide (Labor)	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0	0	0	0	0
Root bio-stimulant (product purchase)	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bio-stimulant (Labor)	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Irrigation</b>																				
Irrigation cost	80	100	113	120	127	133	140	140	167	167	167	167	167	167	167	167	167	167	167	167
<b>Pruning</b>																				
Pruning for renewal	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pruning for production and severe pruning	0	0	0	0	33	0	40	0	67	0	80	0	100	0	133	0	147	0	147	0
<b>Harvesting</b>	0	0	0	117	292	467	583	350	817	175	817	233	817	233	817	117	933	233	933	233

<b>Total expenses for olive orchard per hectare</b>	1,557	551	681	836	1,132	1,296	1,473	1,194	1,839	914	1,713	933	1,733	933	1,766	816	1,896	933	1,896	933
<b>Intercropping (one year vetch- three years Sulla)</b>																				
Preparation of seedbed	23	23	0	0	23	23	0	0	23	23	0	0	23	23	0	0	23	23	0	0
Burial work	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Deep plowing (15th year)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	233	0	0	0	0	0
Seeds	160	71	0	0	160	71	0	0	160	71	0	0	160	71	0	0	160	71	0	0
Fertilizer super 45	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Labor	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
<b>Total expenses for Intercropping</b>	480	391	297	297	480	391	297	297	480	391	297	297	480	391	530	297	480	391	297	297
<b>Total expenses</b>	2,037	942	977	1,133	1,612	1,687	1,769	1,491	2,319	1,305	2,009	1,229	2,213	1,323	2,296	1,113	2,376	1,323	2,193	1,229

**Table 17. Project outcomes (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20
Turnover	467	667	677	1,667	2,967	4,667	5,677	3,667	7,467	2,167	7,677	2,667	7,467	2,667	7,677	1,667	8,467	2,667	8,677	2,667
Expenses	2,037	942	977	1,133	1,612	1,687	1,769	1,491	2,319	1,305	2,009	1,229	2,213	1,323	2,296	1,113	2,376	1,323	2,193	1,229
Gross Operating Result	1,570	-275	-300	534	1,355	2,980	3,908	2,176	5,148	862	5,668	1,438	5,254	1,344	5,381	554	6,091	1,344	6,484	1,438
Depreciation	933	933	933	600	600	600	600	600	600	600	0	0	0	0	0	0	0	0	0	0
Net Operating Result	2,503	1,208	1,233	-66	755	2,380	3,308	1,576	4,548	262	5,668	1,438	5,254	1,344	5,381	554	6,091	1,344	6,484	1,438
Financial expenses	9	13	14	33	59	93	114	73	149	43	154	53	149	53	154	33	169	53	174	53
Result before tax	2,512	1,221	1,247	-99	696	2,287	3,194	1,503	4,399	219	5,514	1,385	5,105	1,291	5,227	521	5,922	1,291	6,310	1,385
Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Result	2,512	1,221	1,247	-99	696	2,287	3,194	1,503	4,399	219	5,514	1,385	5,105	1,291	5,227	521	5,922	1,291	6,310	1,385
Cash flow	1,579	-288	-314	501	1,296	2,887	3,794	2,103	4,999	819	5,514	1,385	5,105	1,291	5,227	521	5,922	1,291	6,310	1,385
Credit refund	0	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263	263
Net Income	1,579	-551	-577	238	1,033	2,624	3,531	1,840	4,736	556	5,251	1,122	4,842	1,028	4,964	258	5,659	1,028	6,047	1,122

### 9.1.8. Financial analysis

In this section we will assess the profitability of the investment project using two financial indicators; the Internal Rate of Return (I.R.R.) and the Net Present value (N.P.V). The Internal Rate of Return is a metric used in capital budgeting to evaluate the profitability of potential investments. The Net Present Value represents the difference between the present value of cash inflows and the present value of cash outflows over a specified period. The IRR was calculated using a discount rate of 10% based on the recommendation of the financial expert.

The project of establishing one irrigated hectare of olive orchard using agroecological practices is considered a profitable project with an IRR of 21% (table 18).

**Table 18. Internal rate of return for the project (Discount rate of 10%)**

Total investment	Period	Interest rate%	IRR
USD 5,000	20 years	10	<b>21%</b>

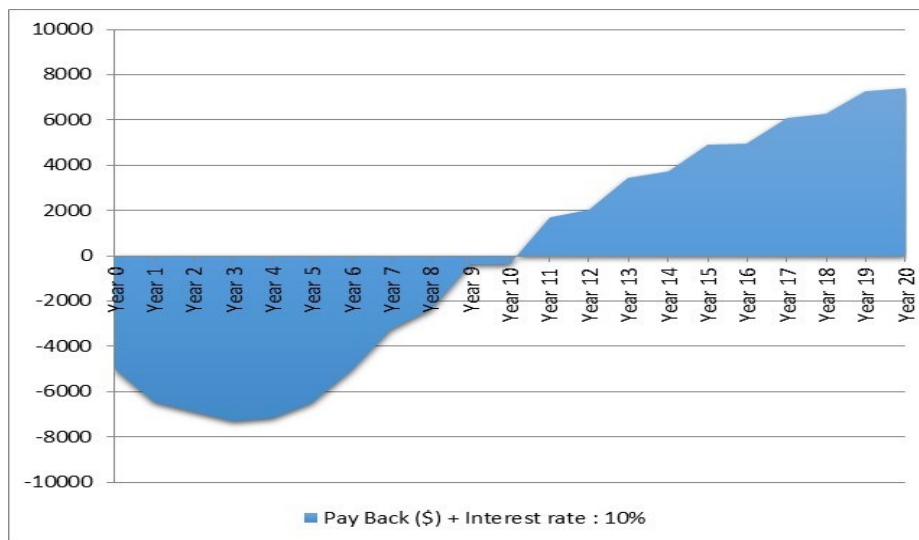
The Net present value of this investment project is estimated at USD 7427 indicating high profitability (table 19).

**Table 19. Net Present value (USD) (Discount rate of 10%)**

Total investment	Period	Interest rate%	NPV
USD 5,000	20 years	10	<b>7,427</b>

### 9.1.9. Payback period analysis

The payback period is the time required to recover the initial investment. For this project, the estimated payback period is ten years (Figure 10).



**Figure 10. Payback Period of the investment**

### 9.1.10. Sensitivity analysis

A sensitivity analysis is a technique used to determine how variations in an independent variable impact a particular dependent variable under a specific set of assumptions.

In the following section, we will examine how changes in the Selling Price of a Kg of Olives (SPKO) and the interest rate (IR) impact the Net Present Value (NPV) for the establishment of one irrigated hectare of an olive orchard using agroecological practices. This sensitivity analysis relies on two key assumptions. First, the selling price of olives fluctuates annually based on national olive production and the international olive oil market. Second, there may be significant increases in interest rates due to factors such as new economic policies, devaluation of the national currency, or other factors. Additionally, interest rates vary significantly between financial institutions, ranging from 5% at BTS to 20% or more at ENDA Tamweel.



The table 20 illustrates the changes in NPV based on fluctuations in the selling price of a kg of olives and the interest rate. The analysis considers two extreme cases: [SPKO USD0.3: IR 5%] and [SPKO USD3: IR 20%]. Three scenarios are developed based on these variables:

- **Optimistic scenario (NPV = USD68,277):** The selling price of a kilogram of olives is approximately USD2.30, due to a weak national olive harvest and strong opportunities for exporting Tunisian olive oil on the international market. The investor secures a loan with a very low interest rate (5%) from the Solidarity Bank of Tunisia (BTS).
- **Modest scenario (NPV = USD7,427):** The selling price per kilogram of olives is estimated at USD1, reflecting an average harvest at the national level, with the investor obtaining credit at a moderate interest rate (10%) from traditional banks.
- **Conservative scenario (NPV = -USD7,355)** The price per kilogram of olives is about USD0.30, due to a large harvest at both national and international levels. The investor is restricted to high-interest credit (20%) from a financial association, such as a microfinance institution.

**Table 20. Evolution of the NPV based on the selling price of a kg of olives & interest rate.**

Olive price (USD/kg) /	0.3	0.7	1	1.3	1.7	2.3
Interest rate%						
5	-7,729	4,939	17,607	30,274	42,942	<b>68,277</b>
10	-7,659	-116	<b>7,427</b>	14,971	22,514	37,600
15	-7,515	-2,739	2,036	6,812	11,588	21,140
20	<b>-7,355</b>	-4,173	-991	2,192	5,374	11,739

## 9.2. Cost Benefit analysis of the project "Introduction of agroecological practices in one hectare of irrigated olive trees"

### 9.2.1. Project description

The aim of this investment project is to introduce agroecological practices such as intercropping and composting, on one irrigated hectare of olive trees. The project will comply with the standards of the Controlled Designation of Origin, including the selection of olive varieties, primarily Chetoui (80-90%) and indigenous varieties, as well as the use of compost. The olives produced through this project will be sold to a processing and packaging unit to create high-quality olive oil for a niche market, packaged in 500 ml bottles.

The general assumptions of this investment project are:

- The olive grower owns the olive tree parcel and has access to a water source,
- The olive grower has a sufficient knowledge on agroecological practices,
- The olive grower has a contract with a processing and packaging unit for the sale of harvested olives.

### 9.2.2. Investments and funding

The project includes 4 main investment components (Table 21):

- Equipment: Estimated at USD6,000 (includes a shredder for tree debris, leaf removal equipment, crates and a drip-irrigation system)
- Layout and installation: Estimated at USD1,000, including electrical connections.
- Working capital: Estimated at USD350, averaging 5% of the total investment.

**Table 21. Project Investment components (USD)**

Investment	Description	Estimated cost (USD)
<b>Layout and installation</b>	This item essentially includes electrical connections, etc.	1,000
<b>Equipment</b>	One shredder for tree debris, leaf removal equipment, crates, drip system, etc.	6,000
<b>Working capital</b>	An average of 5% of total investment	350
<b>Total</b>		<b>USD7,350</b>

Each investment component of the project has a specific depreciation period. The cost of land, building, layout and installation and equipment are depreciated over a 10-year period, considered later as the theoretical project lifetime (table 22).

**Table 22. Depreciation value of project components**

	Duration (years)	Total cost (USD)	Annual depreciation (USD)
Layout and installation	3	1,000	333
Equipment	10	6,000	600

The annual amortization cost is USD933 for the first three years and USD600 from the p fourth to the tenth year (Table 23).

**Table 23. Annual amortization cost of investment components (USD)**

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Layout and installation	333	333	333							
Equipment	600	600	600	600	600	600	600	600	600	600
Total	933	933	933	600	600	600	600	600	600	600

Y: year

### 9.2.3. Operating expenses

Operating expenses are estimated at USD100 per year (Table 24), primarily for commitment fees to the olive growers' association (related to water management).

**Table 24. Operating expenses (USD)**

Component	Description	Estimated annual cost (USD)
<b>Commitment fees</b>	Fees for famers' association	100
<b>Total</b>		100

### 9.2.4. Financing scheme

The project requires an initial investment of USD350 with USD5,350 to be covered by a combination of self-financing and a loan. A government subsidy of USD2,000 is provided for the purchase of the drip-irrigation system (50% subsidy). The investor's contribution is 27.5% less than the total required amount (table 25).

**Table 25. Financing scheme of the investment project**

	Total investment(USD)	Self-financing(USD)	Subsidy(USD)	Loan(USD)
<b>Amount</b>	7,350	350	2,000	5,000

### 9.2.5. Turnover

Revenue per hectare is based on olive sales (kg) and intercropping yields (bales of Sulla and vetch). This is considered for a hectare with 200 olive trees. The total turnover ranges from USD467 in the first year to USD5,000 in the tenth year (Table 26).

The general assumptions considered to calculate the project turnover are as follow:

- The average planting density: 200 trees per hectare in irrigated area.
- The intercropping productions are estimated in bales (biomass) rather than seeds according to the agroecological approach considered in this investment project.
- Selling prices: USD0.47 per bale of Vetch, USD0.67 per bale of Sulla and USD0.67/kg of olives.
- The olive grower has a production contract with the investor in processing and packaging unit of olive oil.

**Table 26. Total turnover (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Olive trees Yield (kg)	0000	6,000	1,500	6,000	1,800	6,000	2,000	6,000	2,000	6,500
Olive Selling price (USD/kg)	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Turnover for olives (USD)	0	4,000	1,000	4,000	1,200	4,000	1,333	4,000	1,333	4,333
Intercropping production (bales)	200	200	200	200	200	200	200	200	200	200
	(Vetch)	(Sulla)	(Sulla)	(Sulla)	(Vetch)	(Sulla)	(Sulla)	(Sulla)	(Vetch)	(Sulla)
Intercropping Selling price (USD)	0.47	0.66	0.66	0.66	0.47	0.66	0.66	0.66	0.47	0.66
Turnover for intercropping	467	667	677	667	467	667	677	667	467	667
Total Turnover (USD)	467	4,667	1,677	4,667	1,667	4,667	2,010	4,667	1,800	5,000

### 9.2.6. Project Expenditures

Expenditures are calculated for a 10-year period<sup>1</sup>, varying based on the specific agricultural interventions required each year (table 27):

- The general assumptions are as follow:
- Standard conditions for 200 olive trees.
- Current agricultural prices (2023-2024 season).
- Selected varieties: Chetoui (80-90%) and local varieties (10-20%).
- Insecticide treatment is applied at a minimum of once a year.
- Use of fertilizer (Super 45) for selective intercropping (reasonable dose).
- Vetch and Sulla are chosen as intercropping crops to produce biomass and improve soil fertility

**Table 27. Project expenses per hectare (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
<b>Olive cultivation</b>										
Leveling (USD)	50	0	0	0	0	0	0	0	0	0
Hoeing (Labor) (USD)	100	100	100	100	100	100	100	100	100	100
Compost (USD)	234	234	234	234	234	234	234	234	234	234
Fertilizer (DAP) (unit price per ton) (USD)	25	25	25	25	25	25	25	25	25	25
Potassium sulfate (USD)	0	134	0	134	0	134	0	134	0	134
Boron (product purchase) (USD)	0	34	0	34	0	34	0	34	0	34
Boron (Labor) (USD)	0	27	0	27	0	27	0	27	0	27
Insecticide (product purchase) (USD)	0	17	0	17	0	17	0	17	0	17
Insecticide (Labor) (USD)	0	20	0	20	0	20	0	20	0	20
Irrigation cost (USD)	133	134	100	134	100	134	100	134	100	134
Pruning for renewal (USD)	200	0	0	0	0	0	0	0	0	0
Pruning for production (USD)	0	67	0	80	0	100	0	117	0	134
Harvesting (USD)	0	700	175	700	198	700	210	700	234	758
Total olive cultivation(USD)	742	1,492	634	1,505	657	1,525	669	1,542	693	1,617
<b>Intercropping (one year vetch- 3 years Sulla)</b>										
Preparation of seedbed (USD)	23	23	0	0	23	23	0	0	23	23
Burial work (USD)	23	23	23	23	23	23	23	23	23	23
Seeds (USD)	160	71	0	0	160	71	0	0	160	71
Fertilizer (super 45) (USD)	23	23	23	23	23	23	23	23	23	23
Labor (USD)	250	250	250	250	250	250	250	250	250	250
Total expenses Intercropping (USD)	480	391	297	297	480	391	297	297	480	391
Total expenses (olive cultivation +intercropping) (USD)	1,222	1,883	931	1,802	1,137	1,916	966	1,839	1,173	2,008

<sup>1</sup> The ten-year period was suggested by the expert of the Olive Institute.

### 9.2.7. Financial results

The table 28 resumes all the projects outcomes including turnover, expenses, net results and annual revenue based on the general assumptions. The project seems very profitable since it is generating a positive net annual revenue of USD2441 from the second year. A loan repayment of USD263 per year is fixed, with a grace period in the first year. The project is tax-exempt during its implementation phase.

**Table 28. Project financial outcomes (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Turnover	467	4,667	1,677	4,667	1,667	4,667	2,010	4,667	1,800	5,000
Expenses	1,222	1,883	931	1,802	1,137	1,916	966	1,839	1,173	2,008
Gross Operating Result	-755	2,784	746	2,865	530	2,751	1,044	2,828	627	2,992
Depreciation	933	933	933	600	600	600	600	600	600	600
Net Operating Result	-1,688	1,851	-187	2,265	-70	2,151	444	2,228	27	2,392
Financial expenses	9	93	34	93	33	93	40	93	36	100
Result before tax	-1,697	1,758	-221	2,172	-103	2,058	404	2,135	-9	2,292
Tax	0	0	0	0	0	0	0	0	0	0
Net Result	-1,697	1,758	-221	2,172	-103	2,058	404	2,135	-9	2,292
Cash flow	-764	2,691	712	2,772	497	2,658	1,004	2,735	591	2,892
Credit refund	0	263	263	263	263	263	263	263	263	263
Net Income	-764	2,428	449	2,509	234	2,395	741	2,472	328	2,629

### 9.2.8. Financial analysis

The project's profitability is evaluated using the Internal Rate of Return (IRR) and the Net Present Value (NPV).

- IRR: The project shows an IRR of 23%, indicating high profitability (table 29)

**Table 29. Internal Rate of Return (Discount rate of 10%)**

Total investment	Period	Interest rate%	IRR
USD5,000	10 years	10	<b>23%</b>

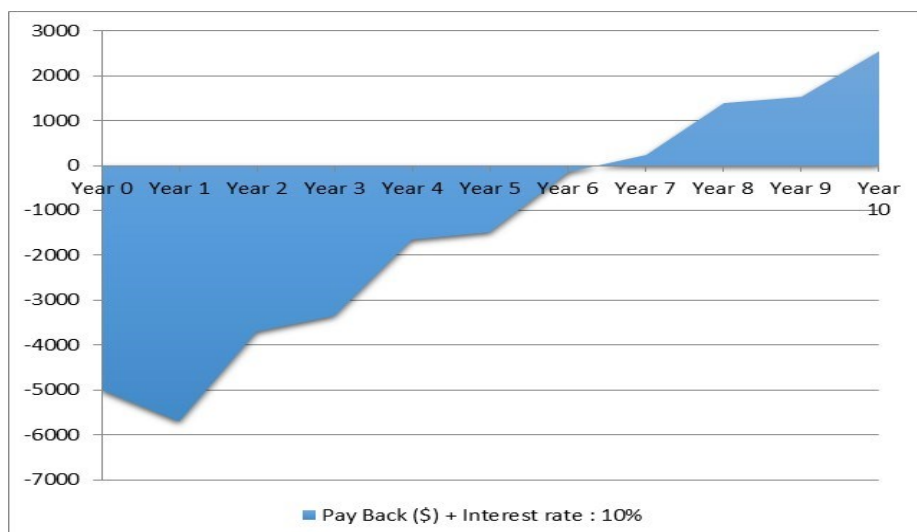
- NPV: The project's NPV, at a 10% discount rate, is USD2,545, further confirming its profitability (table 30).

**Table 30. Net Present value (USD), (Discount rate of 10%)**

Total investment	Period	Interest rate (%)	NPV (USD)
USD5,000	10 years	10	<b>USD2,545</b>

### 9.2.9. Payback period analysis

- The payback period is the time required to recover the investment. For this project, it is estimated to be seven years (figure 11).



**Figure 11. Payback Period of the investment**

### 9.2.10. Sensitivity analysis

The sensitivity analysis examines the impact of fluctuations in the selling price of olives and interest rates on the NPV of the project. This analysis is based on two key assumptions:

- The selling price of olives varies annually due to factors like national olive production and international olive oil market trends.
- Interest rates can increase significantly due to changes in economic policies, currency devaluation, or differences between financial institutions ranging from 5% at BTS to 20% or more at ENDA Tamweel.

Three scenarios are analyzed (table 31):

- **Optimistic scenario (NPV = USD51,183):** The selling price is USD2.33/kg, reflecting a poor national harvest and high export potential, with a low interest loan (5%) from the solidarity bank.
- **Modest scenario (NPV = USD2,545):** The price is USD0.7/kg, reflecting an average harvest, with a moderate interest loan (10%) from traditional banks.
- **Conservative scenario (NPV = -USD4,906):** The price drops to USD0.30/kg, due to a high harvest, and only high-interest loans (20%) are available (microcredit associations)

**Table 31. NPV Evolution based on olive selling price & interest rate.**

Selling price of olives (USD)	0.3	0.7	1	1.3	1.67	2.33
Interest rate%						
5	-4,332	4,921	14,173	23,425	32,678	<b>51,183</b>
10	-4,599	<b>2,545</b>	9,688	16,832	23,975	38,262
15	-4,780	8,82	6,543	12,204	17,866	29,189
20	<b>-4,906</b>	-316	4,274	8865	13,455	22,636

## 9.3. Cost Benefit analysis for the project "Building an olive oil processing and packaging unit"

### 9.3.1. Project description

The project involves establishing an innovative olive oil processing and packaging unit in the Sers region. This unit will transform local olives into high-quality bottled olive oil, tailored to the production capacity of local growers. The focus is on producing a premium agroecological olive oil for a niche market, providing the Elles community's olive farmers an opportunity to generate added-value.

### 9.3.2. Investments and funding

The investment for setting up the olive oil processing and packaging unit covers 7 key components (table 32):

- Establishment costs: USD1,667 for company setup,
- Land acquisition: USD 6,667 for a 200 m2 plot.
- Building costs: USD 50,000 for constructing a 100 m2 solid structure.
- Layout and installation: USD15,000 for electrical connections, transformer installation, landscaping, and parking.
- Equipment: USD 100,000 for an olive oil extraction machine, washing machine, olive-pomace pump, settling tanks, storage tanks (4X1,000 liters), electrical panel, transformer, and Bottling machine.
- Working capital: USD 8,667, approximately 5% of the investment.
- Other fees: USD 333 for registration, commitment and other miscellaneous costs.

**Table 32. Project Investment components of the olive oil processing and packaging unit**

Investment component	Description	Estimated cost (USD)
<b>Establishment costs</b>	Company setup costs	1,667
<b>Land for building</b>	200 m <sup>2</sup> (at USD33 per m <sup>2</sup> )	6,667
<b>Building</b>	Construction of a 100 m <sup>2</sup> facility	50,000
<b>Layout and installation</b>	Electrical setup , transformer, landscaping, parking etc.	15,000
<b>Equipment</b>	Extraction machine, washing machine, olive-pomace pump, 2 settling tanks, 4 storage tanks (1000 liter for each), electrical setup, a transformer, Olive oil Filling Machine Bottling, etc.,	100,000
<b>Other fees</b>	Registration fees, Commitment fees, etc.,	333
<b>Working capital</b>	5% of total investment	8,667
<b>Total</b>		<b>182,333</b>

Each investment component has a specific depreciation period, as outlined in the following table. Major investments like land, building, installation and equipment are amortized over 10 years which defines the project's theoretical lifespan. Establishment costs and other fees are amortized over three years. The total amount of depreciation per year for the project components is presented in the table 33.

**Table 33. Depreciation value of project components**

	Duration (years)	Total cost (USD)	Annual Amortization (USD)
Establishment costs	3	1,667	556
Land for building	10	6,667	667
Building	10	50,000	5,000
Layout and installation	10	15,000	1,500
Equipment	10	100,000	10,000
Others fees	3	333	111

Depreciation expenses vary from USD17833 in the first three years to USD17161 for the last 7 years (Table 34)

**Table 34. Annual amortization cost of the project investment components (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Establishment costs	556	556	556							
Land for building	667	667	667	667	667	667	667	667	667	667
Building	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Layout and installation	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Equipment	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Others fees	111	111	111							
<b>Total</b>	<b>17,833</b>	<b>17,833</b>	<b>17,833</b>	<b>17,167</b>	<b>17,167</b>	<b>17,167</b>	<b>17,167</b>	<b>17,167</b>	<b>17,167</b>	<b>17,167</b>

**Y : year**



### 9.3.3 Operating expenses

Operating costs are estimated at USD14033 per year, covering USD6833 for consumable materials (management costs, water, electricity, maintenance, transport, advertising, etc.) and USD7200 for staffing (table 35). The workforce includes a supervisor, two workers, and a security guard.

**Table 35. Operating expenses components of the investment project (USD)**

Component	Description	Annual cost (USD)
<b>Consumable materials</b>	Management fees, Water, Electricity, Maintenance, Transport, Advertising	6,833
<b>Staff costs</b>	Supervisor, two Workers and one Guard	7,200
<b>Total</b>		USD14,033

### 9.3.4. Financing scheme

To initiate this project, the investor will require USD18,233 in self-financing and a USD149,100 loan (table 36). The government provides USD15,000 in subsidies, representing 12% of the total estimated investment. The total amount required, including credit, self-financing and subsidies is USD502,000, reducing the investor's contribution by 8.2%.

**Table 36. Financing scheme of the investment project (USD)**

Investment type	Amount (USD)
Self-financing	18,233
Subsides	15,000
Loan	149,100
Total investment	USD182,333

### 9.3.5. Turnover

Revenue generation is based on processing capacity and market penetration. According to an expert from the Olive Institute, full capacity (40,000 bottles/year) is expected by year six, thanks to the investor's marketing efforts. For olive processing, the project requires 6.7 tons of olives in the first year, increasing to a maximum of 18 tons by the sixth year. The selling price for a 500 ml bottle is set at USD6.33, a format specifically recommended by the olive oil marketing expert for premium olive oil products. The total turnover of the investment project ranges between USD50,640 for the first year and USD253,200 from the fourth year (table 37).

The general assumptions considered to calculate the project turnover are as follow:

- The cost of a kg of olives is estimated at USD1.66
- A maximum of 8,000 bottles of olive oil can be sold the first year.
- The processing unit can be functional during only 4 months (It depends on the performance of the extraction machine)
- The selling price is estimated at USD6.33 as recommended by the expert from the Olive Institute.

**Table 37. Total turnover of the investment project (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y 10
Olive Quantity (tons)	4	7	11	14	17	18	18	18	18	18
Production capacity (%)	20%	40%	60%	80%	90%	100%	100%	100%	100%	100%
bottles produced	8,000	16,000	24,000	32,000	36,000	40,000	40,000	40,000	40,000	40,000
Selling price (500 ml) (USD)	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33
Turnover (USD)	50,640	101,280	151,920	202,560	227,880	253,200	253,200	253,200	253,200	253,200

### 9.3.6. Project Expenditures

The project's expenses were calculated based on prior assumptions, ranging from USD58,867 in the first year to USD172,800 in the tenth year, accounting for packaging, olive purchase, operating costs estimated at USD14,033, with USD6,833 allocated to consumable materials (including management, water, electricity, maintenance, transport, and advertising costs) and USD7,200 for staff costs (table 38). Depreciation costs vary, totaling USD17,833 for the first three years and USD17,161 for the remaining seven years.

**Table 38. Project expenses (USD)**

Hypothesis	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Packaging costs (bottles, labels, caps)	24,000	48,000	72,000	96,000	108,000	120,000	120,000	120,000	120,000	120,000
Olives purchase olives	3,000	8,640	12,960	17,280	20,520	21,600	21,600	21,600	21,600	21,600
Operating costs	14,033	14,033	14,033	14,033	14,033	14,033	14,033	14,033	14,033	14,033
Amortization	17,833	17,833	17,833	17,167	17,167	17,167	17,167	17,167	17,167	17,167
Total expenditures	58,867	88,507	116,827	144,480	159,720	172,800	172,800	172,800	172,800	172,800

### 9.3.7. Financial results

The table 39 resumes all the project outcomes; turnover, expenses, net results and the annual revenue based on the general assumptions. The project is profitable starting the second year as it generates a net annual revenue of USD10,800. In the sixth year, the project will be generating USD76,067 of annual revenue for the investor. The credit refund is fixed at USD16,567 per year with a grace period for the first year. This project is tax-exempted during its implementation for the first 10 years.

**Table 39. Project outcomes (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Turnover	50,667	101,333	152,000	202,667	228,000	253,333	253,333	253,333	253,333	253,333
Expenses	41,033	70,673	98,993	127,313	142,553	155,633	155,633	155,633	155,633	155,633
Gross Operating Result	9,633	30,660	53,007	75,353	85,447	97,700	97,700	97,700	97,700	97,700
Depreciation	17,833	17,833	17,833	17,167	17,167	17,167	17,167	17,167	17,167	17,167
Net Operating Result	-8,200	12,827	35,173	58,187	68,280	80,533	80,533	80,533	80,533	80,533
Financial Expenses	1013	2,027	3,040	40,53	4,560	5,067	5,067	5,067	5,067	5,067
Result before tax	-9,213	10,800	32,133	54,133	63,720	75,467	75,467	75,467	75,467	75,467
Tax	0	0	0	0	0	0	0	0	0	0
Net Result	-9213	10,800	32,133	54,133	63,720	75,467	75,467	75,467	75,467	75,467
Cash flow	8,620	28,633	49,967	71,300	80,887	92,633	92,633	92,633	92,633	92,633
Credit refund	0	16,567	16,567	16,567	16,567	16,567	16,567	16,567	16,567	16,567
Net Income	8,620	12,067	33,400	54,733	64,320	76,067	76,067	76,067	76,067	76,067

### 9.3.8. Financial analysis

In this section we will estimate the profitability of the investment project using the Internal Rate of Return (I.R.R.) and the Net Present value (N.P.V). The IRR was calculated based on a discount rate of 10% according to the suggestions of the financial expert.

The processing and packaging unit of olive oil is considered as a profitable project with an IRR of 19% (table 40).

**Table 40. Internal rate of the project (Discount rate of 10%)**

IRR	19%			IRR
Total investment	Period	Interest rate%	IRR	
USD167,333	10 years	10	19%	

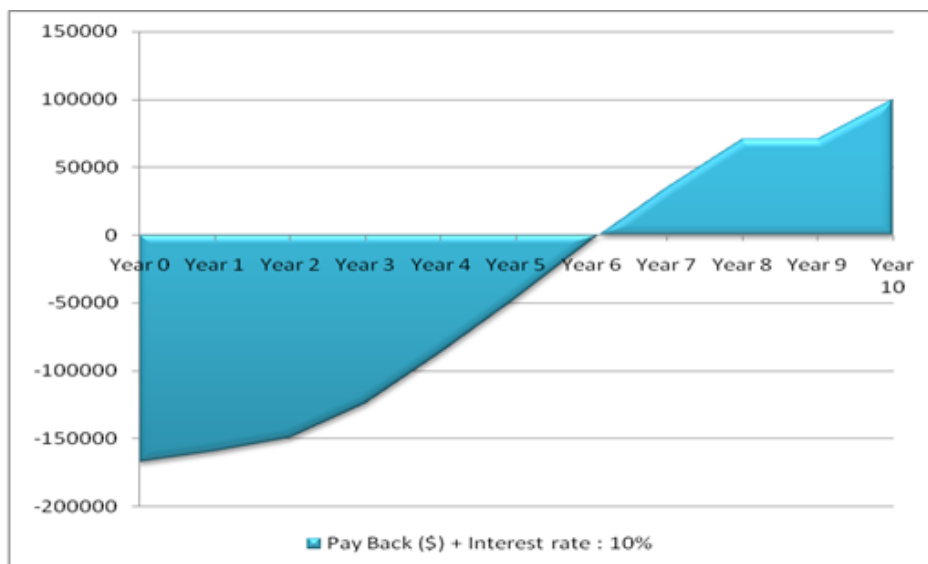
The Net present value of this investment project is estimated to USD99675 showing a high profitability of this project (table 41).

**Table 41. Net Present value in USD (Discount rate of 10%)**

Total investment	Period	Interest rate%	NPV
USD167,333	10 years	10	<b>USD99,675</b>

### 9.3.9. Payback period analysis

The payback period of this investment project is six years (figure 12).



**Figure 12. Payback Period of the project**

### 9.3.10. Sensitivity analysis

The analysis evaluates the impact of olive costs and interest rates on the NPV. In the following section, we will present the impact of increases in the Cost of a Kg of Olives (CKO) and the interest rate (IR) on the net present value (NPV) of an olive oil processing and packaging project. This sensitivity analysis is based on two key assumptions. First, the cost of purchasing a kilogram of olives increases due to rising agricultural input costs and a decrease in olive production, driven by the adverse effects of climate change. Second, there is a substantial increase in interest rates, which could be triggered by new economic policies, the devaluation of the national currency, or other factors. Additionally, interest rates vary significantly between financial institutions, ranging from 5% at BTS to 20% or more at ENDA Tamweel.

The following 42 presents the evolution of NPV according to the evolution of the cost of a 500 ml of olive oil in bottle and the interest rate. The two extreme cases were presented: [CKO 0.7: IR 5%] and [CKO 3.6: IR 20%]. Three scenarios are developed based on variations in the cost per 500 ml of olive oil in bottle and the interest rate:

- **Optimistic scenario (NPV = USD186,373):** Olive price at USD0.70/kg, thanks to high production at national level, and the investor secures a loan with a very low interest rate (5%) from the solidarity bank.
- **Modest scenario (NPV = USD99675):** Olive price at USD1.20/kg, reflecting an average harvest at national level, and the investor obtains credit with a moderate interest rate (10%) from traditional banks.
- **Conservative scenario (NPV = -USD7963):** Olive price at USD3.30/kg, due to a poor harvest at national level, and the investor is limited to credit with a high interest rate (20%) from a financial association (e.g., microfinance).

**Table 42. Evolution of the NPV based on Olive purchase & interest rates.**

Olive purchase(USD/kg)	0.7	1.2	1.7	2.7	3.3
/					
Interest rate%					
5	186,373	185,103	183,992	181,611	180,024
10	100,887	99,675	98,615	96,342	94,827
15	40,830	39,671	38,656	36,482	35,033
20	-2,407	-3,518	-4,491	-6,574	-7,963

This comprehensive analysis underscores the potential profitability and risks associated with the investment.

## 9.4. Cost Benefit analysis for the project “Building a showroom”

### 9.4.1. Project description

The showroom project aims to establish a modern retail space for Elles olive growers to promote an agroecological bottled olive oil, targeting both national and international markets. This investment will enhance growers’ access to modern supermarkets and exporters. The olive oil will be packaged in 500 ml bottles with unique labeling, aiming to add approximately 20% to the selling price of the bottled product.

### 9.4.2. Investments and funding

The showroom's investment is divided into six main components (table 43):

- Land cost: 20 m<sup>2</sup> for construction estimated at USD3,333,
- Building cost: USD6,667,
- Layout and installation: USD 1,667, covering electrical connections, parking space, etc.
- Equipment cost: USD 6,667, including decor, shop windows, cash register, inventory management system, displays, etc.
- Working capital: USD 1,000, representing about 5% of the total investment.
- Other fees: USD 333 concerning the registration fees, Commitment fee, etc.,

**Table 43. Showroom Project Investment breakdown (USD)**

Investment	Description	Estimated cost (USD)
<b>Land for building</b>	20 m <sup>2</sup> (USD 167 per m <sup>2</sup> )	3,333
<b>Building</b>	20 m <sup>2</sup> solid construction	6,667
<b>Layout and installation</b>	Electrical connection, the parking space for vehicles, etc.	1,667
<b>Equipment</b>	Decor, shop windows, cash register, inventory management system, displays, etc.	6,667
<b>Other fees</b>	Registration fees, Commitment fees, etc.,	333
<b>Working capital</b>	5% of investment	1,000
<b>Total</b>		<b>19,667</b>

Each investment component has its own depreciation period. Land, building, layout and equipment are amortized over 10 years which is considered as the theoretical project lifetime. The other fees are amortized for a period of three years. The total amount of depreciation per year for the project components is presented in the table 44.

**Table 44. Depreciation values of investment components**

	Duration (Y)	Total cost (USD)	Annual depreciation (USD)
Land for building	10	3,333	333
Building	10	6,667	667
Layout and installation	10	1,667	167
Equipment	10	6,667	667
Other fees	3	333	111

Amortization costs vary between USD1,944 in the first three years to USD1,833 in the subsequent 7 years (Table 45).

**Table 45. Annual amortization costs (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Land for building	333	333	333	333	333	333	333	333	333	333
Building	667	667	667	667	667	667	667	667	667	667
Layout and installation	167	167	167	167	167	167	167	167	167	167
Equipment	667	667	667	667	667	667	667	667	667	667
Other fees	111	111	111							
<b>Total</b>	<b>1,944</b>	<b>1,944</b>	<b>1,944</b>	<b>1,833</b>	<b>1,833</b>	<b>1,833</b>	<b>1,833</b>	<b>1,833</b>	<b>1,833</b>	<b>1,833</b>

**Y : year**

#### 9.4.3. Operating expenses

Annual operating expenses for the showroom are estimated at USD10,867 (table 46). These costs include USD1,000 for consumables (management costs, water, electricity, maintenance, transport, etc.), USD3,200 for staff and USD 6,667 for marketing.

**Table 46. Annual Operating expenses (USD)**

Component	Description	Estimated annual cost (USD)
<b>Consumable material</b>	Management fees, Water, Electricity, Maintenance, Transport	1,000
<b>Staff costs</b>	One permanent employee	3,200
<b>Marketing fees</b>	Advertising, trade fair participation, etc.	6,667
<b>Total</b>		<b>10,867</b>

#### 9.4.4. Financing scheme

To fund this project, USD1,967 will be self-financed, while a USD16,700 loan will be secured. Government subsidies amount to USD1,000, covering 5% of the total investment estimated by experts (table 47). The total investment needed is USD19,667 but the actual amount required, including credit and self-financing, is USD18667. This results in the investor contributing 5.4% less than the total required amount.

**Table 47. Financing scheme (USD)**

Total investment	Self-financing	Subsides	Credit
19,667	1,967	1,000	16,700

#### 9.4.5. Turnover

The investment project's revenue depends on the olive oil processing capacity and market reach. The peak capacity of 40,000 bottles per year is anticipated by the sixth year according to an expert from the Olive Institute (table 48). A 500 ml bottle is priced at USD8, as recommended by an olive oil marketing expert. Initial turnover is USD57,333 in the first year rising to USD286,667 from year six onward.

The general assumptions considered to calculate the project turnover are as follow:

- The purchasing price for a 500 ml bottle is set at USD6.33
- A maximum of 8000 bottles of olive oil can be sold the first year.
- The showroom is open during the year.
- The selling price is estimated at USD8 as recommended by the expert from the Olive Institute.

**Table 48. Turnover projections (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Production capacity (%)	20%	40%	60%	80%	90%	100%	100%	100%	100%	100%
Bottles produced	8,000	16,000	24,000	32,000	36,000	40,000	40,000	40,000	40,000	40,000
Turnover (USD)	57,333	114,667	172,000	229,333	258,000	286,667	286,667	286,667	286,667	286,667

#### 9.4.6. Project Expenditures

Expenditures range from USD63,478 in the first year to USD266,033 in year ten. Costs are based on the purchase of labelled olive oil (USD6.33 per bottle), annual operating expenses (USD10,867) and depreciation costs varying from USD1,944 for the first three years to USD1,833 for the remaining seven years (table 49).

**Table 49. Project expenditures (USD)**

Hypothesis	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Bottles produced	8,000	16,000	24,000	32,000	36,000	40,000	40,000	40,000	40,000	40,000
Costs of purchasing 500ml bottle of olive oil	50,667	101,333	152,000	202,667	228,000	253,333	253,333	253,333	253,333	253,333
Operating costs	10,867	10,867	10,867	10,867	10,867	10,867	10,867	10,867	10,867	10,867
Amortization	1944	1944	1944	1833	1833	1833	1833	1833	1,833	1,833
Total expenditures	63,478	114,144	164,811	215,367	240,700	266,033	266,033	266,033	266,033	266,033

#### 9.4.7. Financial results

The project's financial performance appears positive, with net income reaching USD3793 by year three and USD14833 by year six (table 50). The loan repayment is set at USD1900 annually, starting in year two. The project enjoys a 10-year tax exemption during its implementation.

**Table 50. Financial results overview (USD)**

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Turnover	57,333	114,667	172,000	229,333	258,000	286,667	286,667	286,667	286,667	286,667
Expenses	61,533	112,200	162,867	213,533	238,867	264,200	264,200	264,200	264,200	264,200
Gross Operating Result	-4,200	2,467	9,133	15,800	19,133	22,467	22,467	22,467	22,467	22,467
Depreciation	1,944	1,944	1,944	1,833	1,833	1,833	1,833	1,833	1,833	1,833
Net Operating Result	-6,144	522	7,189	13,967	17,300	20,633	20,633	20,633	20,633	20,633
Financial expenses	1,147	2,293	3,440	4,587	5,160	5,733	5,733	5,733	5,733	5,733
Result before tax	-7,291	-1,771	3,749	9,380	12,140	14,900	14,900	14,900	14,900	14,900
Tax	0	0	0	0	0	0	0	0	0	0
Net Income	-7,291	-1,771	3,749	9,380	12,140	14,900	14,900	14,900	14,900	14,900
Cash flow	-5,347	173	5,693	11,213	13,973	16,733	16,733	16,733	16,733	16,733
Credit refund	0	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
Net Income	-5,347	-1,727	3,793	9,313	12,073	14,833	14,833	14,833	14,833	14,833

#### 9.4.8. Financial analysis

Using a 10% discount rate, the project's Internal Rate of Return (IRR) is 23%, indicating profitability (table 51). The Net Present Value (NPV) is estimated at USD27,116, suggesting strong financial returns (table 52).



**Table 51. Internal rate of the project (Discount rate of 10%)**

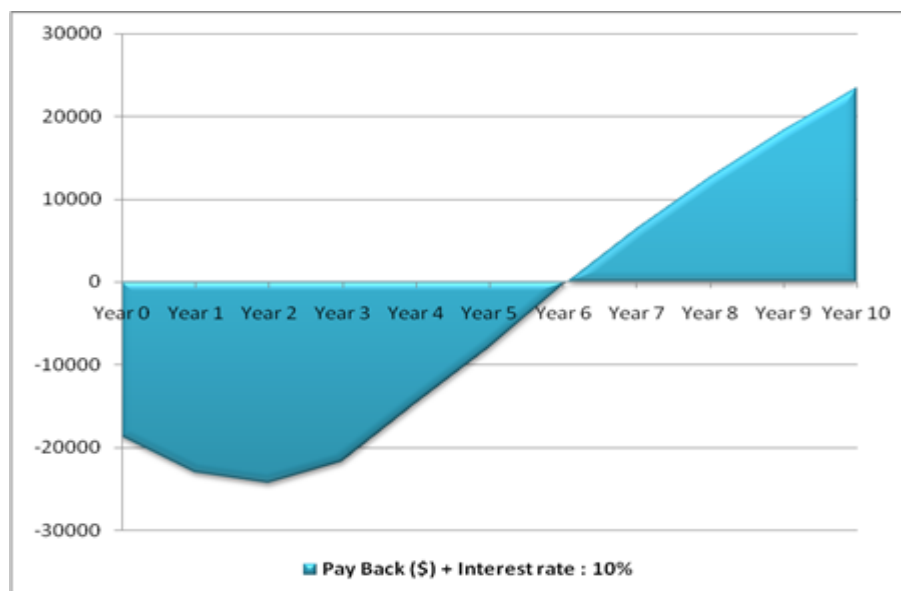
Total investment	Period	Interest rate%	IRR
USD18,677	10 years	10	<b>23%</b>

**Table 52. Net Present value (USD) (Discount rate of 10%)**

Total investment	Period	Interest rate%	NPV
USD 18,677	20 years	10	<b>USD27,116</b>

#### 9.4.9. Payback period analysis

The investment is expected to break even in six years (figure 13).

**Figure 13. Payback Period of the project**

#### 9.4.10. Sensitivity analysis

In the following section, we will present the impact of increases in the Cost of a Bottle of Olive Oil (CBOO) and the interest rate (IR) on the net present value (NPV) of an olive oil processing and packaging project. This sensitivity analysis is based on two key assumptions. First, the cost of buying a 500 ml bottle of olive oil rises due to the increase of input prices especially the packaging costs. Second, there is a substantial increase in the interest rate, potentially resulting from new economic policies, the devaluation of the national currency, or other factors. Additionally, interest rates vary significantly between financial institutions, ranging from 5% at BTS to 20% or more at ENDA Tamweel.

The table 53 presents the evolution of NPV according to the evolution of cost of a bottle of olive oil and the interest rate. The two extreme cases were presented: [CBOO 5: IR 5%] and [CBOO 8.3: IR 20%]. Three scenarios are developed based on variations in the cost of a 500 ml bottle of olive oil and the interest rate:

- **Optimistic scenario (NPV = USD355,385):** The cost of olive oil bottle is approximately USD5 due to the decrease of the input costs and the investor secures a loan with a very low interest rate (5%) from the solidarity bank.
- **Modest scenario (NPV = USD27,116):** The cost of olive oil bottle is around USD6.3 and the investor obtains credit with a moderate interest rate (10%) from traditional banks.
- **Conservative scenario (NPV = -USD212,333):** The cost of olive oil bottle is about USD8.3 reflecting an increase of input costs and the investor is limited to credit with a high interest rate (10%) from a financial association (e.g., microfinance).

**Table 53. Evolution of the NPV based on cost of buying a kg of olive & interest rate.**

Cost of 500 ml bottle (USD)	5	5.7	6.3	7.7	8.3
/					
Interest rate%					
5	<b>355,385</b>	200,616	45,848	-263,689	-418,458
10	261,830	144,473	<b>27,116</b>	-207,597	-324,954
15	196,899	105,630	14,360	-168,179	-259,449
20	150,674	78,073	5,471	-139,731	<b>-212,333</b>

## 10. Conclusion

This report aims to summarize the business models in the olive oil sector in the North-West region of Tunisia. The methodology employed in this study encompasses a rapid value chain assessment within the Agroecological Living Labs (ALL), key informant interviews, workshops involving local stakeholders.

The comprehensive evaluation of Elles' olive oil value chain in El Sers community of Northwest Tunisia marks a significant stride in understanding the prevailing business model. Employing an inclusive and participatory methodology involving stakeholders, this assessment provided an exhaustive understanding of the intricate mechanisms for the olive oil business model in Elles community leading to an upgraded business plan.

Crucial partnerships established with essential stakeholders and institutions, including input providers; national regulatory bodies like CRDA, and the National Olive Oil Office and research institutes (Olive Institute, INRAT) exert substantial influence on olive oil business model in Elles community. This model showcases a robust foundation rooted in conventional practices and environmental consciousness. It signifies a collective commitment to sustainability and community engagement, while also highlighting opportunities for enhancement, particularly in adopting agroecological practices and principles and market expansion through the controlled designation of origin.

The assessment report delved deeply into the vision and missions of the olive growers' group, highlighting their commitment to an agroecological approach in harmony with sustainable farming principles. By focusing on collaborative initiatives to advance agroecological practices like composting and intercropping, the goal is to boost yields and establish long-lasting sustainability. Overall, the endeavours of Elles olive growers collectively underscore a dedicated commitment to sustainability, economic progress, and preserving the region's distinctive olive oil heritage.

The proposed upgraded plan represents a transformative vision addressing the constraints of the current model, emphasizing collaborative endeavours, agroecological practices, and strategic partnerships. It focuses on economic diversification, niche market penetration, and heritage preservation, despite necessitating a substantial investment with promising returns. Indeed, several key initiatives are proposed to strengthen the olive oil production in the region, including the establishment of the olive growers' association. This collective effort is geared towards unifying and empowering olive growers, fostering collaboration, knowledge exchange, and collective decision-making. Additionally, the adoption of agroecological practices, such as composting and intercropping, aims to optimize yields, improve soil health, and promote long-term sustainability. The creation of a Controlled Designation of Origin label serves to authenticate and elevate the quality of the region's olive oil, establishing its unique identity and distinguishing it in the market. Moreover, integrating olive oil processing, conditioning, and marketing into the olive growers' association ensures quality control, streamlines operations, and enhances value across the olive growers' business model.

This new business model built upon the upgraded plan presents a comprehensive roadmap for Elles' olive oil sector, integrating sustainability, economic growth, and community engagement through a holistic approach. Importantly, this transformational plan is a collaborative initiative involving various stakeholders, echoing a unified vision to upgrade Elles olive oil into agroecological business model.

Transitioning to agroecology in Tunisia requires innovative financial mechanisms that align public policies, private sector investments, and farmer capacities to promote sustainable practices. These mechanisms include state subsidies redirected from chemical inputs to organic methods, tax incentives, microfinance loans, and cooperative financing. International aid programs like the EU-funded ADAPT initiative and partnerships with organizations like the Green Climate Fund further bolster efforts by providing grants, loans, and investments in green agriculture. Additional tools, such as carbon markets and Payments for Ecosystem Services (PES), reward farmers for eco-friendly activities like reforestation and soil regeneration. By integrating these mechanisms, Tunisia can advance its agroecological transition, ensuring inclusivity, scalability, and resilience in the agricultural sector.

The cost-benefit analysis of the investment projects associated with the upgraded business model integrating agroecological principles demonstrates their profitability based on key financial indicators such as the Internal Rate of Return (IRR) and Net Present Value (NPV). Sensitivity analysis reveals that the profitability of these projects could increase significantly under an optimistic scenario.

## References

- Afuah, A. 2004. Business models: A strategic management approach. (No Title).
- Afuah, A., and Tucci, C. L. 2001. Internet business models: A strategic management approach. Irwin/McGraw.
- Amit, R., and Zott, C. 2001. Value creation in e-business. *Strategic management journal*, 22(6-7), 493-520.
- Applegate, L. M., and Collura, M. 2000. *Crafting business models. Building E-Businesses*, HBS Publishing, Boston.
- Brousseau, E., and Penard, T. 2007. The economics of digital business models: A framework for analysing the economics of platforms. *Review of network Economics*, 6(2).
- CRDA Kef Commissariat Régional de Développement Agricole. 2020. Technical report in Kef.
- Doligez, F., Mejdoub, MM, Bunge, F., Gourvez, JY, & M'Kacher, A. (2016). What are the prospects for the emergence of "solidarity" microfinance? The case of microcredit associations in Tunisia. *Tiers Monde Review*, (1), 49-76.
- DeLong, M, Miles, A, Carlisle, L.2016. Investing in the transition to sustainable agriculture. *Environmental Science and Policy* 55(1) 266273 DOI: <http://dx.doi.org/10.1016/j.envsci.2015.09.013> .
- Dubosson-Torbay, M., Osterwalder, A., and Pigneur, Y. 2002. E-business model design, classification, and measurements. *Thunderbird International Business Review*, 44(1), 5-23.
- George, G., and Bock, A. J. 2009. *Inventing entrepreneurs: Technology innovators and their entrepreneurial journey*. Upper Saddle River, NJ: Pearson Prentice Hall.
- HLPE, 2019. *Agroecological and other innovative approaches for sustainable agriculture and food systems that improve food security and nutrition. A report of the High-Level Panel on Food Security and Nutrition of the Committee on World Food Security*, Rome.
- Johnson, M. W., Christensen, C. M., and Kagermann, H. 2008. Reinventing your business model. *Harvard business review*, 86(12), 50-59.
- Magretta, J., 2002. Why Business Models Matter? *Harvard Business Review*, vol.80, n.5, 2002, 86-93.
- Morris, M., Schindehutte, M., and Allen, J. 2005. The entrepreneur's business model: toward a unified perspective. *Journal of business research*, 58(6), 726-735.
- Murray, A., and Scuotto, V. 2015. The business model canvas. *Symphonya. Emerging Issues in Management*, 94-109. Available from: [https://www.researchgate.net/publication/339222590\\_The\\_Business\\_Model\\_Canvas](https://www.researchgate.net/publication/339222590_The_Business_Model_Canvas) [accessed Jan 11, 2024].
- ODNO Office de Développement du Nord-Ouest. 2017. *Gouvernorat de Siliana en chiffre*.
- ODNO Office de Développement du Nord-Ouest. 2020. *Gouvernorat de Siliana en chiffre*.

- Osterwalder, A., and Pigneur, Y. 2010. *Business model generation: a handbook for visionaries, game changers, and challengers* (Vol. 1). John Wiley and Sons.
- Osterwalder, A., Pigneur, Y., and Tucci, C. L. 2005. Clarifying business models: Origins, present, and future of the concept. *Communications of the association for Information Systems*, 16(1), 1.
- Osterwalder, A., Pigneur, Y., Oliveira, M. A. Y., and Ferreira, J. J. P. 2011. *Business Model Generation: A handbook for visionaries, game changers and challengers*. *African journal of business management*, 5(7), 22-30.
- Seelos, C., and Mair, J. 2007. Profitable business models and market creation in the context of deep poverty: A strategic view. *Academy of management perspectives*, 21(4), 49-63.
- Shafer, S. M., Smith, H. J., and Linder, J. C. 2005. The power of business models. *Business horizons*, 48(3), 199-207.
- Stewart, D. W., and Zhao, Q. 2000. Internet marketing, business models, and public policy. *Journal of public policy and marketing*, 19(2), 287-296.
- Teece, D. J. 2010. Business models, business strategy and innovation. *Long range planning*, 43(2-3), 172-194.
- Weill, P., and Vitale, M. 2001. *Place to space: Migrating to eBusiness Models*. Harvard Business Press.
- Zott, C., and Amit, R. 2010. Business Model Design: An Activity System Perspective, *Long Range Planning*, 43, (2-3), 2010, p. 174-192.

## Annex

### ANNEX1. Capacity building for Elles olive growers

As a facet of the development research project titled "*Transformational Agroecology Across Food, Land, and Water Systems*," the Integrated Olive Production laboratory at The Olive Institute conducted a hands-on demonstration day focused on producing high-quality extra virgin olive oil (Figure 14). This event, geared toward contributing to the roadmap for establishing a Geographical Indication label in Elles/Sers, took place on November 30<sup>th</sup>, 2023, at the Specialized Unit of Tunis. Olive growers and processors from Elles community were invited to the demonstration day.



Step 1. Putting the olives into the press



Step 2: Olives are crushed into a paste

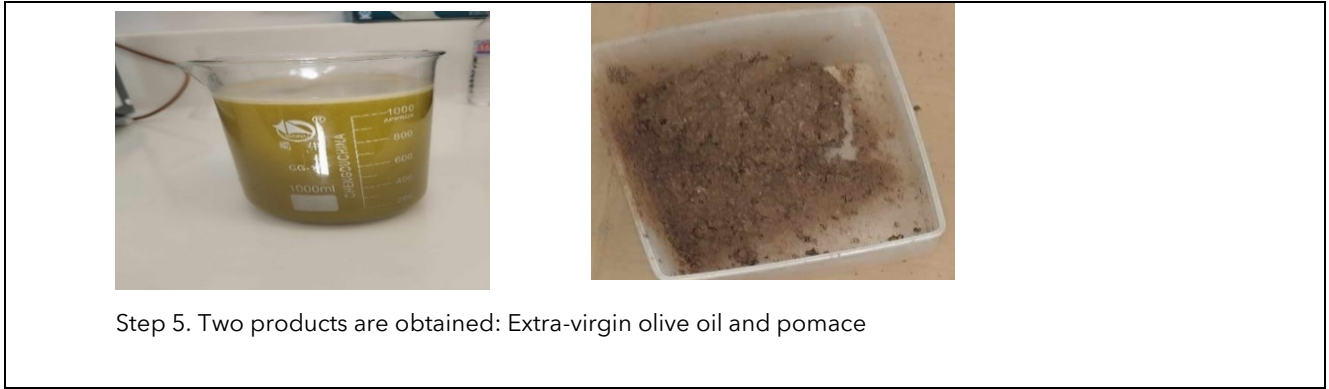


Step 3. Paste undergoes further pressing



Step 4. Oil is separated from the solids





**Figure 14. Demonstration day on producing high-quality extra-virgin olive oil**

Following the extraction process, the Olive Institute team orchestrated a comparative tasting session featuring the freshly extracted olive oil alongside oil obtained from a three-phase oil mill, both sourced from the same producer. The tasting session illuminated a discernible disparity between the two olive oils, evident in their distinct quality, appearance, and aroma. The nuanced variations observed during the tasting underscored the impact of extraction methods on the final characteristics of the olive oil (Figure 15).



**Figure 15. Tasting session for high-quality extra-virgin olive oil**

## ANNEX 2. Key Interview Survey to financial institutions

Date of interview	
Institution	
Name of the respondent / Position	
Contact details: (Email/telephone)	

### 1. Characteristics of the institution:

1. Business Type:

Bank      Microfinance institutions      Cooperatives and farmers' groups      NGOs  
 Public institutions      Other.....

2. What is your field of intervention?

Regional national

3. Who are your main customers? (Companies, individuals, organizations, etc.)

Companies      Individuals      Organizations

4. What are your main financing sectors? (Industry, agriculture, services)

Industry      Agriculture      Services

### 2. Expertise in agriculture

1. What is your area of expertise in agriculture?

Microfinancing      Investment project      companion credit

2. Do you have clients (companies, farmers) from the agricultural sector in your portfolio?

Yes      No

If yes, can you classify them by type:

Agricultural company (SA)	
Large farm (Farmer)	
Small Farm (Farmer)	
Farmers' Association (SMSA, GDA)	
Cooperatives	
Other :... ..	

3. How many years have you been offering credits to companies in the agricultural sector?

.....  
 .....

4. What are the main types of credits that you offer specifically for the agricultural sector?

Short term (agricultural campaigns)  
 Medium term (equipment, infrastructure)  
 Long term (Heavy investments)

5. What is the total amount of credit allocated to agricultural activities? (% of the total)

.....



6. Do you provide specific services to companies in the Agricultural sector?

Yes No

If so, which ones?

Type of service	Details
Support for agricultural development projects	
Advice	
Trainings	
Others : .....	

7. What is the average amount allocated to finance a new agricultural project?  
.....

8. What are the advantages you offer to farmers that differentiate you from other financing institutions? ( Loans without collateral, etc.)

.....  
.....  
.....

9. Do you have agreements with government structures to support Tunisian agriculture?

Yes No

If yes, which ones?

.....  
.....  
.....

10. Do you offer loans tailored to specific sub-sectors (livestock farming, cereal crops, market gardening, etc.)?

.....  
.....  
.....

11. Do you have adjustment mechanisms in the event of poor harvests or agricultural crises (deferral of repayment, adjustment of interest rates, etc.)?

.....  
.....  
.....

12. Do you have any projects or innovations underway to improve farmers' access to credit?

.....  
.....  
.....

13. Do you have any idea about agroecology?

Yes No

14. What are the main barriers you encounter in financing agroecological projects?

.....  
.....  
.....

15. How do you plan to overcome these barriers?

.....  
.....  
.....

16. Would you be open to developing new financial products adapted to innovative agricultural projects such as the marketing of agroecological products?

.....  
.....

17. How do you integrate gender and equity considerations into your funding strategies?

.....  
.....  
.....

**3. Financing terms**

1. What are the types of agricultural loans and what are the terms and conditions for granting each type of loan?

<b>Nature of Credit</b>	<b>Beneficiaries</b>	<b>Eligibility Conditions (Guarantee)</b>	<b>Credit amount</b>	<b>Car - funding</b>	<b>Duration</b>	<b>Grace period</b>	<b>Interest rate</b>	<b>Number of credit tranche</b>

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