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Financing table olive cultivation with diminishing musharakah: Financial analysis of a project in Bursa province

Sofralık zeytin yetiştiriciliğinin azalan müşareke ile finansmanı: Bursa ilinde bir projenin finansal analizi

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ABSTRACT

Despite the high demand for olives, there has been a decline in cultivated olive acreage in Türkiye in recent years. An important reason for this is the financial sustainability issues associated with the current interest-bearing debt financing model. The irregularity of income versus the regularity of loan repayments exposes farmers to commercial and seasonal risks, shifting the entire risk burden onto them without shared accountability from lending institutions. This study conducted a comparative financial analysis over a ten-year horizon for an olive orchard project in Bursa province, utilizing current market data, property values, and insights from table olive growers and it is revealed that the Diminishing Musharakah financing model is significantly more profitable for farmers compared to the interest-bearing debt financing model. Although the initial cost of establishing the orchard is similar under both models, interest-bearing debt financing model leads to a higher total repayment amount due to interest, whereas Diminishing Musharakah financing model maintains the initial cost without any interest, allowing for greater profitability. Additionally, this model provides distinct advantages in managing cash flow, as it aligns repayment schedules with harvest periods, thereby reducing the financial strain on producers. This financing structure also facilitates risk sharing among partners, effectively addressing challenges related to yield fluctuations and market volatility. The study shows that enhancing the financial sustainability of olive cultivation requires the adoption of alternative financing models.

ÖZET

Zeytine olan yüksek yerel ve uluslararası talebe rağmen son yıllarda Türkiye'de zeytin ekili alanlarda bir azalma görülmektedir. Bunun önemli bir nedeni mevcut faizli borç finansmanı modeli ile ilişkili finansal sürdürülebilirlik sorunlarıdır. Gelirlerin düzensizliği ile kredi ödemelerinin düzenliliği arasındaki uyumsuzluk, çiftçileri ticari ve mevsimsel risklere maruz bırakmakta ve kredi veren kurumlarca sorumluluğun paylaşılmaması risk yükünü tamamen çiftçilerin üzerine bırakmaktadır. Bu çalışma, Bursa ilinde bir zeytin bahçesi projesi için güncel piyasa verileri, arazi değerleri ve sofralık zeytin yetiştiricilerinin görüşlerini kullanarak on yıllık bir dönem için karşılaştırmalı bir finansal analiz gerçekleştirmiş ve Azalan Müşareke finansman modelinin, faizli borç finansmanı modeline göre çiftçiler için önemli ölçüde daha kârlı olduğunu ortaya koyulmuştur. Her iki modelde de bahçenin başlangıç maliyeti benzer olmakla birlikte, faizli borç finansmanı modeli, faiz nedeniyle daha yüksek bir toplam geri ödeme tutarına yol açmakta; buna karşın Azalan Müşareke finansman modeli faiz olmaksızın ilk maliyeti koruyarak daha yüksek kârlılık sağlamaktadır. Ayrıca, bu model, ödeme takvimlerini hasat dönemlerine uyarlayarak nakit akışının yönetiminde üreticiler için mali baskıyı azaltıcı avantajlar sunmaktadır. Bu finansman yapısı aynı zamanda ortaklar arasında risk paylaşımını kolaylaştırmakta, verim dalgalanmaları ve piyasa oynaklığı ile ilgili zorlukları etkin bir şekilde ele almaktadır. Çalışma, zeytin yetiştiriciliğinin finansal sürdürülebilirliğini artırmak için alternatif finansman modellerinin benimsenmesi gerektiğini göstermektedir.

1. Introduction

Türkiye's agricultural sector holds significant global importance due to its ability to meet increasing food demands driven by population growth, contribute to employment and national income, supply raw materials needed for the industrial sector, and provide direct and indirect contributions to exports. As technology advances, it has become evident that many factors once deemed important are not as critical as ensuring sustainable food production. Türkiye's geographical location further enhances its agricultural advantages, making it highly suitable for farming and bringing numerous benefits. Additionally, its location serves as a crucial bridge in global agriculture.

Türkiye's extensive coastline with a Mediterranean climate highlights its significant potential for olive cultivation. Olive cultivation dates back to ancient times, with the olive tree being considered the ancestor of all trees. Its importance in human history is underscored by its presence in all sacred texts and creation myths. Today, planting olive trees not only supports future food production but also contributes to economic development. In the 2022-2023 season, Türkiye achieved $184.5 million in olive exports [1]. However, recent challenges in financial sustainability have led to the uprooting of many olive trees, especially in the Marmara region. Vacant and fertile lands from olive groves are either being repurposed for other uses or converted to grow agricultural products with easier financial management. While mature olive trees capable of yielding hundreds of kilograms of produce are used for decorative furniture production [2-4], the high prices of olives [5] have made domestic access to olive oil increasingly difficult [6-7], prompting significant portions of the harvest to be exported abroad [8]. Therefore, establishing olive orchards holds crucial importance for both Türkiye and the global community.

Türkiye's domestic and international market potential underscores the significant economic contributions that olive cultivation can provide if its financial sustainability is ensured. Despite the government's support and the financial burdens, it assumes for farmers, challenges persist regarding the financial sustainability of olive cultivation. Therefore, the Financing Models (FMs) used when establishing olive orchards are crucial. Typically, investors prefer the Interest-bearing debt financing model (IBDFM), in other words credit financing, where farmers face high cash flow imbalances throughout the year and shoulder all commercial and seasonal risks. Any market fluctuation can significantly impact the financial sustainability of olive production.

In this study, the impacts of financing olive cultivation through alternative models on sustainability and profitability have been examined. The alternative FM discussed in this study is the Diminishing Musharakah Financing Model (DMFM), a subcategory of Islamic finance. One significant advantage of the Musharakah Financing Model (MFM) is its avoidance of interest-based financing, making it viable for farmers seeking to manage their cash flows effectively. Using real market data, a comparative analysis of both IBDFM and MFM has been conducted through a sample scenario, evaluating their respective internal rates of return. The findings not only address financial implications but also discuss risks associated with each FM.

The structure of the study is organized as follows: Section 2 introduces the DMFM, Section 3 provides general information on olive cultivation, Section 4 compares scenarios of financing olive cultivation using IBDFM and DMFM, calculates relevant economic metrics, and Section 5 interprets and discusses the obtained results, while Section 6 presents conclusions and future research recommendations.

2. Musharakah Financing Model

MFM, which means "partnership" or "joint venture," involves two or more parties pooling capital to engage in business together, sharing profits or losses according to agreed terms [9]. It is a partnership where each party contributes capital according to their own preferences, aiming to undertake joint commercial activities and share resulting profits or losses based on the principle of profit and loss sharing. MFM is a FM designed for use in interest-free banking, operating on the profit-loss sharing principle. This arrangement allows individuals and institutions to combine their capital to engage in business activities, providing an avenue for financing without interest. MFM is particularly used as an alternative to conventional interest-based banking systems for sectors such as real estate, business ventures, residential property, land, and agricultural fields, catering to those sensitive to interest rates.

In MFM, the capital contributions from parties involved can vary in amounts. The profit-loss relationship dictates that profits generated from the partnership are distributed according to an agreed profit-sharing ratio, which may not necessarily be proportional to the capital contributions. In case of losses, however, the losses are shared based on the initial capital contributions of each party [10-11].

MFM involves an interest-free financial institution becoming a partner in a newly established or existing company. Through MFM, the institution acquires shares of an independent legal entity under an MC, which is considered permissible from a religious standpoint. MFM can also involve the financial institution holding shares of another entity for investment purposes or to diversify its risk [12].

The structure of the MFM is highly suitable for financing agricultural products. This can be justified as follows:

- Production quantity and quality can vary due to factors such as weather conditions, diseases, and market prices. MFM relies on a profit-loss partnership, where partners share in the profits earned and bear losses proportionate to the capital they have invested. This makes it an appropriate FM for uncertainties and risks that may arise in olive production.
- Olive production is a sector that requires long-term investment. The growth and productivity of olive trees take time. MFM enables pooling of resources among parties to facilitate larger and more comprehensive investments, thereby promoting more efficient and higher-quality olive production.
- Olive producers may be sensitive to interest rates and may prefer not to use IBDFM. MFM offers a non interest-based-FM, allowing producers to meet their financial needs without the burden of interest payments.

- MFM is a FM that requires collaboration and solidarity among partners. In olive production, partnerships in areas such as knowledge and experience sharing, technical support, and marketing are crucial for success. MFM encourages and strengthens such collaborations.
- Olive production is susceptible to risks such as natural disasters, diseases, and market fluctuations. MFM facilitates the sharing of these risks among parties, preventing one party from bearing large losses alone and making risks more manageable.
- MFM is a long-term and sustainable FM. Parties engage in long-term cooperation and investment planning rather than focusing solely on short-term profits. This is crucial for enhancing the sustainability and quality of olive production.

2.1. Diminishing musharakah financing model

DMFM is a FM based on profit-loss sharing agreement conducted among two or more parties on a project. One of the parties gradually purchases the shares of their partner in specified amounts over a determined period, eventually becoming the sole owner of the project. Throughout DMC, profits and losses are shared according to the agreed-upon shares [13]. This allows individuals with Islamic sensitivities to acquire property and assets without engaging in interest-based transactions. When forming a Diminishing Musharakah Contract (DMC), the transfer of shares according to agreed conditions over a specified period suitable for buying and selling is considered [13]. An example scenario for DMFM flow is illustrated in Figure 1.

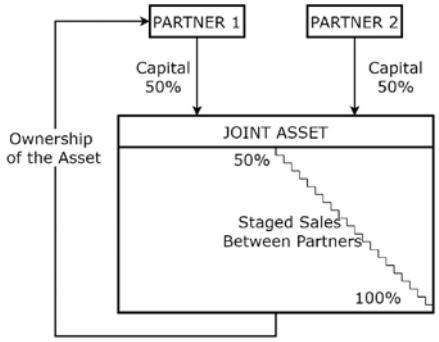

Figure 1. Diminishing musharakah flow for an example scenario

In DMFM, the aim is to bring together the party in need of financing with the party interested in investing to generate profit. DMFM has various economic and social benefits. Some of these can be listed as follows:

- Providing an opportunity for investment and funding without interest,
- Opening an investment gateway for individuals with capital to contribute their capital to the service of the economy,
- Contributing to fair benefit sharing from production and raising societal welfare,
- Offering financiers, the opportunity to enter into projects, make profit at the end of the project, terminate the partnership after a certain period, and redirect towards other investment opportunities,
- For customers, it provides the opportunity to own the entire property in the project at the end of the project.

2.2. Permanent musharakah financing model

Permanent Musharakah Financing Model (PMFM) means "a partnership established based on the principle of profit and loss among two or more parties to carry out a profitable project" [12]. The main point in this FM is that the partnership established at the outset is permanent and continuous. The difference between DMFM and PMFM, as the name implies, is that in PMFM, the parties do not have the intention to terminate the partnership at a specific time or gradually over a period [12].

3. Olive Cultivation

Olive is the fruit of the olive tree, which is native to the Mediterranean climate. Olive leaves, which are renewed approximately every three years and do not all fall off at once in autumn, have high durability. The cuticle and stomatal structures of these leaves allow for both moisture retention and high-capacity CO_2 absorption. Moreover, their densely packed and numerous leaves can reduce the adverse effects of heavy rainfall and regulate the flow of water into the soil, minimizing the risk of erosion. One of the significant reasons olives can grow in different soil types is their robust and deep root system. These roots protect against erosion and soil loss by drawing water from deep layers. All these biological and ecological characteristics contribute to olives forming a pattern intertwined with other living and non-living systems in the same ecosystem, supporting and sustaining biodiversity. In today's world, where climate crisis and ecological damage are rapidly continuing, preserving and strengthening olive groves is of vital importance [14].

Olive is a versatile fruit used for olive oil production and consumption as a table fruit. Olives can sometimes develop different flavors when soaked in salt and vinegar. Additionally, olives are used as essential raw materials in the production of creams, soaps, skincare, and the cosmetics industry. Olive cultivation involves processes such as selecting suitable land, soil analysis, planning irrigation systems, and planting olive seedlings. Olive orchards require special care in the initial years. During this period, regular maintenance is essential to support seedling growth, prevent diseases, and improve overall health. As olives mature, the harvesting process begins, and the harvested products are transported to processing facilities.

Choosing the right location for olive farming is crucial. For regions aiming to withstand cold climates, south-facing slopes are more suitable as they protect against cold. The suitability of the site for establishing facilities should be investigated based on climate conditions and soil structure. Areas with temperatures above -7 degrees Celsius throughout the year and moderate groundwater levels are preferred. Necessary soil analyses should be conducted, and based on these results, appropriate fertilizers should be selected to enhance soil quality [15].

Olive tree maintenance requires specific processes and careful practices. Firstly, olive trees thrive best in well-drained and lightly clayey soils. Before planting, the soil is thoroughly cultivated and enriched with organic fertilizers. Seedlings are usually planted at intervals of 5-7 meters. Although olive trees are resilient to drought, irrigation should be regular, especially during their youth and

flowering periods. Pruning is important for shaping the trees and ensuring air circulation, typically done at the end of winter or early spring. Fertilization with nitrogen, phosphorus, and potassium-containing fertilizers is regularly carried out during the growth season, in spring and summer. Regular control measures against pests such as the olive fruit fly, olive moth, and various fungal diseases are essential, using both chemical and biological methods [16].

The yield of olive trees varies depending on the tree's age, care, and climatic conditions. A well-cared-for olive tree can yield between 20-40 kilograms of olives annually during maturity (approximately 10-15 years). This amount can increase up to 90 kilograms in subsequent years. Olive trees thrive in regions with a Mediterranean climate, with the Aegean, Mediterranean, and Marmara regions of Türkiye being prominent in olive production. The Aegean Region is the largest olive production center in Türkiye [17].

The financing of olive production is facilitated through various FMs. Banks and agricultural credit cooperatives offer farmer loans to olive producers. These loans provide support to producers with low-interest rates and long-term repayment options. Additionally, olive grove owners can enter into agreements with processors to process their olives. Processors typically handle grove maintenance and harvesting, taking a third of the resulting product. In Türkiye, the Ministry of Agriculture and Forestry provides various grant and support programs to olive producers [18]. These supports include financial assistance for organic farming, seedling support, and irrigation projects. Olive producers can also benefit from bulk purchasing, marketing, and financing advantages by joining cooperatives. These cooperatives alleviate financial burdens for producers and help sell their products at better prices.

The process of leasing land to processors in olive cultivation is strengthened through various financial support and cooperation models. Farmers can undertake costly investments such as land preparation, irrigation systems, and seedling procurement for olive cultivation with resources like agricultural loans, grant programs, and government support. Furthermore, through partnerships with the private sector, farmers can efficiently manage their operations by accessing specialized consultancy and investment services. By coming together through cooperatives and associations, farmers gain advantages in joint marketing and trading, thereby enhancing their financial capabilities. Private investors and venture capital also support farmers who see potential in olive cultivation, promoting innovation and sustainability in the sector. These financed initiatives enable olive growers to establish more efficient, profitable, and sustainable agricultural enterprises.

Olive is an agricultural product that plays an important role in the agricultural sector of Mediterranean countries and also has high economic value. Besides being valued as table olives, it can be processed into oil, making it a valuable food item that has gained prominence in recent years due to its health benefits. Approximately 90% of olives produced worldwide are used for oil, while the remaining 10% are used as table olives. About 90% of olive cultivation worldwide takes place in the Mediterranean Basin, with the remainder occurring in Latin American countries [19]. Globally, olive production covers approximately 10.6 million hectares, yielding 16.6 million tons of olives [20]. Due to increasing demand for olive products worldwide, olive cultivation has expanded not only in countries bordering the Mediterranean but also in other countries with Mediterranean climates such as Argentina, Chile, and Peru, where it has become economically viable. Although global production of table olives has shown an increasing trend in the last five years since 2016, fluctuations in production have occurred due to diseases or natural conditions. The top five countries in table olive production include Italy, Spain, Greece, Türkiye, and Morocco [20-21].

The comparison of olive production quantities cultivated area sizes, and production efficiency for the countries producing 95% of olive production in 2021 are presented in Figure 2 [22].

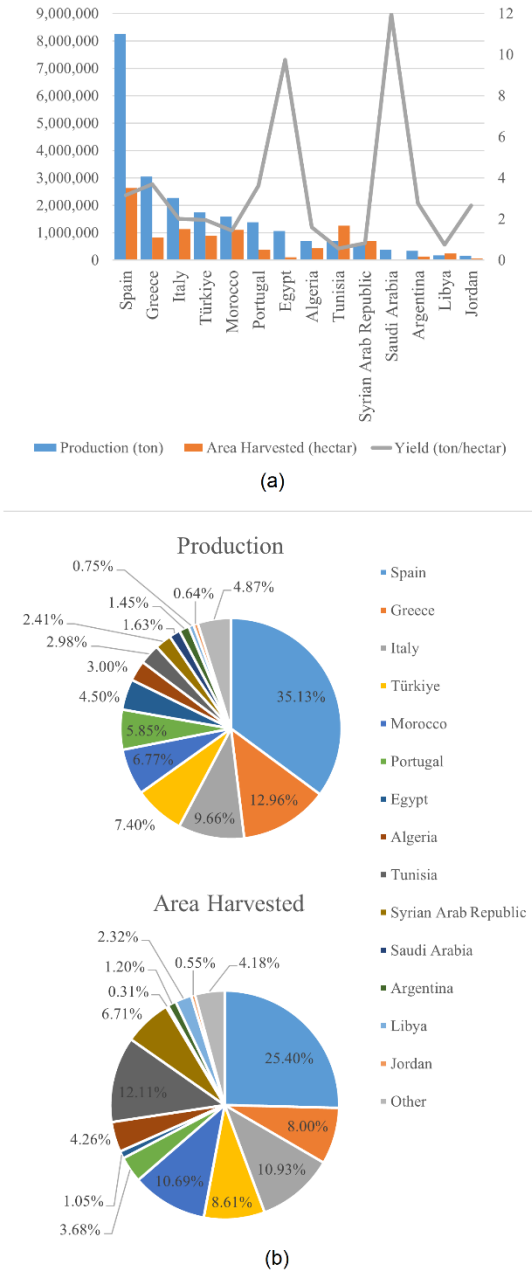

Figure 2. Comparison of countries in terms of olive production

The change in olive production and olive growing areas between 1994 and 2022 is given in Figure 3 [22].

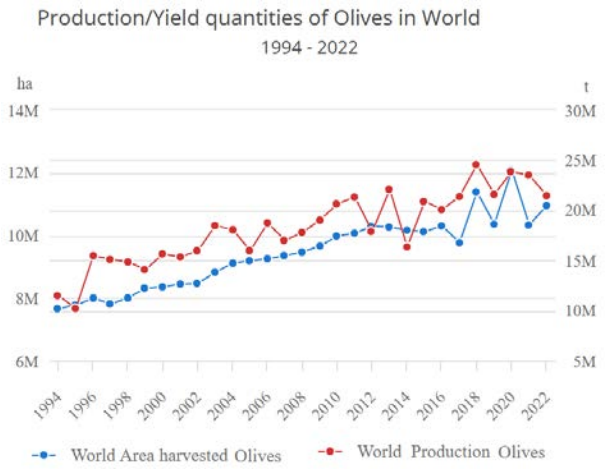

Figure 3. Change in total olive production by years

Olive production is one of the most important activities in Türkiye's agricultural sector. A significant portion of olives produced in Türkiye is directed towards domestic consumption. Of the table olives produced in Türkiye, 85% are processed as black, 15% as green, and some as partially ripened [19]. Türkiye exports about 89,000 tons annually of table olives primarily to Romania, Bulgaria, Russia, and Germany [15]. Considering all these aspects, olives hold a crucial place in the country's economy as a significant source of income for numerous producers and as an industrial raw material. Investments in this sector are expected to have a positive impact by meeting domestic demand and promoting exports. Establishing olive orchards emerges as a financially viable investment. However, careful attention to climate, land, and other ecological factors during the investment period is essential. Proper technical maintenance, suitable climate and ecological conditions, correct variety selection, proximity to major markets, and domestic/international trade opportunities all contribute to making olive fruit production a profitable sector.

4. Application

In this section, financial analysis for olive cultivation has been conducted using information obtained from farmers and land pricing values from real estate sales platforms. Land prices in a suitable region for olive cultivation in Bursa, which includes vacant land with mature table olive trees, were considered. Calculations were made assuming the acquisition of one of the vacant alternative lands deemed suitable for olives, and a 10-year project was planned. Basic cost and income expectations for olive cultivation on the selected land are determined as shown in Table 1.

4.1. Financing with interest-bearing debt

Ziraat Bank and Agricultural Credit Cooperatives encourage the use of certified seedlings to meet the financing needs in agricultural production. Producers intending to establish olive orchards are offered interest-free discounted investment and operating loans. Within this framework, for loans extended for olive cultivation, an interest rate reduction of 75% is set [15]. However, when certified seedlings approved by the Ministry of Agriculture and Forestry are used, an additional incentive increases the interest rate reduction by 20%, totaling a reduction of 95% [15]. Therefore, the interest rate applied in the investment plan is set at 15%.

However, while the maximum limits of these loans are sufficient to meet the investment and annual needs of current landowners, they may be insufficient for those starting agricultural production by acquiring new land. Therefore, investors may need to obtain loans under market conditions. Considering that obtaining loans under market conditions may involve very high interest rates, a more reasonable and realistic annual interest rate of 15% is chosen in this study to establish a balanced comparison between government loans and market loans. The loan is calculated with a grace period for the first 3 years. Since using only this rate for analysis would be insufficient, comparative analysis was conducted using different interest rates, as presented in the comparison section. Cash flow calculations using a 15% interest rate to illustrate the general structure are provided in Table 2.

4.2. Financing with diminishing musharakah

DMFM can occur between two or more individuals, as well as between an Islamic bank and a customer. This partnership involves one party's share increasing while the other's decreases. By the end of the partnership, all shares of the agreed-upon asset are transferred to one of the parties. Throughout the DMC period, profit sharing is based on the ratios determined while considering the share percentages and the nature of the effort contributed.

In this study, calculations have been made from the perspective of two investors who come together without the intermediation of Islamic banks and who assume that both contribute equally in terms of effort. The results are presented in Table 3.

Table 1. Income and expense expectations for table olive cultivation

Market Data	Value	Investment Item	Value
Vacant Land Price per Hectare (TL)	700,000	Capital	3,400,000
Mature Olive Grove Price per Hectare (TL)	1,100,000	Area to be Acquired (Hectares)	4.86
		Number of Trees to be Planted	121
Number of Trees per Hectare	25	3rd Year Yield (kg)	1,214
Yield per Tree at 3 Years (kg)	10	10th Year Yield (kg)	10,321
Yield per Tree at 10 Years (kg)	85	3rd Year Revenue (TL)	123,452
Cost per Sapling (TL)	50	3rd Year Cost (TL)	33,332
Annual Maintenance Cost Rate	0.27	10th Year Revenue (TL)	1,049,345
Price per kg for Olive Grade 1 (TL)	125	10th Year Cost (TL)	283,323
Price per kg for Olive Grade 2 (TL)	100	Initial Year Sapling Cost (TL)	6,071
Price per kg for Olive Grade 3 (TL)	80	1st Year Maintenance Cost (TL)	4,000
Average Price per kg of Olive	102	2nd Year Maintenance Cost (TL)	10,000
		10th Year Land Value (TL)	5,342,857

4.3. Comparison of results

In the study, the initial cost of establishing the orchard is 3,406,071 TL. However, in IBDFM, the total repayment of the loan includes interest, resulting in a total cost of 5,714,255 TL under the current FM. In the DMFM, since there is no interest involved, the initial cost remains 3,406,071 TL. Despite the fixed returns due to reduced costs, profitability percentage has increased. Interest rates in IBDFMs can vary over time. This variability affects repayment costs and can lead to liquidity issues. The absence of interest rates in DMFM eliminates these risks associated with IBDFM. The study includes sensitivity analysis for different interest rates, and the comparison of FMs is presented in Figure 4.

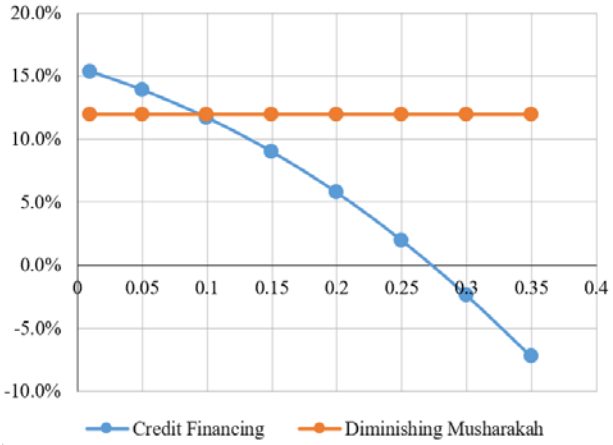

Figure 4. Comparison of financing models for different interest rates

It is observed that the Internal Rate of Return (IRR) increases for IBDFM at lower interest rates than the current rate. However, the same does not apply to DMFM. For DMFM, the internal rate of return values remain constant across different interest rates.

5. Discussion

The demand for olives in Türkiye is expected to follow a positive trend in the coming years. Several key factors contribute to this optimistic outlook. Firstly, increasing awareness of healthy eating and consumer demand for organic products are driving the rising demand for olives thanks to the positive health effects of the many minerals, vitamins, and antioxidant oils they contain. Türkiye's potential to be a global player in olive production offers export opportunities beyond meeting domestic demand. However, factors such as climate conditions and technical details in agricultural practices, and others need to be considered. Regular market analysis and sectoral assessments will be crucial for making future demand predictions more definitive.

The future projection of olive orchard establishments can vary based on several factors. Overall trends and developments impacting the olive sector include increasing health consciousness, demand for organic and natural products, innovative products and flavors, international market growth, sustainable agriculture and production, climate change and harvest cycles, technological advancements, digital marketing, and global collaborations. A combination of these factors can influence the future growth and evolution of the olive sector. Olive producers and businesses can succeed by monitoring market developments, adapting to changing demands, and embracing sustainable production practices.

Table 2. Cash flow for financing scenario with interest-bearing debt

Year	Capital Investment	Land Sale Revenue	Agriculture			Financing Cost	Net Amount
			Income	Expanses	Profit		
0	-1,700,000			6,071	-6,071	0	-1,706,071
1				4,000	-4,000	0	-4,000
2				10,000	-10,000	0	-10,000
3			123,452	33,332	90,120	-501,023	-410,902
4			255,723	69,045	186,678	-501,023	-314,345
5			387,993	104,758	283,235	-501,023	-217,788
6			520,264	140,471	379,792	-501,023	-121,230
7			652,534	176,184	476,350	-501,023	-24,673
8			784,804	211,897	572,907	-501,023	71,885
9			917,075	247,610	669,465	-501,023	168,442
10		5,342,857	1,049,345	283,323	766,022	-501,023	5,607,856
						Internal Rate of Return	8.985%

Table 3. Cash Flow for financing scenario with diminishing musharakah

Year	Capital Investment	Land Sale Revenue	Land Share Transfer	Agriculture			Rate to be Paid from Profit	Net Amount
				Income	Expanses	Profit		
0	-1,700,000				6,071	-6,071	0.50	-1,703,036
1			-179,714		4,000	-4,000	0.50	-181,714
2			-189,429		10,000	-10,000	0.45	-194,928
3			-199,143	123,452	33,332	90,120	0.40	-145,071
4			-208,857	255,723	69,045	186,678	0.35	-87,517
5			-218,571	387,993	104,758	283,235	0.30	-20,307
6			-228,286	520,264	140,471	379,792	0.25	56,559
7			-238,000	652,534	176,184	476,350	0.20	143,080
8			-247,714	784,804	211,897	572,907	0.15	239,257
9			-257,429	917,075	247,610	669,465	0.10	345,090
10		5,342,857	-267,143	1,049,345	283,323	766,022	0.05	5,803,435
							Internal Rate of Return	11.96%

In comparing DMFM and IBDFM, DMFM is more cost-effective due to the absence of interest costs, making the project more attractive. From the perspective of banks, it has been concluded that IBDFM is not an attractive investment concerning repayment. In an analysis based on a Minimum Attractive Rate of Return (MARR) of 5%, IBDFM appears attractive, but DMFM is deemed more appealing. DMFM has yielded better results in terms of feasibility compared to IBDFM, primarily because the absence of interest costs has facilitated a more comprehensive income-expense analysis.

Olive cultivation is a significant economic activity, especially in countries with a Mediterranean climate, and businesses in this sector may face various commercial risks. Among these risks, yield and market fluctuations are prominent. Yield risk arises from various natural factors affecting olive trees, such as unexpected weather events, pests, or diseases which significantly impacting both the quantity and quality of olive production. This creates considerable income uncertainty for olive and olive oil producers. On the other hand, market fluctuations also play a crucial role among commercial risks. Global and local economic conditions, changes in consumer preferences, and regulations in export-import policies can influence the prices of olive products. These two primary risk factors directly impact the financial performance of olive cultivation businesses. Therefore, effective implementation of risk management strategies is critical for the sustainability of these enterprises.

DMFM offers significant advantages in financing olive production and plays an effective role in managing various risks. This FM eliminates additional costs that may arise from interest payments, thus reducing financial obligations for olive producers. Fixed repayment plans help olive producers manage cash flows more effectively and facilitate financial planning. Additionally, in DMFM, initial costs and profits are shared among partners, reducing startup costs and mitigating investment risks.

DMFM also presents important advantages in terms of commercial risks such as yield fluctuations and market volatility. This model allows risks to be shared among parties; in adverse situations like low yields or market fluctuations, the producer does not bear the entire risk alone. Partners collectively shoulder such risks. DMCs can offer flexible repayment terms during unfavorable market conditions, preventing financial pressure on producers and enabling them to continue operations. Moreover, partners typically establish long-term relationships in this model, allowing producers to make long-term plans and investment decisions with greater confidence.

Another significant advantage of the DMFM is its ability to manage cash imbalances throughout the year. In IBDFM, monthly installment payments create a regular burden, while olive harvesting occurs only once a year, with production expenses concentrated at specific times of the year. This can lead to cash flow imbalances and financial strain for the producer. In contrast, repayments in the DMFM can be more flexible and tailored to the production cycle based on the DMC. This flexibility helps producers balance cash flow, meet financial obligations focusing on the harvest season, and manage unexpected expenses throughout the year more effectively. Thus, DMFM stabilizes cash flow for olive producers, enhances financial sustainability, and offers a more advantageous option compared to IBDFM.

The DMFM also ensures investment protection. By pooling their capital, partners can invest in larger and more efficient projects, thereby increasing production capacity and efficiency. Partners support olive producers by sharing market knowledge and commercial networks, enabling producers to be better prepared for market fluctuations and achieve better prices for their products. DMFM effectively reduces financial and commercial risks for olive producers. Its features such as interest-free financing, risk sharing, flexible repayment terms, and long-term partnerships help maintain financial stability, enhance resilience against market fluctuations, and support the sustainability and profitability of olive production.

In the comparison between IBDFM and DMFM in olive cultivation, DMFM stands out with its advantages in managing cash flow imbalances. While IBDFM typically involves monthly installment payments, the DMFM allows farmers to benefit from income during the harvest season. Since olive crops are usually harvested once a year, the DMFM enables farmers to manage this income more effectively. The monthly installment structure of IBDFM can lead to financial difficulties for farmers before harvest, whereas the DMFM synchronizes income with the harvest period, allowing farmers to more comfortably meet pre-harvest expenses. Furthermore, the DMFM allows other costs in olive cultivation to be distributed more evenly, offering farmers the opportunity to manage cash flow more sustainably. This demonstrates that, in terms of cash flow imbalance, the DMFM is more advantageous compared to IBDFM.

There are other steps that can be taken to enhance the effectiveness of MFM. Establishing organizations to organize partnership-based FMs (like Mudarabah) (e.g., cooperatives, agricultural chambers, Ministry of Agriculture, Ministry of Trade, public participation banks, etc.) can effectively utilize capital resources for agriculture. Partnerships with pharmaceutical and fertilizer companies through MCs can facilitate profit-sharing trade models, providing both parties with high profit potential and easing cash management. If these partnerships are guaranteed by an intermediary institution, mechanisms such as insurance, financial intelligence, and public institution queries can establish trust, enhancing security for both investors and farmers. On a broader scale, these organizations can organize as regional and national exchanges, increasing liquidity potentials.

Today's agricultural sector has significant transformation potential through diversification of FMs and more efficient allocation of resources. In this context, partnership-based FMs, especially FMs like Musharakah and Mudarabah, can offer innovative and effective solutions for financing agricultural production. Establishing organizations to effectively organize these FMs can create opportunities to utilize idle capital for agriculture while meeting the financial needs of the agricultural sector.

Cooperatives, agricultural chambers, Ministry of Agriculture, Ministry of Trade, and various institutions such as public participation banks can support these FMs. These organizations can act as bridges between farmers and investors, facilitating risk sharing and more efficient use of resources. For example, Musharakah Contracts (MCs) between pharmaceutical and fertilizer companies and farmers enable trade based on profit-sharing models, offering high profit potential for both sides. This approach

also contributes to financial sustainability by facilitating cash management ease for businesses.

The success of partnership-based FMs is directly related to establishing a trust environment. Therefore, conducting such partnerships under the guarantee of an intermediary institution is important. Establishing trust through FMs such as insurance mechanisms, financial intelligence, and public institution queries can create a secure investment environment for both investors and farmers.

On a larger scale, organizing these entities as regional and national exchanges can increase liquidity potentials. Such a structure ensures that financial transactions in the agricultural sector are more transparent, efficient, and accessible. Additionally, enhancing financial depth and diversity in the agricultural sector can reduce overall risks, paving the way for more stable growth. Implementing partnership-based FMs in the agricultural sector can not only ensure effective use of capital but also contribute significantly to the sustainability of agricultural production. This approach expands the financial capacity of the agricultural sector while creating an ecosystem where farmers and investors mutually benefit.

6. Conclusion

The uprooting of olive trees in Türkiye reflects issues related to financial sustainability. Despite high olive exports, farmers' struggles with financial difficulties and the conversion of olive groves for other purposes are increasing sustainability concerns in the sector. Addressing Türkiye's agricultural potential, particularly through olive cultivation, is strategically important given its geographic advantages. This is because, considering the contributions of olives not only as a food product but also to economic development, the financial sustainability of olive cultivation holds vital importance for the national economy.

This study examines the burden of the current IBDFM on farmers and discusses significant commercial risks arising from yield and market fluctuations. The proposed collaboration-based financing approach offers a more sustainable option for farmers looking to establish new olive orchards. This approach not only presents attractive return potentials for investors but also helps farmers balance their cash flows by reducing financial burdens. Additionally, financing through the DMFM has been seen as a more appealing alternative for farmers sensitive to interest. The findings underscore the need to evaluate alternative FMs to enhance the financial sustainability of olive cultivation. DMFM, particularly in its reduced form, emerges as a more suitable and sustainable financing option for olive cultivation.

Future studies could comparatively analyze the performance of other alternative FMs suitable for olive cultivation. Similar analyses could also be conducted for other agricultural products of strategic importance to Türkiye.

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