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Olive Oil in the North-West of Tunisia: Findings from a Value Chain and Jobs Survey

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
CAP	Common Agricultural Policy
CW	Center West
EVOO	Extra Virgin Olive Oil
F-O/SP	Family-owned or sole proprietorship
FGD	Focus Group Discussion
GDA	Communal ownership groups for Agricultural Development (Groupements de Développement Agricoles)
IOC	International Olive Council
INS	National Statistical Institute of Tunisia
ITC	International Trade Council
NW	North West
ONH	National Oil Office (Office National d'Huile)
OOPAO	Olive oil production of agricultural output
PDO	Protected Designation of Origin
PGI	Protected Geographical Indication
SA	Limited Company (Société Anonyme)
SARL	Limited Liability Company (Société à responsabilité limitée)
SME	Small and Medium Enterprise
SMSA	Mutual Agricultural Service Companies (Sociétés mutuelles de services agricoles)
Survey	Survey of respondents in NW region across agriculture, manufacturing, and distribution segments of the Olive/Olive Oil value chain
Tunisia Strategic Market Segmentation Report	Report on the Roadmap to developing more competitive value chains for Olive Oil, Medicinal plants, and Tomatoes in North-West Tunisia: Findings from the pilot strategic market segmentation
UAA	Utilized Agricultural Area
VC	Value Chain
VOO	Virgin Olive Oil
WBG	World Bank Group

EXECUTIVE SUMMARY

This study analyzes the olive oil sector in the North West of Tunisia, encompassing the governorates of Jendouba, Béja, Siliana, and Kef. It focuses on the creation of more and better jobs in the sector, based on a survey conducted on the olive oil value chain ("VC") in the North West region, and a comparison to other leading countries in the olive oil industry. It thereby determines potential productivity gaps and areas of improvement to ultimately increase the sectors' competitiveness and lead to more and better jobs. The data used for this report was collected in 2017 and 2018. The survey covered a sample of 861 respondents, split across the three main parts of the VC – agriculture (544), manufacturing (192), and distribution (125). The survey involved both quantitative and qualitative interviews as well as focus group discussions.

Global overview

World production of olive oil was 2,56 million tons in 2017 with ~98% concentrated in the Mediterranean basin. Spain (50.3 percent), Greece (7.6 percent) and Italy (7.1 percent) are the top tree ranked olive oil producers and Tunisia (3.9 percent) ranked seventh. Consumption of olive oil has increased significantly, 1.8-fold between 1990 and 2016–17, driven largely by rising consumption in non-IOC member countries while consumption in main producing countries has remained stable. Olive oil consumption is expected to continue increasing moderately given its growing end-use segments: food, pharmaceuticals, and cosmetics and the growing middle class in developing countries such as China.

Tunisia olive oil sector

The cultivation of olive trees in Tunisia extends over the majority of agricultural land. It accounts for 80 percent of the total area devoted to tree crop plantations, 35 percent of arable land, and 65% of all farmer's jobs in Tunisia. Olive oil production varies annually in Tunisia with average production between 2006 to 2016 at ~180,000 tons and a peak in 2015 of ~340,000 tons to meet constrained production in Spain and Italy. Over 90% of olive oil farming is traditional rainfed mostly on steep slopes. Tunisia produces, among others, two autochthonous olive varieties, Chétoui and Chemali, and its olive oil tends to be favored by export markets. Olive oil exports are at the top of agricultural exports, representing about 75 percent of total production in the country. Tunisia is the fifth main exporter and accounts for 5 percent of the world's total olive oil exports. However, the Tunisian Olive Oil sector suffers from climate related and other constraints (quality bottling, packaging, and service at high standards such as logistics) affecting consistency of production levels. Additionally, Tunisia seems to experience some inefficiencies in its olive production practices with low yields in tons olives per hectare (0.8 vs. 2.5-3 of Italy, Spain and Greece). Also, it the ratio of percent olive oil production of agricultural output to percent utilized agricultural land is lower in Tunisia (~0.2) than in Spain and Greece (~0.6 each) and Italy (~0.4). Though this is a challenge for more bulk olive oil focus, the current production characteristics might be favorable to more organic and gourmet olive oil production as they are more environmentally sustainable compared to high-input high-yielding irrigated new farms.

Olive Oil VC in Tunisia NW Region

The NW region represents 41 percent of Tunisia's production of organic virgin olive oil and extra-virgin olive oil, with a total average production of 90,000 tons per year. In the NW region, Chétoui is the main variant. The region produces and sells two main types of olive oil either in bulk or individually bottled. The first is virgin olive oil for which no chemicals or heat is used when extracting oil from the fruit. It maintains the purity and taste of the olive, while production standards are not as rigid as for other oils. Second is extra virgin olive oil, the highest international standard in the industry, which retains more authentic olive taste and has a lower level of oleic acid (not more than 0.8 grams per 100gr) than other olive oil varieties.

The olive oil VC comprises 5 main segments ("production", "picking and collection", "crushing and oil production", "conditioning", and "commercialization") which can be organized across the 3 nodes of agriculture, manufacturing, and distribution. Most establishments in the olive oil value chain are either family-owned or sole proprietorship, by nodes, their share ranges from 99 percent in agriculture to about 61 percent in manufacturing. Micro establishments dominate the olive oil value chain, ranging from about 97 percent in agriculture to 10 percent in manufacturing. Main olive oil customers types differ across VC nodes. Small shop/retailer/wholesalers dominate the agriculture node while large shops/retailers/wholesalers dominate the manufacturing node. There is no real dominant customer type in the distribution node. Across nodes, though by varying degrees, labor and production inputs[1] hold the highest shares of costs with other cost types like fuel, electricity, and water in manufacturing and transportation and storage in distribution emerging as important in line with activities of those nodes.

Jobs in the NW region olive oil VC

The estimated total number of jobs in the NW region's olive oil VC is ~219,793, of which 216,008 are in agriculture (household labor reported in full-time equivalent (FTE)), 3,251 in manufacturing (temporary and household labor in FTE), and ~535 in distribution (temporary and household labor in FTE). By workforce type, ~50,560 workers are permanent, 41,764 constitute household labor (in FTE), and 127,470 temporary labor (of which 809 in manufacturing and 77 in distribution in FTE). Labor intensity is particularly high in the agriculture node of the value chain when compared to the manufacturing node. Less hours are used and more value generated per liter of olive oil produced in the manufacturing node compared to the kilogram of olives in the agriculture node. Given the seasonal nature of the work in the agriculture node, temporary labor accounts for the majority of employment in this sector and very few full-time trained employees are hired throughout all the nodes (highest share in manufacturing at ~50%). Across the value chain, employment is characterized by low levels of education and work experience. Over 70 percent of workers hired across all nodes over the last 3 years have primary education or less. Women ownership of operations is highest in the manufacturing node (albeit only ~8 percent) and in terms of employment, women are most represented in the distribution node. In manufacturing, the share of trained female workers and those in permanent employment reach ~60 percent and more than 20 percent, respectively. Youth[2] are employed as permanent workers throughout all nodes and hold the highest overall share in distribution (~21 percent). For trained permanent youth workers, the highest share is in agriculture at ~25 percent.

Quality of the jobs

Monthly wages of full-time general employees are similar between firms across all three nodes. They range between TND 1,000 and 1,500 and are highest in agriculture. Women tend to be paid less than men for performing similar work; TND 12-15 per day compared to TND 20-25 per day for men. Furthermore, for temporary workers in the agriculture node, wages are significantly lower (equivalent to TND ~400-450 per month) than those for full-time workers. Workers receive in-kind benefits but they typically lack access to social protection benefits associated with formal employment (e.g. healthcare). While wages appear to be low, they are considered to be the main labor-related issue facing firms. That said, only ~35 percent of businesses perceive labor costs as a constraint across all nodes**.**

Opportunities for growth and job creation

[1] These include technical services, seeds/fertilizers, rental of machinery, irrigation, storage, etc. in the agricultural node and raw material inputs in the other nodes.

[2] Determined as workforce of age 25 or younger.

An upgrade *and* reposition strategy might be the best strategy for growth in Tunisia's NW region olive oil VC. In this context, upgrading would imply a focus on adding value by moving to bottling for the current markets that predominantly receive bulk olive oil (and any potential new markets emerging from new extra-virgin olive oil importers). Repositioning, in turn, implies a focus on the emerging and growing premium and gourmet olive oil importers. Tunisia is unlikely to grow its olive oil sector solely through the existing bulk-focused export strategy because its price competitiveness is neither sustainable nor well aligned to creating more and better jobs. Also, Tunisian producers do not have strong productivity competitiveness in this segment and are vulnerable to Spanish producers' dominance and market positioning. However, in the gourmet olive oil segment, Tunisia has an even higher price competitiveness to would be major competitors on quality of oil and an export focus. Tunisia might be in a position to better compete in new and emerging markets where the current labor-cost margin can be used to develop its logistics and promotional capacities. Additional value can be added in the segment by bottling as opposed to selling in bulk.

Based on the hypothetical question on investments in capital and permanent labor (general and trained) needed for doubling output, respondents report elasticities[3] that are suggestive of production functions with diminishing returns to scale. Further, the relationship between investments in capital and permanent labor provide some insights into the dynamics or capital and labor requirements with respect to output growth (measured through a ratio of input growth multiples[4]). Across the value chain, for both general and trained permanent labor, output growth in the olive oil VC requires relatively more capital except in the agriculture node that requires relatively more general labor than capital for doubling production. To increase the likelihood of output growth, Tunisia will have to address current inefficiencies and constraints to production. Most significantly, constraints to accessing finance (which could pose a key constraint as growth will largely be capital-driven) and markets, and challenges in transportation and logistics, as well as packaging inefficiencies and quality of bottles currently available in Tunisia.

Better quality job creation could be expected if output is doubled with more of a focus on higher-end market segments and selling higher-value added bottled olive as serving this market segment requires higher skills. However, it might be hard to achieve these jobs based on reported elasticities, their implied associated costs of labor, and challenges to hiring higher skilled employees (expecting higher wages or applicants lacking required experience). Nonetheless, it would be expected that these new better jobs would benefit women and youth who are lowly represented in current permanent labor at 6.4 percent and 17.0 percent overall respectively.

[3] In separate modules, survey respondents are asked (i) how many additional workers, both general and trained, they would hire and (ii) how much they would additionally invest in equipment/facilities if they were awarded a three-year contract that requires them to double their output. As such, reported elasticities should be interpreted as the input requirement (e.g. labor) to double output holding other inputs constant (e.g. capital). The survey does not ask about the anticipated increase in temporary labor.

[4] The r*atio of labor-capital multiples* captures the relationship between a labor multiple to capital multiple given a doubling of output. If relative input multiple range is (0,1) then output growth in the value chain requires relatively more capital; however, if it is >1 it requires relatively more labor.

1. INTRODUCTION

This study analyzes the olive oil sector in the North West of Tunisia, focusing particularly on the potential creation of more and of better-quality jobs. It is based on a survey conducted on the olive oil value chain ("VC") in the North-West region of Tunisia, benchmarking its performance to other leading countries in olive oil industry to determine potential productivity gaps and areas for improvements to ultimately increase the sectors' competitiveness and lead to more and better jobs. It provides insights on potential areas for policy interventions. This study is part of the "Value Chain Development for Jobs in Lagging Regions - Let's Work Program in Tunisia" which aims to identify some of the most binding constraints affecting the creation and productivity of jobs within targeted value chains in a lagging region in Tunisia and inform relevant World Bank Group lending projects currently in preparation to help tackle these constraints[5].

Economic development in Tunisia has been characterized by significant regional imbalances where coastal regions develop faster and interior regions lag. The North West (NW) and Center West (CW) regions together are home to about 47 percent of the poor in Tunisia. They have the lowest regional development indicators in education, employment, and health and the highest unemployment rates for university graduates. Well-paying jobs and other income opportunities are limited, and poverty levels are high. Consequently, the World Bank Group ("WBG") approach aims to promote structural change in the Tunisian economy, particularly in the country's lagging regions. Its approach uses the concept of VC and cluster development to determine how to improve market access and increase productivity, employment, and competitiveness. The ultimate objective is to create more and better jobs in small and medium enterprises (SMEs) that are competitive[6] in a diversified range of markets.

Ultimate goals of the VC analysis for jobs is to determine opportunities for increasing formal wage employment (more jobs), especially for women, youth, as well as vulnerable groups (inclusive jobs), and improve returns to self-employment and informally employed (better jobs). VCs offer potential to leverage large scale job creation that span from high-skilled, formal employment in globally competitive firms to quality, sustainable earning opportunities for low-skilled self-employed workers or smallholders[7].

Agriculture (crops, forestry, and livestock) dominates the economy in the NW and CW regions, which are regions targeted by multiple WBG operations, including the one to which this technical assistance is associated[8]. The two regions account for 50 percent of Tunisia's agricultural land and 82 percent of forests. Agriculture provides the bulk of employment and income opportunities in these two regions and income levels remain low. The Olive Oil industry in particular is critical in the governorates of Jendouba, Béja, Siliana, and Kef in the North West Region.

The rest of the document proceeds to provide an introduction and overview of the methodology in sections 2 and 3 respectively, contextual background on the global and Tunisian olive oil sector in section 4, and a focus on the olive oil value chain in the NW region of Tunisia in sections 5-7 based on the

[5] This program is part of the Let's Work Program coordinated by the World Bank Group for more and better private sector jobs in countries like Bangladesh, Mozambique, and Tunisia. Let's Work is a global partnership that unites organizations dedicated in the effort to provide effective solutions to the global job crisis by harnessing the potential of the private sector to help create more and better jobs, in a vision that seeks fairness and inclusiveness (see https://www.jobsanddevelopment.org/lets-work/).

[6] Offer fair competition-based opportunities to local actors and smallholders

[7] Jobs in Value Chains Survey Toolkit, World Bank, 2018: 4,

[8] Tunisia Integrated Landscape Management Project

conducted survey with a comparison to benchmark countries and related growth and employment scenarios.

This report is supplemented by the "WBG Support to Value Chain Competitiveness in Tunisia" report which goings into further detail about the productivity and employment growth opportunities, challenges to these and initiatives that can be taken to mitigate the challenges.

2. METHODOLOGY

2.1 Quantitative data collection

The data used for this report was collected from 861 respondents, split across the three main parts of the VC (agriculture, manufacturing, and distribution), mostly in the NW of Tunisia. Of all respondents, 544 belong to the agriculture node, 192 to manufacturing node, and 125 to the distribution node. The survey was conducted in 2017 and 2018. The primary area for the survey were the four governorates of the NW (Beja, Jendouba, El Kef and Siliana) though some nodes of these VCs were also covered in the governorates of Nabeul, Sfax and Ben Arous. The latter areas were included because they 1. account for most of the processing facilities in the country (>50 percent while only 18 percent of processing facilities are in the North) and 2. constitute the majority of olive processing whereas the NW regions processing facilities (75 mills and 7 packaging units) are currently underutilized at ~20-30 percent of their capacity.

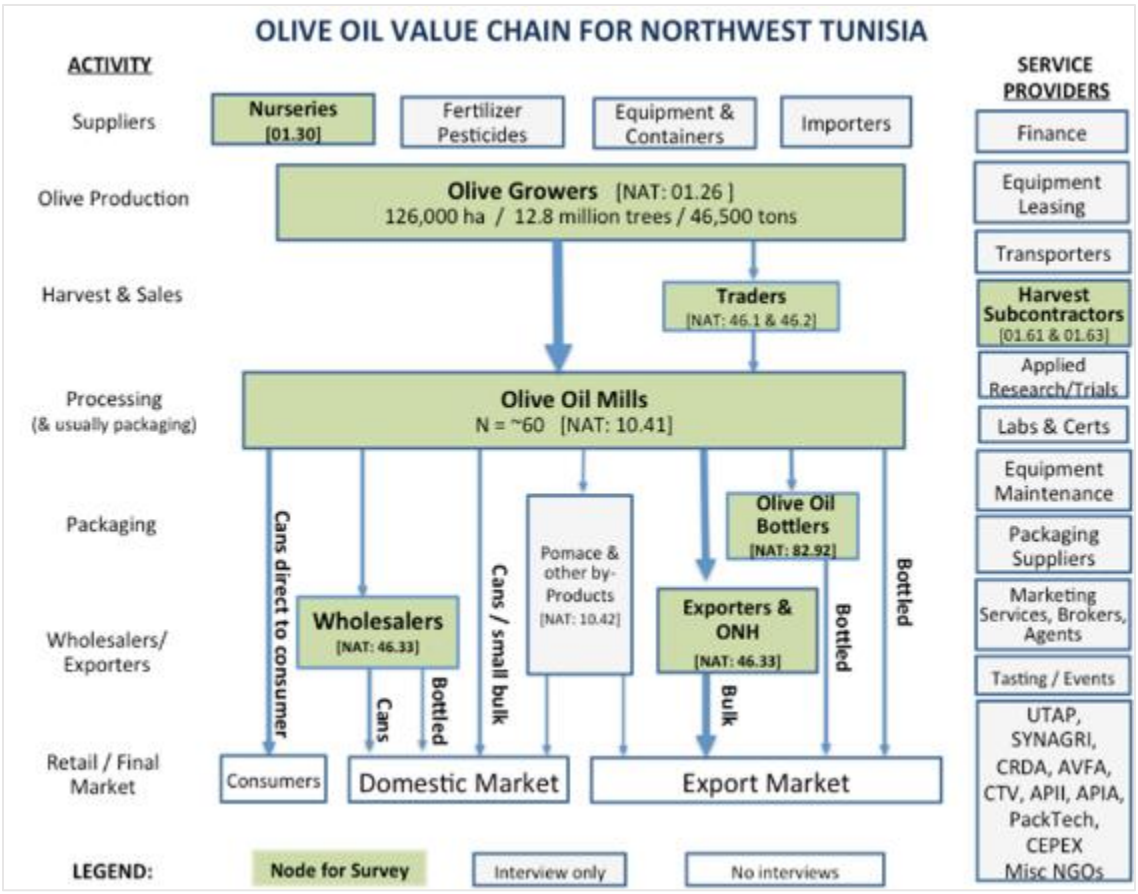
The sampling strategy varied by node of the olive oil value chain. There are three nodes considered: agriculture (nurseries, harvesting subcontractors, and olive growers); manufacturing (olive oil mills, producers of by-products, and olive oil bottlers); and distribution (traders, wholesalers, and exporters & ONH) (Figure 1). The sampling frame was stratified by node and region, with 11 strata in total. The agriculture node, due to the large number and dispersion of establishments, used a stratified two-stage sample design; the first stage consisted of a selection of sample clusters and replacement clusters from the database of the National Statistical Institute of Tunisia (INS). For most establishments, the weight is equal to the inverse of its probability of selection. However, the largest establishments in some nodes were selected with certainty, so they were classified as self-representing and have a weight of 1. See Annex 1 for more detailed information on survey sampling approach[9].

2.2 Qualitative data collection

In order to complement the findings from the quantitative survey, a number of focus group discussion ("FGDs") and individual interviews were conducted with actors from the same nodes. The aim was to get a better understanding of the main issues facing firms in these sectors, with a particular focus on matters related to production, access to imports, marketing, exports, packaging and branding, as well as certification. There was a total of 36 individual interviews, with representatives of nurseries, olive growers, traders and exporters, olive oil mills and producers of by-products. Each of the three focus group discussions was organized around the three nodes. Responses from the interviews and FDGs were coded and analyzed to identify patterns and draw insights (See Annex 2 for methodology used).

[9] For more detailed on the sampling procedure see "Annex 1: Survey Sample design and weighting procedure"

Figure 1: Survey coverage in Tunisia NW Olive Oil VC



2.3 Benchmarking

To put the performance of the Tunisia Olive Oil VC in perspective, comparator country market performance (benchmarking) was undertaken. Additionally, benchmarking provides useful insights on possible constrained segments/nodes of the Tunisia Olive Oil VC and probable performance targets it could reach. There is no official, universally recognized benchmark in the international olive oil market; as such, representative markets (i.e. Spain, Italy, and Greece – some of the best performing countries in Olive Oil production) were considered. The report merely draws insights from these markets and is not intended to be a comparative assessment of the olive oil sector across the four countries. The analysis of specific nodes will pay special attention to the Tunisian case and highlight lessons from benchmarking countries to address similar problems or opportunities which Tunisia encounters.

Though potential insights will be drawn from other markets, this report does not attempt to prescribe what Tunisia should do as the operating context of the Tunisia olive oil sector is different from comparator countries. The report does not explain in detail the specific strategies that firms need to implement to be more competitive; instead, it provides general guidance on where market opportunities lie and the foundational considerations for accessing them.

3. OVERVIEW OF THE OLIVE OIL SECTOR

3.1 Global olive oil context

World production of olive oil was 2,56 million tons in 2017 with ~98% concentrated in the Mediterranean basin[10]**.** Spain (50.3 percent), Greece (7.6 percent) and Italy (7.1 percent) are the top tree ranked olive oil producers and Tunisia (3.9 percent) ranked seventh (Table 1). Beyond the Mediterranean basin, the cultivation of the olive tree is spreading to other countries, such as the United States, Afghanistan, India, Pakistan, South America countries[11], and other Asian countries. Production areas are being developed, often through foreign investment from leading traditional countries such as Spain and Italy. It is likely that new producer countries will increase quality and productivity and will become competitors of the Mediterranean area in the long term. Globally, the total area of olive groves is over 11 million hectares in 47 countries. More than 6.7 million families worldwide have olive trees with an average 1.67 hectare per family[5].

Table 1: Main olive oil producing countries (2016-17)

Country	Production (tons, thousands)	Percentage of world total	Percentage change from 2006
Spain	1,290.6	50.3	+56.2
Greece	195.0	7.6	−54.0
Italy	182.3	7.1	−71.3
Turkey	178.0	6.9	+58.9
Morocco	110.0	4.2	+46.7
Syrian Arab Republic	110.0	4.2	+10.0
Tunisia	100.0	3.9	-54.5
Portugal	69.4	2.6	+138.5
Algeria	63.0	2.4	+96.9

Source: IOC website, 2019

The worldwide consumption of olive oil has increased significantly over the last decade. Pressing whole olive produces olive oil but it is also used in cosmetics, pharmaceuticals, and soaps, and as fuel for traditional oil lamps. Within the Mediterranean, olive oil is the main component in the diet and it has gained popularity in food and beverages in global consumption because of its many proven health benefits and its culinary usefulness. Though olive oil producing countries tend to also be high consumers of it, olive oil consumption is growing in non-producing countries. The global market in olive oil is expected to continue to grow at a moderate pace because of the expansion of its end-use segments (the food industry, pharmaceutical industry, and beauty care and cosmetics industry).

Between 1990 and 2016–17, world consumption of olive oil increased 1.8-fold in volume driven largely by non-IOC member countries[12], whose share of world consumption increased from 11 percent to 24 percent in this period (IOC). The bulk of consumption is still largely concentrated in the producer

[10] IOC website, www.internationaloliveoil.org/. The IOC is the world's only international intergovernmental organization in the field of olive oil and table olives. Its current membership members includes the leading international producers and exporters of olive oil and table olives

[11] Argentina and Chile already produce almost 25,000 tons per year (FAO 2015)

[12] IOC currently has state members, plus the European Union. State members are Albania, Algeria, Argentina, Croatia, the Arab Republic of Egypt, the Islamic Republic of Iran, Iraq, Israel, Jordan, Lebanon, Libya, Montenegro, Morocco, Palestine, the Syrian Arab Republic, Tunisia, Turkey, and Uruguay.

countries. Among non-IOC members, the United States has seen the most spectacular growth in total consumption 336,000 tons in 2018 from 209,000 tons in 2000 (+60,8 percent)[13]. Additionally, changes in world imports of olive oil from 2006 to 2016-17 reflects the change in world consumption of olive oil. The United states accounted for ~39 percent of world imports in 2016-17, European Union ~12 percent, Brasil ~8 percent, and Japan ~7 percent. All countries/regions, except the European union and Australia (no change), increased imports from 2006 (Table 2). Though China accounts for only ~5% of olive oil imports in 2016-17, the IOC estimates that by 2020, 160 million Chinese households will have the purchasing power to include olive oil in their diets.

Table 2: Main olive oil importing countries (2016-17)

Country	Import (tons, 000s)	Percentage	Percentage change from 2006
United States	305.0	39,05	+31,5
European Union*	90.5	11,52	-52,1
Others nonproducers	60.0	7,68	+44,6
Brasil	59.5	7,60	+128,8
Japan	54.5	6,97	+81,7
Canada	39.5	5,05	+31,7
China	39.0	4,99	**
Australia	29.0	3,71	0

**Without intra-community trade. ** No import of olive oil in China in 2006*

Source: IOC website, 2019

3.2 The Tunisian olive oil sector

The cultivation of olive trees is of great importance to the Tunisian economy, contributing to employment, rural development, and exports. The cultivation of olive trees in Tunisia extends over the majority of agricultural land and currently holds 1,788,000 hectares, representing ~ 80 percent of the total area devoted to tree crop plantations and 34 percent of arable land. There are ~60 million olive trees in Tunisia, mostly found in single-crop plantations, but can also be found in combination with other fruit trees. The olive farm distribution is 32% in the north, 46% center, and 22% south. Planting density per region adapts to average annual rainfall. The North, with an annual average 400-600mm of rainfall has the highest density of trees at 100 trees per hectare followed by the center with an annual rainfall of 300-350mm corresponding to 50-60 trees per hectare, and the south with 17-20 trees per hectare given its 200-250mm of rain per year. The general age structure of olive orchards in Tunisia in 2009 was 15.5% young orchards (less than 5 years), 75% bearing orchards (5-50 years), and 9.5% old orchards (greater than 50 years). Olive growing provides income to >309,000 farmers, representing 65 percent of all farmers in Tunisia. Additionally, the IOC Tunisia country profile suggest that it generates 50 million work days a year. The sector has a network of 1,707 olive processing facilities with a ~43,680 tons per 8-hour day capacity. These include 613 traditional mills, 437 press mills, and 657 continuous-process facilities of which 18% are in the North, 28% Sahel, 33% Sfax, 15% Centre and South-west, and 6% South-east. Additionally, there are 7 olive-pomace oil extraction plants (operating below-capacity), and 40 packaging plants with yearly capacity greater than 160 000 tons, a dozen of which specialize in olive oil only[14].

[13] Statista, 2019

[14] IOC Economic Affairs and Promotion Unit County Profiles – Tunisia 2012: https://www.internationaloliveoil.org/what-we-do/economic-affairs-promotion-unit/ (accessed 12/03/2019)

Olive oil productions varies annually in Tunisia; average production between 2006 to 2016 was ~180,000 tons. Average annual production growth in this period was 3 percent. If Tunisia performed at its average production in 2016-17, it would be ranked in the top 4 olive oil producing nations only behind Spain, Italy and Greece (some of its biggest buyers). However, in 2016-17, Tunisia produced only ~100,000 tons, accounting for ~4 percent of global exports and ranking 7th in top producers (Table 1). This signified a ~71 percent decrease from its record production of 340,000 tons of olive oil in 2014/15. Chetoui and Chemali are the main varieties of olives produced in Tunisia (Box 1 provides further context and supplemented by Annex 3 which provides information on olive oil standards).

Box 1: History of Olive Oil Production in Tunisia and the olive varieties it produces

Olive oil was introduced in modern-day-Tunisia by the Phoenicians, it has been producing olive oil since the 8th century BC. It was then spread by the Carthaginians, and under the Roman empire olive oil cultivation expanded even further as irrigation techniques and methods of olive oil extraction evolved. The Arab conquest is associated with the ceasing of olive cultivation, but olive orchards reappeared under the French protectorate (since 1881).

Tunisia produces two main autochthonous varieties, Chetoui and Chemali, considered of best quality. Chetoui, which Is grown in nearly 15 percent of Tunisia olive groves, is present in the coastal region, valleys and highlands in the North-West (the main variety of the region). It is naturally high in phenolics, including antioxidants, and has good levels of mono-unsaturates (oleic acid) that aid oil stability. However, the high level of bitterness in Chetoui means that its flavor can be harsh and unpleasant if the fruitiness of the oil is not well conserved. This variety like all olives needs high standards of processing and storage. Chemlali is cultivated in warm coastal areas, constitutes nearly 85 percent of olive plantations and represents 80 percent of the national production. It has naturally lower phenolics than Chetoui and may have lower levels of mono-unsaturates than some other varieties and therefore lower stability; however, this can be mitigated by early harvest and high standards of processing and storage. Both these varieties are used for the production of table olives and olive oil. There are numerous other varieties that can be utilised, some unique to the NW, others from elsewhere. These include Oueslati which is present in Kerouan and Siliana in the North, Zarazi present in the south, Jerboui present in the North and North West, and Zalmati and Chemchali present in the south (ONH, 2017).

This natural diversity offers opportunities to blend oils for particular taste profiles. Some producers in the NW purchase specific unique oils from other parts of Tunisia for this purpose. Such blends can also deliver stable and exciting oils for discerning consumers.

Traditional, hence extensive, agriculture dominates Tunisia's olive sector and is mainly practiced in marginal lands, the South, and some areas in the Center. It is characterized by a low use of inputs and variable rain, with lower levels in the center and south as discussed. Trees in center and south areas are normally older and less productive. As a result, the productivity in these regions is lower than the NW of the country. Overall, while in some other MENA countries there is an increasing investment in super-intensive systems, Tunisia, however, might want to consider intensive systems (i.e. using drop systems or technologies) especially if it intends to continue to compete on standard extra virgin olive oil exports. However, super-intensive systems, while existing in the country, present several issues related to water consumption and sustainability of the trees. There seems to be a general consensus that super-intensive olive tree farms are not sustainable in the long-term and that both traditional and intensive should be.

Tunisia olive oil tends to be favored because of its high quality and organic nature[15]**.** 40 percent of Tunisia's total olive growing areas are organic olive-growing, covering 125,000 hectares, the third largest in the world. ~30 Tunisian producers are responsible for the 183 percent increase in organic olive oil production in Tunisia from 2006-2013. This presents a unique opportunity to portray itself as a leader in the organic production of food and olive oil in particular. The transition to "organic" cultivation is simple in Tunisia because of the traditional way of growing olives; the main barrier is the cost of certification. With respect to organic olive cultivation, the production characteristics production characteristics may confer advantages regarding organic status, environmental sustainability, carbon status and pest and disease management, especially when compared with high input high yielding irrigated new farms. Additionally, more than 70 percent of the production is of extra virgin quality, especially within the first month of the life of the oil.

Olive oil exports are at the top of agricultural exports and representing about 75 percent of total production in the country with Tunisia as the fifth main exporter, accounting for 5 percent of the world's total olive oil exports[16]**.** Main destinations are the European Union, which took around 70 percent of the exported olive oil, and North America (16 percent); most exports (90 percent) are in bulk. Export of 53,700 tons of Extra Virgin Olive Oil ("EVOO") in bulk to almost 20 countries including Italy (18,800 tons), Spain (16,000 tons), the USA (9,000 tons) in addition to several new destinations like Argentina, Austria, Australia, etc. The country exported 4,200 tons of Bottled ("EVOO") to 31 destinations, including 1,500 tons in France and 1,000 tons in Canada. Tunisia exports packaged olive oil to 50 markets (28 in 2006/07) although markets are less diversified for bulk exports. China and Japan are the only two Asian countries that import Tunisian olive oil, around 1 percent each of them and Brazil is a growing market, three percent in 2016 (ONH, 2016). Tunisia is trying to market its agricultural production as bio, a niche that has a lot of potential across products. This has been also the case of the olive oil and the exports of the bio olive oil are around 12 percent of the total export with a 10 percent higher selling price. Organic olive oil exports have grown from 2,100 tons in 2004 to 13,500 in 2015.

However, the Tunisia Olive Oil sector suffers from climate related and other constraints affecting consistency of production levels. Ninety-five per cent of olive growing is rain fed in varying climactic conditions. The unstable conditions have led to potential shortages in olive oil production in addition to the bad crops in northern Mediterranean countries (due to decimated crops or hot temperatures that attract fruit flies and bacteria have damaged groves). Additionally, poor harvests in Spain and Italy led Tunisia to become the world's second largest producer of olive oil. In 2015, Tunisia has not been able to capitalize on this situation. It suffers from low quality standardization, weak marketing and exports extensively in bulk (90 percent of total olive oil exports, mainly to Italy and to lesser extent to Spain and France). Value-added bottled and branded oils currently represent barely 10 percent of total olive oil exports. Small, technologically ill-equipped and poorly organized producers are disadvantaged in face of the requirements of big international food chains and networks. They find it practically impossible to comply with high marketing and logistical standards of those (Lybbert and Elabed, 2013).

[15] Major determinants of olive oil quality are variety of olive grown and harvested , climate conditions, cultivation techniques, ripening of olives, harvesting modalities, transport and storage conditions of olives, extraction system and conditions, and storage conditions of the obtained oil.

[16] See Box 4, Fig. i in section 6.1 Market opportunities. ***Harvard Center for International Development – Atlas of Economic Complexity*** *(accessed 2019/11)*

Tunisia domestic consumption of olive oil is lower compared to other major producers. The per capita consumption of olive oil in Tunisia is around ~3 kilograms per person, >3-5 times less than other main producers: 16 kilograms in Greece, 11 kilograms in Spain and 10 kilograms in Italy. The domestic consumption of olive oil is relatively weak likely due to its high price in comparison to, subsidized, vegetable oils and despite its health benefits. Additionally, Tunisia also account for <1 percent of total world consumption of olive oil whereas at minimum, major producers account for 7 percent (Greece) (Table 3).

Tunisia seems to experience some inefficiencies in its olive production practices with low yields and production relative to land used. Though its share of olive oil production of agricultural output ("OOPAO") is the highest (9.7 percent vs. 5 percent for Spain, 4 percent Italy, and 9 percent for Greece), its share of utilized agricultural area ("UAA") is 45 percent compared to 9 percent for Spain and Italy and 14 percent for Greece. As such, its OOPAO:UAA ratio is ~0.2, 2-3 times lower than its competitors (0.6 each for Spain and Greece and 0.4 for Italy). Also, its national yield of olives per hectare is 3-4 times lower than competitors at 0.8 tons compared to 2.5 tons for Spain, 2.9 tons for Italy and 3.0 tons for Greece. There might be some knowledge sharing and synergies that are not being leveraged or taken advantage of to improve productivity because it appears that Tunisia has little olive oil produced under cooperatives. On being asked whether firm/establishment are part of cooperative or association 0.2, 13.5, and 0.4 percent of firms/establishment in the agriculture, manufacturing, and distribution nodes respectively report they are[17] compared to 70 percent for Spain, 15 percent for Italy and 50 percent for Greece) (Table 3). In Tunisia, there is still a lot of skepticism in and distrust of this approach.

Table 3: Olive growing sector statistics for Tunisia and major producers

	Spain	Italy	Greece	Tunisia
% Share in world consumption, 2016/17 (IOC, November 2018)	16.2	16.1	3.9	0.8
Per capita consumption (kg), 2014	11	10	16	3
% Share of olive oil production in agricultural output, 2014	5	4	9	9.7 (2012)
% Utilized Agricultural Area (UAA), 2014	9	9	14	45 (2012)
Most productive regions (2014) (percent contribution to national olive production, yield in tons olive per hectare) National yield (tons olive per hectare)	Andalusia (80, 3.3) 2.5	Puglia (36, 3.3) Calabria (30, 5.5) 2.9	Peloponnese (39, 3.5) Crete 30, 3.9) 3.0	North (2012) (25, 1.0) Centre (2012) (65, 0.6) 0.8
Producer selling price for extra virgin olive oil, 2016 (nominal price, euro per 100 kg)	294.3	454.0	342.5	320
% oil produced under cooperatives	70	15	50	13.5 (Jobs survey, NW region)

[17] Though 0.2 percent of olives are produced in farms operating under the GDAs (communal ownership groups for agricultural development)/SMSAs (mutual agreement service companies) legal structure in the agricultural node, no firms in the manufacturing and distribution nodes report operating under this legal structure which poses a slight contradiction to the cooperative response.

4. OLIVE OIL VALUE CHAIN ANALYSIS IN NW TUNISIA

4.1 Overview of the olive oil VC in NW Tunisia

The NW region represents 41 percent of Tunisia's production of organic virgin olive oil ("VOO") and EVOO, with a total an average production of 90,000 tons per year. It includes the Beja, Jendouba, Kef, and Siliana districts with 75 olive mills (~5 percent of total), 7 packaging units (25 percent of total), and 180,000 hectares of land (7 percent of national land but ~10% of crop plantations). The region represents 16% of national total olive trees based on its 100-150 trees per hectare (See Table 2 for overview of NW value chain) with lowest costs per tons due to its relatively high density and low labor costs. The NW region records the highest yields (904 kilograms per hectare) (DGPA 2017), compared with Central (870 kilograms per hectare) and South (650 kilograms per hectare) regions of Tunisia. The higher yield is attributable to its higher rainfall, higher planting density, and younger age of olive trees. Though yields are high, productivity in the region, especially in Kef and Siliana, is amongst the lowest in the Mediterranean area.

In this region, the main commonly produced olive oils are EVOO and VOO with the Chétoui olive variety dominating plantations though some varieties exist as well (see Annex 3 for olive oil standards). ~90 percent of the olive trees are the Chétoui variety and 10 percent are Gerboui and Oueslati. The Chétoui variety has some of the highest yields (28 percent in oil) and produces fruity oil, with a predominant aftertaste, that is highly appreciated for its phenolic content and as an antioxidant. Gerboui variety produces 25% of oil yield with an oil with a flavor reminiscent of fresh fruit with a tinge of bitterness. Oueslati variety is grown in the Kairouan region (outside of scope of VC analysis) an is a well-balanced and fruity oil, with low bitterness and a taste that is reminiscent of almonds.

Box 2: Segmentation of the main olive oils, their use, and quality

Virgin Olive Oil: is commonly used for cooking. An unrefined oil for which no chemicals or heat is used when extracting oil from the fruit. It maintains the purity and taste of the olive, though production standards are not as rigid as for other oils. It is considered a "commodity" that satisfies the basic needs of buyers. VOO has a free acidity, expressed as oleic acid, of not more than 2 % (2 grams in 100 grams) and the other characteristics of which correspond to those fixed for this category in this standard. It is derived from virgin oil production only it has good taste although inferior to extra-virgin olive oil.

Extra Virgin Olive Oil: EVOO is high-quality olive oil and the highest internationally recognized standard. It is commonly used for seasoning. Because of the way the oil is made, it retains more authentic olive taste and has a lower level of oleic acid (not more than 0.8 grams per 100gr) than other olive oil varieties. It also contains more of the natural vitamins and minerals found in olives. It is considered an unrefined oil because it is not treated with chemicals or altered by temperature. It is derived from virgin oil production and from first pressing only and has superior flavor.

Gourmet/premium olive oil: "Gourmet" olive oil is not only Extra virgin but also a highly-differentiated product, with strong value added, few surrogates, and high entry barriers. Quality is subjective as it is based on buyers and experts' opinions when assessing the oil. Differentiation aspects refer to sensory experiences, production processes, uniqueness of treatment, packaging. Consumers and buyers of this product are more demanding than for the other olive oils. Production is more complex because attention is paid on quality control.

The NW region olive oil VC comprises 5 main segments which can be organized across the 3 nodes of agriculture, manufacturing, and distribution. The five segments are "production", "picking and collection", "crushing and oil production", "conditioning", and "commercialization". The agricultural node encompasses "production" and "picking and collection" with some of the main actors being nurseries, olive growers, and harvest subcontractors. Main suppliers for this node are those focusing on fertilizers/pesticides and equipment and containers. The manufacturing node encompasses "crushing and oil production" and "conditioning" with some of the main actors being olive mill operators, pomace and other by-product producers, and olive oil bottlers. The distribution node encompasses "commercialization" with some of the main actors being traders of olives to mills, wholesalers of olive oil to domestic market, and exporters & ONH who sell to the export market. Olive mills, olive oil bottlers, and pomace and other by-product producers do also sell directly to end customer (domestic or export) mainly in cans, bottled or small bulk. Throughout the VC many service providers contribute such as financiers, logistics companies, marketers and service agents, laboratory and certification operators, etc. See Figure 1 earlier for more of the interaction and Table 4 below for the main features of the NW region Olive Oil VC[18].

Table 4: Main features of the NW Tunisia Olive Oil VC

Segment	Description
Production	• 180,000 hectares of olive trees, including 5,600 hectares in organic mod • > 36% young trees • 56,900 tons of olives per year; 90% of planted olive trees are of Chétoui variety • Less than 4% of the area is irrigated • Low level of control of cultivation techniques • Jobs created are 15 to 20 days per hectare per person; 1 work day (6 hours) earns between TD 10 and TD 20
Picking and Collection	• Picking is done manually • Amount of olives at harvest is estimated at 80 kilograms to 100 kilograms per TD per person • No control over collection (a very high waiting period) • Lack of transport logistics
Crushing and oil production	• Two-thirds of production is processed outside the region • Oil mills are below their capacity (20–30%) • Poor mastery of technical processing and extraction • No valuations of byproducts • Jobs created are 5 permanent posts per mill
Conditioning	• 75 mills • 7 units for processing (2 organic) • High need of mobilization of large capital (purchase of olives, picking, collecting, trituration, storage, packaging) • 10 permanent jobs created per unit • used to produce olive oil residue, seed oil, and packaging units, around 40 of which 10 package only olive oil

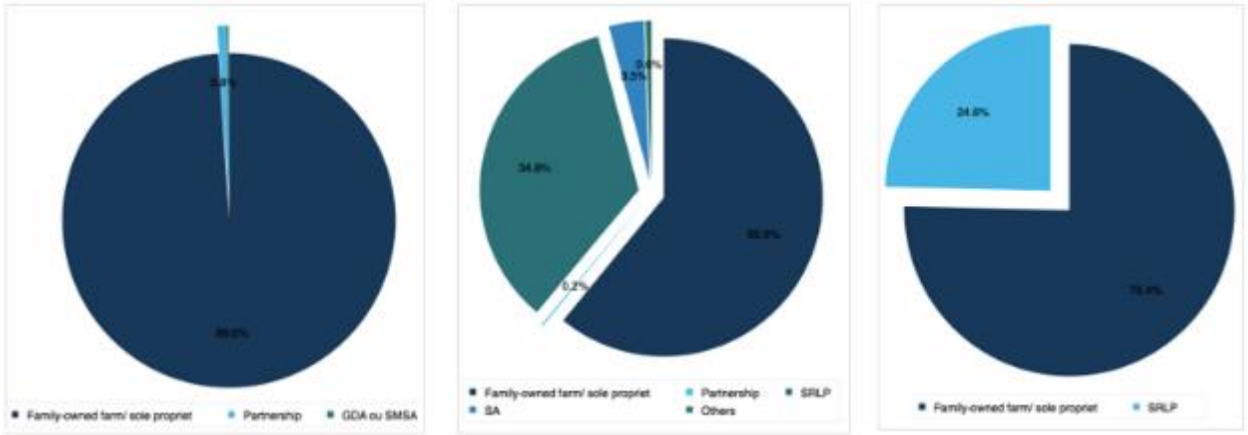
[18] See "Annex 1: Survey sample design and weighting procedure" for the sampling approach, actors sampled and number of respondents

Commercialization	• ~90% of the production is exported and mainly in bulk • Organic olive oil accounts for ~12% of exports

4.2 Structure of the olive oil VC in NW Tunisia

Most farms/firms in the olive oil value chain node are either family-owned or sole proprietorship "F-O/SP", with ~61 percent in manufacturing being the least share of this legal structure across the nodes and 99% the highest in agriculture (Figure 2). Almost all agricultural farms/firms are F-O/SP with only 0.8% being partnership and the rest communal ownership ("GDA") and Mutual Agreement Service Companies ("SMSA"). The distribution node firm's legal structure has only 2 varieties; F-O/SP accounts for ~75 percent of firms and "SARL" for ~25 percent. Manufacturing has the lowest share of F-O/SP firms at ~61 percent and the most diverse legal structure mix. ~35 percent of firms are SRLP and 3.5 percent Société Anonyme ("SA"). The rest are partnership and other type.

Figure 2: Legal structure of farms/firms across the value chain nodes (agriculture - LHS and Distribution - RHS)

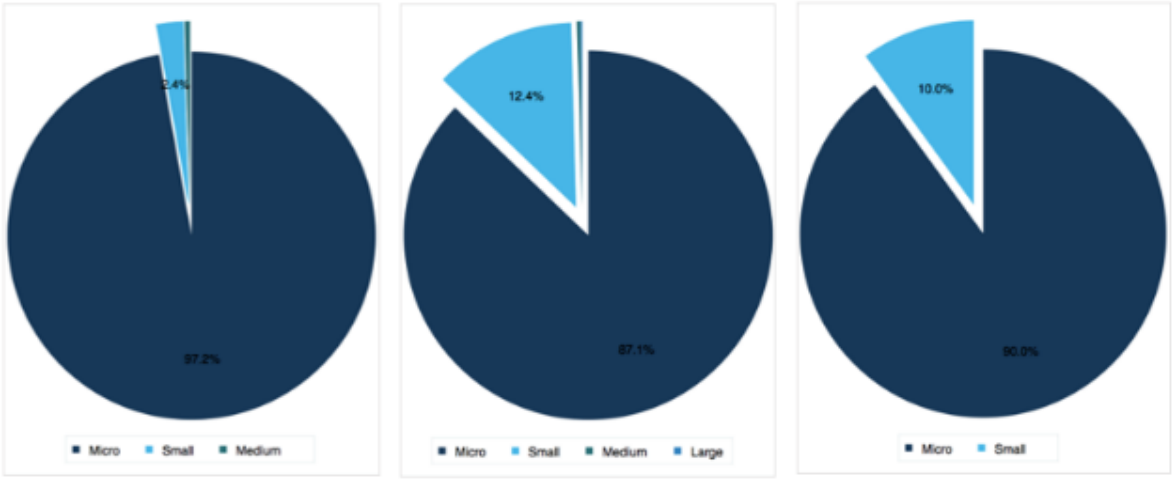


Source: Jobs survey

Additionally, micro[19] firms/farms dominate the olive oil value chain, with their least representation being in the manufacturing node, which is 10 percentage points from the highest representation in agriculture (figure 3)**.** ~97 percent of farms in the agriculture node are micro and ~2 percent small sized, with a small percentage of medium farms. This, combined with the high share of F-O/SP firms, illustrate large potential for scaling through cooperatives, joining ventures, or partnerships to leverage scale economies. Within manufacturing, there are lesser micro firms (87 percent) and a larger share of small firms (12 percent). Half a percent of firms are medium and large. Distribution has only micro and small firms split 9 to 1. This suggests a very fragmented distribution network which might be prone to coordination challenges especially where processes might need to be standardized to get a clear and consistent Tunisia olive oil branding.

[19] Micro establishments have 10 or less workers, small establishments 11-30 works, medium establishments 31-200 workers and large establishments > 200 workers

Figure 3: Distribution of establishments by its size in each node - agriculture (LHS), manufacturing (Mid), and Distribution (RHS)

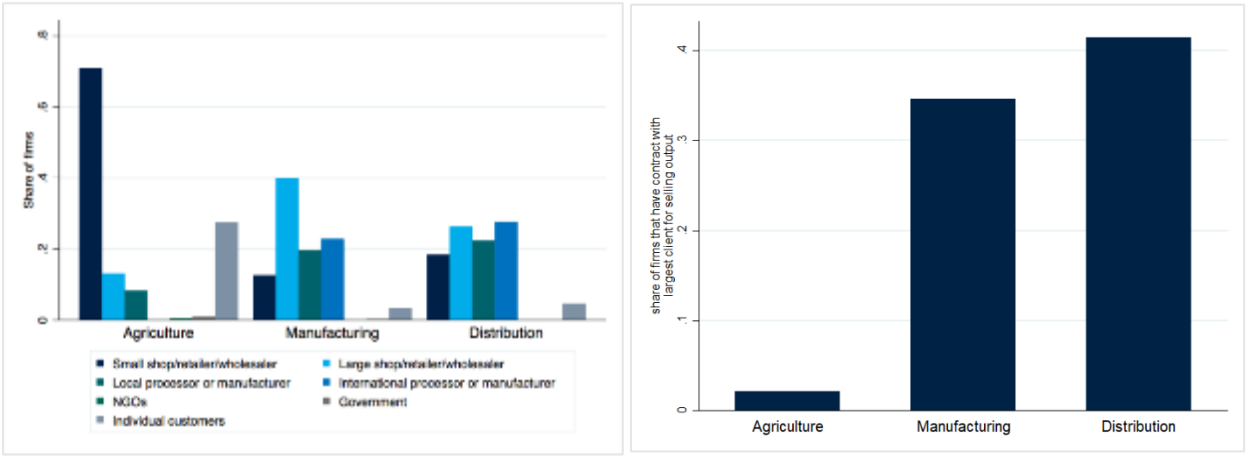


Source: Jobs survey

All nodes of the olive oil VC participate in sale of output with differences in dominant customer types and extent of selling by node; manufacturing and distribution firms more active (Figure 4). Small shop/retailer/wholesalers dominate the agriculture node, large shops/retailers/wholesalers dominate the manufacturing node, and there is no standout dominant player in the distribution node. Across all nodes of the value chain, small and large shops/retailers/wholesalers; local processors or manufacturer; and individual customers feature as customers at varying shares. The most prominently dominant player in any node is small shops/retailers/wholesalers in agriculture at 70 percent; all other shares of customer types are ~40 percent and below. The agriculture node's second largest customer type are individuals at ~23 percent who seem to have the most representation in this node compared to other nodes (~4-5 percent in the manufacturing and distribution node). Large shops/retailers/wholesalers and local processor/manufacture also feature (both <= 15 percent). Though consumption of olive oil per capita is low (Table 3), it seems as though individuals predominantly buy olives directly. Locals can reduce final packaged olive oil costs by going directly to mills to have their bought olive processed, deriving the same value at lesser costs. That said, less than 2 percent of farms participate in selling outputs.

In the manufacturing node, large shops/retailers/wholesalers (~40 percent) are the biggest customers, followed by international and local processor/manufacturer (~22 percent and 20 percent respectively). Small shops/retailers/wholesalers do feature in this node as well but to the lowest extend of all nodes (~11 percent). Individuals also buy directly from firms in the manufacturing node but account for a very small share only (<5 percent); the same is observed in the distribution node. This might confirm that processed olives might be more expensive for consumers compared to direct sourcing. Additionally, small and large shops/retailers/wholesalers and local and international processors/manufacturers are major consumers in this node (all around 20-23 percent share). The latter though leads all other customer types, as would be expected, given the anticipated international orientation of this node for exporting purposes. Within the distribution node, over 40 percent of firms have a contract to sell to their largest client while ~35 percent of firms in manufacturing have this arrangement.

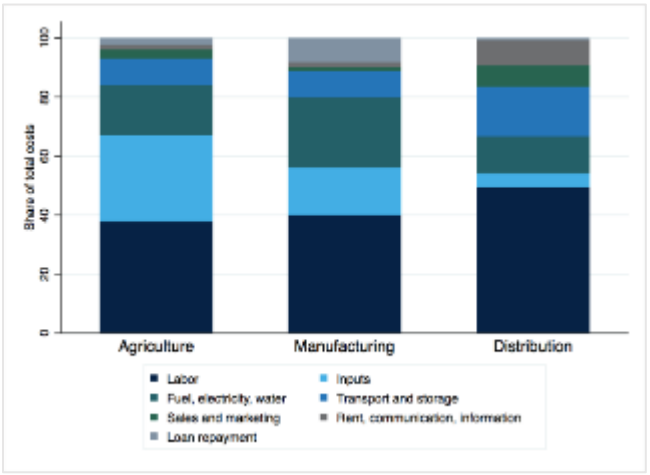
Figure 4: Customer type across the nodes of the Tunisia NW Olive Oil Value Chain



Source: Jobs survey

Across the nodes, though by varying degrees, labor and inputs constitute the greatest shares of costs with other cost types emerging as important based on the expected activities in each of the nodes. Labor and inputs account for over 50 percent of costs across all the nodes. However, distribution has the highest share of labor costs (~50 percent) with relatively low share of input costs (~2 percent) while agriculture has less than 40 percent of costs attributable to labor and ~30 percent to inputs. The second largest share of costs in distribution is "transportation and storage" and "rent, communication, and information" also constitutes a notable share of costs. Both these costs are not surprising given the predominant activities in this node (logistics and customer/marker sourcing and coordination). Labor is also a large share of costs in manufacturing; but, "fuel, electricity, and water" are second largest category of costs. Given the industrial nature of activities in this node, "fuel, electricity, and water" would be expected to account for a fair share of the costs. Loan repayment costs are also notable in this node and might be suggestive of high capital intensity nature of the node.

Figure 5: Split of costs types across each node



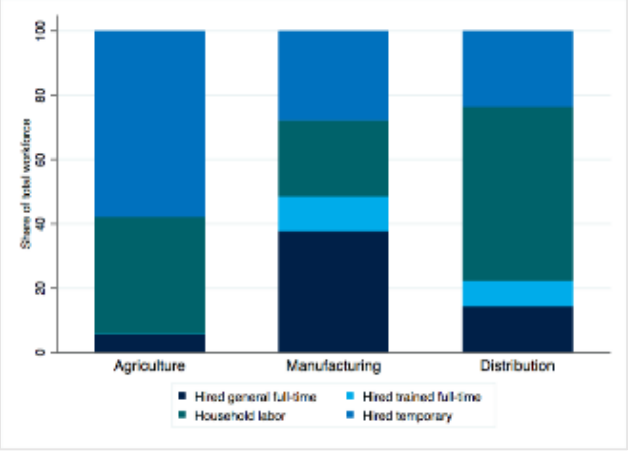
Source: Jobs survey

5. JOBS IN TUNISIA'S NW REGION OLIVE OIL VALUE CHAIN

5.1 Employment/employee profile

Given the seasonal nature of the work in the agriculture node, temporary labor accounts for most employment in this sector and very few full-time trained employees are hired throughout all the nodes (Figure 6). The total number of jobs in the NW region olive oil VC is ~219,793, of which 216,008 is in agriculture (household labor reported in full-time equivalent (FTE)), 3,251 in manufacturing (temporary and household labor in FTE), and ~535 in distribution (temporary and household labor in FTE). By workforce type, ~50,560 workers are permanent, 41,764 household labor (in FTE), and 127,470 temporary labor (of which 809 in manufacturing and 77 in distribution in FTE)[20] (Table 5). Over 90 percent of agricultural node labor is temporary (58 percent) and household labor (36 percent). Though full-time trained workers do not seem to be a feature of the Tunisia NW olive oil, with the highest representation found in the manufacturing node (~10 percent), they seem to account for <1 percent of workers in the agriculture node. Manufacturing node has the ~50/50 split between fulltime and household and temporary labor, with general full-time hired constituting the largest share. This might indicate that institutional knowledge retention is important for processing, conditioning and bottling activities and some processes requiring high skills given the share of trained labor. The distribution node, on the other hand, relies more heavily than others on household labor (54 percent of total workforce). Employment structure does vary somewhat by size of the firm; for example, household labor becomes less important the larger the firm and is replaced, along with temporary workers, by full-time employees. In the manufacturing node, medium or large firms rely almost exclusively on full-time workers. Last, survey results show that temporary labor accounts for more than half (57 percent) of all the hours worked in the olive oil VC in the NW which seems reasonable as the most labor-intensive segment of the value chain is agriculture which also accounts for largest share of labor.

Figure 6: Employment type



Source: Jobs survey

[20] See "Annex 5: Deriving baseline workforce numbers".

Table 5: Baseline estimated employment in the OO VC in NW Tunisia

Category of Employee	Agriculture	Manufacturing	Distribution	Total
Total Employees				
Permanent (general)	45,082.4	1,737.7	152.5	**46,972.6**
Permanent (trained)	2,948.3	450.1	188.5	**3,586.9**
Household labor	41,392.9	254.0	116.7	**41,763.6**
Temporary labor	126,584.6	809.1	76.6	**127,470.3**
Women Employees (Permanent[21])				
Permanent (general)	2,470.4	28.8	20.7	**2,519.8**
Permanent (trained)	597.1	24.8	108.3	**730.1**
Youth Employees (Permanent)				
Permanent (general)	7,535.2	303.9	28.2	**7,867.3**
Permanent (trained)	716.9	5.8	18.4	**741.1**

Source: Jobs survey

Based on revenue per working hour, labor intensity[22] is higher in the agricultural node of the olive oil VC compared to the manufacturing node. In terms of revenue per hour, EVOO in manufacturing returns Euro 0.14 while olive in agriculture Euro 0.064.[23] As such, labor intensity is higher in the agricultural node based on its lower returns per hour compared to the manufacturing node. Additionally, on average, it takes ~22 hours to produce a liter of olive oil in the manufacturing node compared to 44 hours per kg of olives in the agricultural node (Figure 7)[24]. Fewer working hours are required in the manufacturing node for more revenue, indicating that production is for a higher value product. The higher working hours in agriculture node likely illustrates the dependency of labor in this node for both plantation and harvest as opposed to machinery. Possible causes of the high dependency on labor are low labor costs and high cost of capital or finance, a constraint to investing in machinery. The small size of plantations and location also seem to limit the types of investment in technology that are possible for this node.

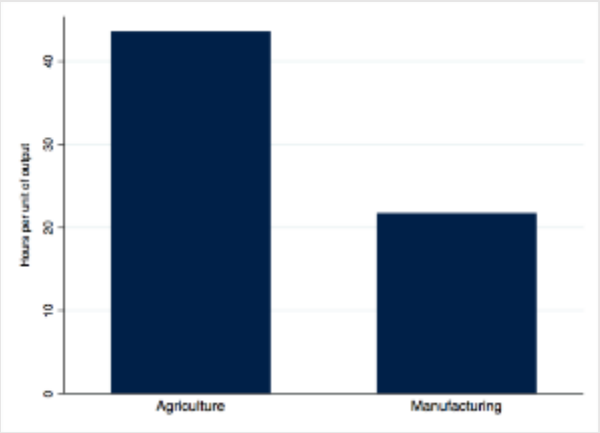
Figure 7: Hours per output of product

[21] Reliable information for gender and age employee dynamics was found in permanent employees (see figures 9 and 10)

[22] Labor intensity is determined based on the revenue generated per hour of labor. Where more value is generated per hour, labor intensity is taken to be low.

[23] EVOO price is per kg, where 1 kg = 1.1 liters, is Euro 3.43 (IOC, Aug 2019; as such Euro 3.12 per liter) while that of olives per kg is Euro 2.81. As there was difficulty finding the price of table olives in Tunisia given the diverse range, the lower end price of table olives in Spain (which ranges Euro 2.81-3.89) is used as a proxy: https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/canned-olives/

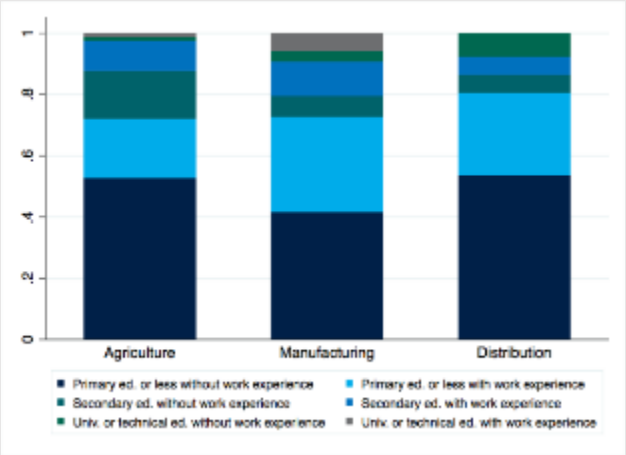
[24] To calculate hours worked per product we use baseline employee numbers for permanent and temporary workers (as discussed in "Annex 5: Deriving baseline workforce numbers") and multiply by 2080 hours in a year (i.e. 8 hours per day in a 5-day workweek); for household labor, hours worked by each member are given in the survey. Data was not gathered for the distribution node as it was not expected to produce output.



Source: Jobs survey

Throughout the value chain, employment is characterized by low levels of education and work experience based on new hires in the last 3 years (Figure 8). Across all nodes of the value chain, over 70 percent of workers have only primary education or less with the highest being in distribution at ~80 percent and at least 50 percent of workers in any node has no prior work experience. As would be expected given the higher levels of trained workers, the node with the highest education level is manufacturing and is the only node that prominently feature tertiary educated workers with none seemingly found in distribution and very few in the agriculture node.

Figure 8: Education levels of new hires last 3 years



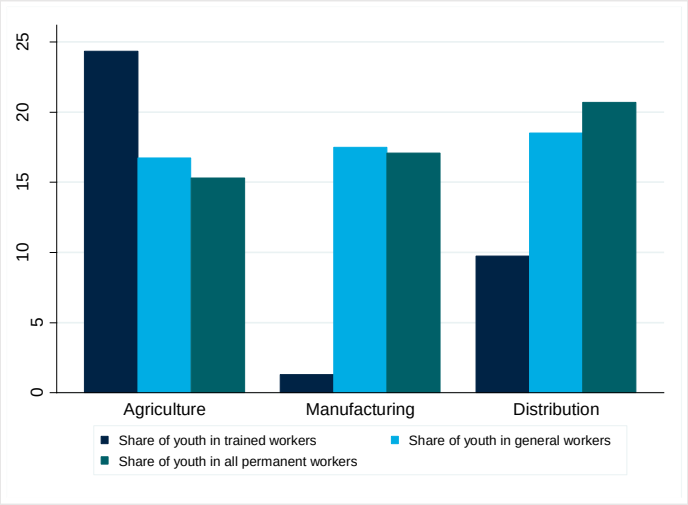
Source: Jobs survey

The survey suggests that youth[25] are employed as permanent workers throughout all nodes and hold the highest share in distribution (Figure 9). However, for trained workers, youth have the highest share in agriculture and at close to 25 percent of workforce and lowest in manufacturing at ~2 percent of workforce. There is no real significant difference in share of general youth workers throughout the nodes as they range from 17 percent in agriculture to ~ 19 percent in distribution. As the agricultural node is characterized by high shares of uneducated/unskilled new workforce (Figure 8) and per below high wage

[25] Determined as workforce of age 25 or younger.

pressure, this likely explains why youth might be favored as skilled permanent workforce as their relative wages to skilled experienced workforce will likely be lower.

Figure 9: Share of youth in permanent workers

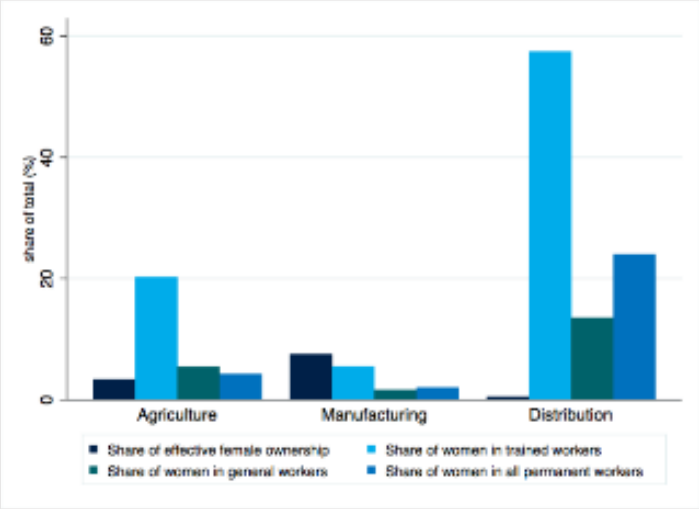


Source: Jobs survey

Women ownership is highest in the manufacturing node and in terms of employment, women are most represented in the distribution node (Figure 10). The share of women is relatively higher among skilled workers than it is among general workers – in particular, women accounted for almost 60 percent of all skilled workers in the Distribution node. Skilled workers include managers, agricultural specialists, marketing persons, and accountants whereas general workers include agricultural workers, administrative staff, drivers, and transformers. Female owners of firms are rare; however, the share of effective female ownership (where effective ownership means having the authority to make decisions on the overall management of the establishment) is 3.4 percent in the VC overall and is highest in Manufacturing (7.5 percent) and lowest in distribution (0.5%). While women account for a small share of all permanent workers in the Agriculture node, they make up the majority of the seasonal workers hired for harvesting [26]. Additionally, permanent (24 percent) and general (14 percent) women workers are most represented in the distribution node. It is interesting to observe that where share of women ownership is relatively high, share of women general and permanent workers tend to be low (manufacturing) where the opposite is observed in the distribution node.

[26] Quotes from interviews *(translated from French using google translate)*: "For example, last year there were 300 workers ; 90% of the women were picking and the rest of the men." "The majority of the workers in the nursery are women" " Yes, there are women who harvest the olives. For about every fifteen women, there is a man who picks up the sacks of olives."

Figure 10: Women participation (ownership and employment)



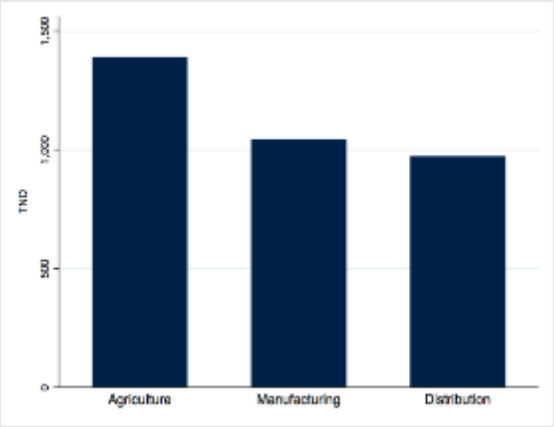
Source: Jobs survey

5.2. Employment quality

Monthly wages to full-time general employees are similar between firms in the three nodes, ranging ~TND 1,000-1,500 and highest in agriculture (Figure 11). The agriculture node pays ~TND 1,400 per month compared to just over TND 1,000 in the manufacturing node and just under TND 1,000 in the distribution node. This similarity in wages across nodes is consistent with the profiles of those workers – in terms of education; most have only a primary or less education thus would tend to be on the lower end of wages. However, it is surprisingly that manufacturing average wages do not lead other nodes given the larger share of workers with either work experience or higher education in this node. This could be explained by the small share of permanent workers in the agriculture node who likely would be in higher and better paying positions compared to other permanent workers in the other nodes (Figure 7). With respect to gender, qualitative data suggests that women are paid less than men for performing similar work; TND 12-15 per day compared to TND 20-25 for men[27].

[27] Quotes from interviews *(translated from French)*: For olives, workers are paid mostly per day. If the season is good, the workers demand a payment per kg because they can achieve a better yield. The day is usually 12 dinars for women and 15 dinars for men, and transportation is provided by the farmer." "Women are paid 12 dinars a day and men 20 dinars a day." "For the woman 15 dinars a day and 20 dinars for men and I assure them the transport by my own means."

Figure 11: Average monthly wages for permanent workers

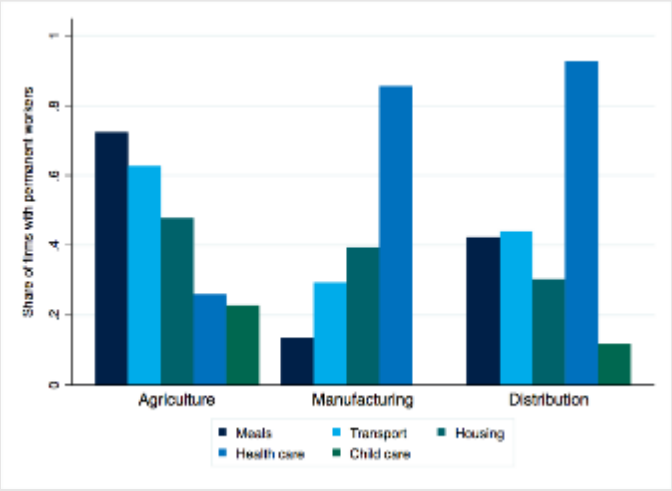


Source: Jobs survey

For temporary workers in the agriculture node, wages are significantly lower than those for full-time workers. The average wage of seasonal workers is TND 15-25 per day, depending on whether they are paid daily; weekly; or monthly and on the gender of the worker (as alluded to above). The daily wage translates to a monthly equivalent salary of TND ~400-450, while full-time general workers receive an average monthly wage of over TND 1000.

Workers receive in-kind benefits but often they lack access to the social protection benefits associated with formal employment (Figure 12). Both quantitative and qualitative data revealed that temporary workers do receive some in kind benefits: they are usually provided with transportation and meals. These benefits are also common among permanent workers in Agriculture. On the other hand, they do not often receive health care benefits, which are commonly given to permanent employees of Manufacturing and Distribution node firms. The higher share of permanent workers with health benefits in the distribution and manufacturing nodes relates to the nature of the work; it is a year-round business thus people need to be retained for longer (benefits are one such retention strategy).

Figure 12: In-kind benefits of full-time workers

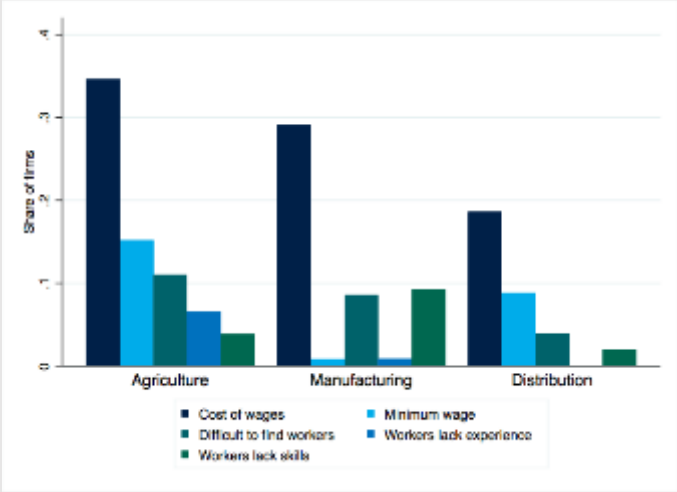


Source: Jobs survey

5.3 Constraints to employment/job creation

Overall, the cost of wages is considered to be the main labor-related issue facing firms but at maximum only ~35 percent of business state it as a constraint across all nodes (Error! Reference source not found.**)**[28]**.** Given the structure of employment by sector – the Agriculture node hires mainly unskilled, temporary workers for harvesting the olives, while the majority in Manufacturing are full-time, permanent workers – it is likely that firms in the Agriculture node are referring to the (relatively lower per worker) cost of hiring seasonal workers. This is confirmed by the fact that these firms are also much more likely to cite minimum wage regulations as an issue. For manufacturing firms, on the other hand, the workers' skill level is a bigger concern, second to cost of wages, though under 10% of firms cite it as an issue. Importance of issues (by order) in the distribution node resembles those of the agriculture node but a smaller share of firms general cite issues in this node compared to others (e.g. cost of wages cited by <20 percent of firms and minimum wage by <10 percent of firms).

Figure 13: Main labor related obstacles to business growth



Source: Jobs survey

Very few firms tried to hire trained work force in the last 3 years – only 25 in total in the distribution and manufacturing sample of ~300 establishments – and virtually all of them said they encountered substantial problems in doing so. These problems mostly had to do with workers' expecting higher wages or applicants lacking required experience. Firms responded to these issues by either increasing the salary or hiring fewer workers than originally intended, though some also hired less-skilled workers and trained them. However, training workers in general remains rare; fewer than 2 percent of firms in the sample report organizing any in-house or external training for their employees. Almost all of these firms were in the Manufacturing node.

[28] In the EU labor is the most costly factor in olive growing where the family work force accounts for 43-57 percent of the total cost and paid labor for 10-17 percent.

6. POTENTIAL AND REQUIREMENTS FOR JOB GROWTH

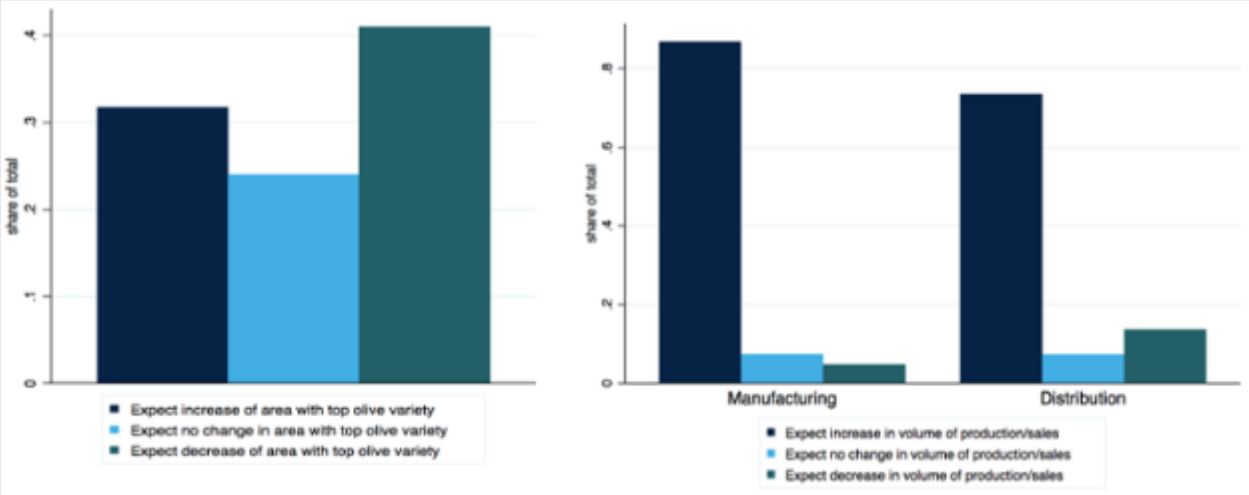
6.1 Market opportunities

Tunisia does have the potential to grow production and exports based on olive oil VC participants views as well as historical production and export levels. IOC (2018) production and export volumes over the past decade reveal that Tunisia has reached higher levels of production and exports compared to current (2016/17) production and export volumes of olive oil. In 2011/12, 2012/13, and 2014/15 it produced ~182,000 tons, ~220,000 tons, and ~340,000 tons and exported ~130,000 tons, ~170,000 tons, and ~304,000 tons of olive oil respectively. Additionally, survey participants throughout the nodes were optimistic about increasing production/sales/output from current levels in the following year (Figure 14), particularly in manufacturing and distribution. Over 80% and 70% of respondents in the manufacturing and distribution nodes, respectively, expect increase in production/sales volumes in the coming year. This expectation could be driven by a desire to increase the utilization of their plants as in the NW region they are operating at 20-30% capacity currently as opposed to market prospect. That said, the optimism is illustrative of a belief that more can be done. However, the outlook of agricultural node respondents is mixed with over 30% expecting an increase in area of the top olive variety they produce and over 40% expecting a decrease. Understanding the rate of young tree growth vs. old tree orchards as well as requirements for planting area expansion might help to provide insights into the agriculture node view.

Given the low domestic consumption and high ratios of exports to production, growth opportunities in Tunisia seem to lie in the export market, with three possibilities. First, growth of the premium/gourmet olive oil exports, which would require Tunisia building-up capacities and expertise. Second, increasing exports of current quality (including organic olive oil) to both new and emerging markets but increasing share of branded products, implying more direct competition with existing major competitors (e.g. Spain) and emerging ones. Third, a combination of both. The first option seems more oriented toward gaining position in higher-end emerging and growing markets (it's non-traditional export market) and the second toward increasing shares in markets that are already accessible and some new emerging ones. The third

would require some combination of both allowing for greater adaptability based on strengths and comparative advantages of the specific establishments.

Figure 14: Output and production/sales expectations for the following year



Source: Jobs survey

An upgrade and reposition strategy might be the best strategy for growth in Tunisia's NW region olive oil VC where upgrade focuses on existing markets (and any potential new emerging standard extra-virgin olive oil importers) and reposition focuses on emerging and growing gourmet/premium olive oil importers. First, a strategic market segmentation study[29] on the market segment most attractive to Tunisia NW olive oil producers revealed that the gourmet segment is most attractive for Tunisia whereas the virgin olive oil for cooking and extra virgin olive oil for seasoning (both constituting commodity olive oil) are not, as, "competitiveness depends mainly on ultra-high productivity and low price, less on differentiation" (section 2.5 Strategic Market Segmentation). As majority of NW regions production comes from traditional rainfed on steep slope, based on Table 6[30], Tunisia does have the price competitiveness especially in relation to Italy and Spain (Euro 2.36 vs. 2.54-3.56 per kg of olive oil), albeit unsustainable as it heavily squeezes already ultra-low cost of labor in farms (Euro 108 vs. 295-520 in traditional rainfed steep slopes and Euro 101 vs. 403-650 in traditional rainfed steep slopes for Tunisia and the other countries respectively)[31] who, as already discussed, state labor costs as biggest constraint to labor growth. As such, this would exacerbate the already low quality of employment for workers. Additionally, the price competitiveness only accounts for production without including logistics and marketing; efforts required to establish itself in main importing markets or growing ones. A comparison of Tunisia and Spain's 2017 export markets as well as main importers of olive oil illustrates that Spain might be better positioned on both a logistics and market presence perspective (Box 3). It is both closer in proximity to some of the largest importers in Europe, North America (Box 3, Figure ii) thus might have favorable logistics costs and is more entrenched in established and

[29] Report on the Roadmap to developing more competitive value chains for Olive Oil, Medicinal plants, and Tomatoes in North-West Tunisia: Findings from the pilot strategic market segmentation, 2019 ("Tunisia Strategic Market Segmentation Report")

[30] Unconfirmed whether costs are at PPP; cost comparison of intensive and super-intensive irrigated systems in Annex 4: Cost comparison of major farming system of main olive oil producing countries.

[31] Using sum of harvesting and pruning costs as proxy for farm labor costs

emerging markets (e.g. South America, China, and Japan), based on export values, (Box 3, Figure iii vs. Figure iv) implying a favorable marketing and administration position for Spain in these.

Table 6: Olive oil production costs for different farming systems in major olive oil producing countries, 2009-2013

	Spain	Italy	Greece	Tunisia
Traditional rainfed on steep slopes (gradient > 20% and < 180 trees/ha)				
Harvesting (€/ha)	362	307	210	57
Pruning (€/ha)	158	212	85	51
Soil management (€/ha)	244	53	10	30
Fertilization (€/ha)	43	244	50	10
Plant protection (€/ha)	129	96	15	8
Indirect costs (€/ha)	94	0	2	39
Amortization costs (€/ha)	29	0	40	142
Total costs (€/ha)	**1059**	**911**	**412**	**336**
Yield (kg olive/ha)	1437	1721	1100	730
Total cost kg olives (€)	**0.74**	**0.53**	**0.37**	**0.46**
Processing costs (€/kg olive milled)	0.03	0.1	0.065	0.036
Total cost kg olive oil (€)	**3.56**	**3.97**	**2.54**	**2.36**
Traditional rainfed on moderate slopes (gradient < 20% and < 180 trees/ha)				
Harvesting (€/ha)	288	271	470	63
Pruning (€/ha)	115	262	180	38
Soil management (€/ha)	187	66	180	49
Fertilization (€/ha)	29	252	255	18
Plant protection (€/ha)	63	88	260	17
Indirect costs (€/ha)	68	0	11	55
Amortization costs (€/ha)	43	0	200	103
Total costs (€/ha)	**793**	**939**	**1556**	**342**
Yield (kg olive/ha)	1438	1829	3240	797
Total cost kg olives (€)	**0.55**	**0.51**	**0.48**	**0.43**
Processing costs (€/kg olive milled)	0.03	0.1	0.065	0.036
Total cost kg olive oil (€)	**2.71**	**4.01**	**2.34**	**2.22**

Box 3: Importers of olive oil and destination market of some major exporters, 2017

Fig. i: Europe dominates the 2017 olive oil exports, particularly Spain

Fig. ii: Most geographical regions have seen significant growth in their olive oil imports from 1995-2017 with Europe dominating the market followed by North America then Asia. South America and Africa have also seen some growth though account from small share of importers. In the longer term, as more middle class emerges, these might be future potential markets.

Fig. iii & iv: Spain has a firm footing in all geographies around the world both in presence and value of exports. Tunisia has a good presence in North America, China, Japan, Brazil and Australia and good potential to grow here in the short term and new untapped markets like in South America, other emerging Asia and Africa (purple) in the longer term

Source: Harvard Center for International Development – Atlas of Economic Complexity *(accessed 2019/11)*

Fig. i: Olive oil exporters, 2017

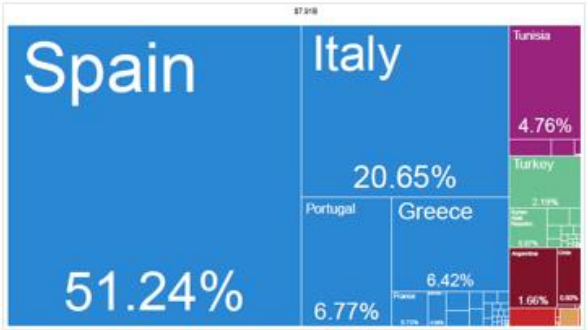


Fig. ii: Olive oil imports and destination, '95-'17

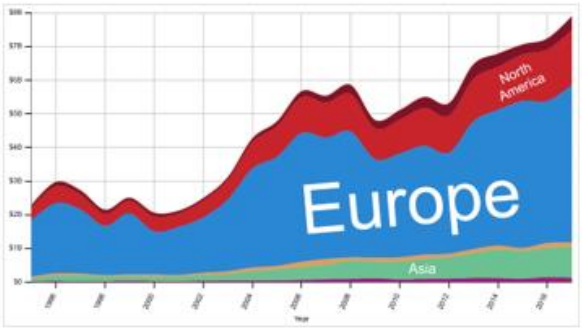
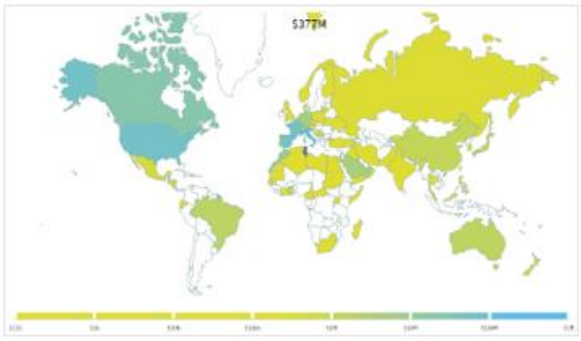
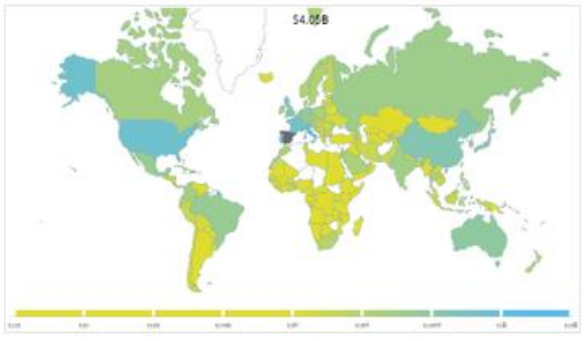


Fig. iii: Destination of Tunisia olive oil exports, 2017



Destination of Spain olive oil exports, 2017



Tunisia also does not have productivity competitiveness, both yield and land utilization as prior discussed with the former also confirmed by Table 5. To improve this competitiveness, Tunisian producers might have to more aggressively pursue cooperatives to organize activities in the sector and embrace innovation and technology as in the mold of Spain (**Error! Reference source not found.**[32]). However, this would be a more

[32] Common Agricultural Policy (CAP): https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en

longer-term focused strategy given the structural and organizational changes likely tied to this approach. As such, the upgrade strategy would likely focus on current export activities whereas expansion strategy on new opportunities such as export of gourmet and premium olive oil. This focus would be better suited to current production characteristics of Tunisia which are more conducive to organic and higher quality olive farming and are also more environmentally sustainable. These points could be emphasized to further elevate consumer perception of Tunisia olive oil.

Box 4: Increasing efficiencies through cooperatives and innovation/technology - Examples from Andalusia, Spain

Cooperatives/partnerships

The three largest olive oil companies in Spain and in the world by production volume (Sovena Spain, Ybarra-Migasa, and Acesur) are located in Andalusia. These and other Spanish large olive oil firms like Deoleo and Borges became global players, integrating their production and transformation activities on scale to be able to meet the quality and logistical standards requirements and buying strategies of large international retailers.

In Andalusia and other relevant Spanish producing regions like Castilla-La Mancha and Catalonia, strategies of cooperation and concentration of supply have been developed and applied successfully, especially through cooperatives, in response to the high business concentration of retailers and the fragmentation of production. Spanish cooperatives control a high share in production (70 percent of national olive oil production). The largest and more efficient olive oil cooperatives in the world are Andalusian (Dcoop, Jaencoop, and Oleoestepa).

The cooperatives also have largely benefited from the Common Agricultural Policy ("CAP") in terms of support received for restructuring orchards and modernizing production, quality certification, encouraging sustainable production systems (integrated and organic systems), and promotion activities.

Innovation and technology

Additionally, small and large operators are paying increasing attention to innovation, be it technical or organizational. Innovation in integrated logistics management of the olive oil value chain stands out. Distributors tend to be more advanced in this field, while producers are increasing their still low participation in the logistic efficiency of the olive oil value chain. Also, Spain has been able to increase yield and reduce farm production costs through the introduction of innovations in the cropping systems in Andalusia and mechanical pruning and harvesting respectively. On organizational innovation, Andalusian firms consider the availability of good export professionals, with high commercial and administrative knowledge of international trade and fluency in foreign languages vital.

Tunisia might have an even higher price competitiveness to what would be its major competitor on quality of oil and export focus, Italy, particularly in differentiated olive oil market segments (gourmet olive oil). For the traditional rainfed steep slopes, costs of olive oil per kg is Euro 2.36 for Tunisia vs. Euro 3.97 for Italy and is even higher for traditional rainfed moderate slopes at Euro 2.22 for Tunisia vs. Euro 4.01 for Italy (Table 5). As earlier discussed, some of the margin might be eroded by logistics and marketing/promotion efforts but it is likely that not all will be eroded allowing for sustainability. Tunisia is already showing capability and willingness to transition towards more higher value olive oil exports because it already exports bottled and packaged olive oil to 31 and 50 countries respectively as earlier discussed. It would need to build on these capabilities to transition to gourmet/premium. Italy, itself, provides an indication on what a gourmet/premium olive oil focus might necessitate, especially for small farmers specializing in high quality

olives (**Error! Reference source not found.**[33]). Overtime, as Tunisia firmly entrenches and differentiates itself in the markets and becomes the favorable choice given the higher quality nature of its oil (which Italy itself uses to enhance the qualities of some of its olive oils), through economies of scale but also potential price increases, it might be in a position to maintain more of the profit margin from gourmet/premium sales to improve wages (hence quality of work). That said, for Tunisia to succeed in this serving gourmet olive oil, its quality would need to be above the minimum quality standards that are used by ONH and IOC to have a change of the oil reaching the customers in good share as export markets require shelf life of olive oil at extra virgin quality of more than 12 months. Ultimately, it will be the value for customers that will matter, their perceived value of Tunisia olive oil.

[33] PDO and PGI explained: https://uncommoneurope.eu/pdo-and-pgi/

Box 5: Differentiation strategy and market positioning for small companies/farmers - examples from Spain and Italy

Spain

In Andalusia, many small companies try to orient their business towards niche market opportunities and organize their economic and financial activity in this niche, both in the national and export markets. This type of strategy requires productive and commercial specialization, very specific promotional investment oriented to a precise segment of population, own quality or through Protected Designation of Origin ("PDO"), Protected Geographical Indication ("PGI"), or other certifications that allow transmitting a perception of quality, as well as internationalization.

Italy

Most olive farms in Italian producing regions are small and located in disadvantaged hilly areas, where the introduction of innovations in farming systems is particularly difficult. However, despite challenges they face, the Italian olive oil industry in different regions has shown the ability to develop markets for higher quality products. It has benefited from the EU mandatory rule of origin for the olives on the oil packs and bottle labels because many consumers are willing to pay a premium for oils certified as 100% Italian. In addition, the Italian olive oil companies enjoy the advantage of a highly reputed image of Italian olive oil on international markets. Where the reputation is high enough, some other suppliers use the association with the Italian brand to boost their own brand (e.g. Spanish companies like Deoleo included Italian brands in their brand portfolio strategies).

The distribution of high quality, high priced olive oils has some similarities with premium wines soled in specialized wine shops and restaurants. There are some experiences where high quality olive oil is traded both in Italy and in foreign markets in synergy with the high-quality wines

Direct sales, a traditional way of procurement for Italian consumers, is an important marketing and promotional strategy used by Italian olive oil producers domestically and internationally. This strategy leverages trust built with consumers who would pay a premium price on the farm gate compared to market prices. Customers coming to farm or the production firm have the benefit of experiencing and understanding the production technologies and quality of oil produced. Some companies specialize in direct sales to public by mail and are recently shifting parts of their business to e-commerce. This channel allows direct sales to even reach customers in foreign markets (e.g. USA, Germany, etc.). In certain cases direct connection with final customers are established exclusively by mail or internet orders, though this brings added complexity.

To be aware of in a differentiation-focused strategy

Traditional companies are losing market share in favor of large retail chains with increasing market power. As in Spain, large distribution chains include olive oil in their product portfolio mostly with their own brands and their own organizational and commercial rules. As they manage a limited number of brands in their stores, it makes very difficult to provide space for products with a higher grade of differentiation. This is a critical consideration for future development and positioning of the gourmet/premium olive oil industry in Italy and elsewhere.

Across the value chain, for both general and trained permanent labor, output growth in the olive oil VC requires relatively more capital with the exception of the agriculture node where relatively more general labor is needed. In the past, Tunisia has demonstrated its potential to quickly expand its production in response to market needs. For example, relative to 2017 output levels, Tunisia produced over 2-3 times of its olive oil in 2012/13 and 2014/15. These outputs predominantly focused on bulk olive oil and balanced the low production in Spain and Italy. The survey therefore asked respondents in the value chain about their additional investments required in the hypothetical case of doubling outputs. The derived elasticities to capital and (permanent) labor suggest a production function with diminishing returns to scale (**Error!**

Reference source not found.). In general, a doubling of output tends to be accompanied by a relatively higher increase in inputs (whether capital or labor). Marginal costs of production are therefore expected to increase across the VC as outputs increase. Furthermore, this hypothetical question allows to relate the investments needed in capital to those in permanent labor (general or trained) when doubling output. This relationship is captured in the *ratio of labor-capital multiples*[34] (**Error! Reference source not found.**Table 7). They indicate that -except for agriculture - firms require higher increases in capital relative to general labor when doubling outputs. Only in agriculture, output growth would lead to relatively higher increase in general permanent labor for every increase in capital spent. Across all nodes, relatively more capital would be required than trained permanent labor to double production. Between general and trained permanent labor, there tends to be a higher increase in general labor for every additional increase in capital spent. With respect to general permanent labor, the *ratio of labor-capital multiples* is about the same in the distribution and manufacturing nodes. This suggests that general labor and capital inputs would grow at similar proportions across both nodes.

Table 7: Input growth multiples and their ratio in the OO VC

	Agriculture	Manufacturing	Distribution
Effective increase (input growth multiples)			
Capital	3.9	5.4	5.7
Labor - permanent (general)	5.8	3.3	3.6
Labor - permanent (trained)	2.1	2.0	2.8
Ratio of labor-capital multiples			
Permanent (general) labor : capital	1.46	0.61	0.62
Permanent (trained) labor : capital	0.54	0.37	0.49

Better quality job creation requires a focus on higher-end market segments and selling higher-value added bottled olive oil. The relationship between capital and general but especially trained labor underlines that output growth for existing markets with current products will not necessarily boost the quality of the jobs created (Table 7). This suggests a move to higher value markets and products. Given the higher skills required by a gourmet/premium and bottled olive oil focus, a relatively higher share of both, trained and permanent labor could be expected. (An example could be the current dynamics of the more specialized manufacturing node). Distribution might follow this pattern as direct customer relations and management are important for gourmet oil. These new and better jobs could attract more women and youth who overall represent only 6.4 percent and 17.0 percent of permanent labor, respectively as per the survey data.

It must be noted that the above is a theoretical projection based on the assumption of a linear relationship between production factors (e.g. output to labor, capital to labor, etc.) **only for the purpose of estimating potential impacts.** Depending on productivity levels of different nodes, economies of scale might start taking effect (especially in distribution and manufacturing given the higher elasticities of capital). It should be noted that the relationships between capital and permanent labor are based on the current operations in the value chain, i.e. a predominantly bulk olive oil export focus. It is yet to be determined and tested whether the same relationship would be observed in case of a greater focus on gourmet and higher-value bottled olive

[34] The r*atio of labor-capital multiples* captures the relationship between a labor multiple to capital multiple given a doubling of output. If relative input multiple range is (0,1) then output growth in the value chain requires relatively more capital; however, if it is >1 it requires relatively more labor.

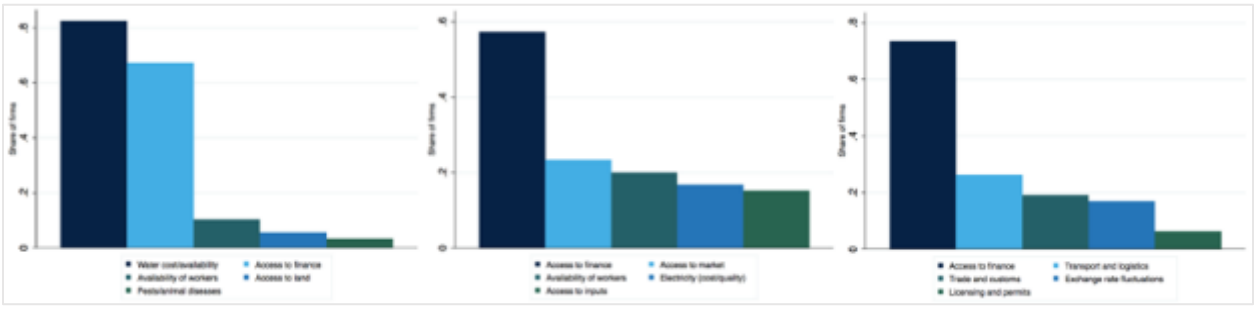
oil. Further, some nodes are not operating at 100% utilization therefore doubling production might not translate into more jobs or capital investments; instead, it might translate into increased utilization with current jobs and capital (e.g. processing is at ~30% utilization so doubling production might move it to 60% utilization if current operational processes are maintained). However, if all additional agricultural production is captured in the NW region and not sent to the center and south for processing, production capacity would likely be overestimated and additional capacity and jobs might be needed. Last, while survey questions on doubling output focused on new permanent jobs, temporary workers will still be required, especially in agriculture during harvesting. Taking these caveats into account, this analysis provides an idea of possible capital and labor dynamics in the VC given output growth.

6.2 Constraints to seizing opportunities (competitiveness and output growth)

Regarding production obstacles, access to finance emerges as the most prevalent one across all nodes of the value chain and water costs/availability is also high in the agricultural node. Across all nodes of the value chain, at least ~60% of establishments in any one node raise access to finance as a constraint to production. In agricultural, ~78% of firms state this, ~58% in manufacturing, and ~72% in distribution. Within agriculture, over 80% of establishments also raise water cost/availability as a constraint. Though there is no large difference in share of firms raising other issues as constraints across the nodes, within manufacturing, the second highest mentioned constraint is access to markets (just over 20% of establishments state this) and in distribution transport and logistics are the second highest mentioned constraint (just under 30% of establishments state this). All of these constraints pose a high risk for growth prospects, especially linked to premium/gourmet exports as logistics, access to markets, and additional investments to shift to premium/gourmet productions and procure required inputs (e.g. training, investment in technologies, improved bottling and labelling processes, etc.) would be important for serving the higher end export market.

Access to finance, amongst other factors, could have a ripple effect into production quality and output growth potential in the value chain. It should be noted that good retail oils depend on high quality olives resulting in oils that are well-made and effectively stored. Some contributory factors to achieving these high-quality oils are temperature controls of olives after harvest and of olive oils and the control of olive fly in organic and traditional farming methods (a key problem in the NW region of Tunisia). However, producers have problems paying for and importing capital equipment on time which is the most predominant anticipated requirement for output growth as prior discussed.

Figure 15: Constraints to current production operations (LHS – Agriculture, Center – Manufacturing, RHS – distribution)



Source: Jobs survey

Based on the survey, many respondents raise packaging as an issue, complaining about the quality of domestic supply and the costs of importing high quality bottles or tanks. The fabrication of glass bottles is in the hands of the *Societe Tunisienne du Verre* (Sotuverre), a privatized company which holds some monopoly over glass. According to many of the companies interviewed, the quality of the bottles is deficient both for marketing purposes but also to preserve the qualities of the olive oil. This impacts those companies outside the wholesale sector and they normally import bottles from Italy and, after complicated customs procedures, they are refunded the custom duties when exporting the bottled olive oil. Enhancing bottling quality is key to market the product but also to render Tunisian exporters more efficient. With regard to packaging, the highest quality olive oils should be packed in the darkest (better quality) glass which guarantees the preservation of olive oil properties. Although in recent years metal and PET (polyethylene terephthalate) packaging has gained ground as these materials provide effective protection at lower cost, the glass remains the best option as it has the largest number of advantages in terms of cleanliness, protection, conservation, presentation and usability. As Tunisia predominantly produces bulk olive oil, it is not predisposed to glass production or availability as bulk exports do not use glass. Italy is the main world supplier of olive oil packaging materials (bottles, containers) and it supplies to Tunisian exporters in the highest segments. Tunisian producers try to circumvent the import duties by balancing it out with some favorable tax treatment of sales. Additionally, Tunisia also suffers from low quality standardization, weak marketing, and small, technologically ill-equipped and poorly organized producers are disadvantaged in face of the requirements of big international food chains and networks.

Beyond these findings from the survey, the "WBG Support to Value Chain Development, Tunisia, 2019" report has done an extensive job on detailing constraints and challenges Tunisia will likely face in moving into the gourmet segment and provides further recommendation and actions that can be taken to overcome the constraints in a move to capitalize on this opportunity.

7. CONCLUSION

This study analyzes the olive oil sector in the NW of Tunisia, focusing on creating more and of better-quality jobs. It is based on a survey conducted on the olive oil VC in the NW region of Tunisia (governorates of Jendouba, Béja, Siliana, and Kef). This study is part of the "Value Chain Development for Jobs in Lagging Regions - Let's Work Program in Tunisia". Conclusions drawn are predominantly based on the results of the survey and evidence prior discussed.

Currently, most of the jobs in the VC are temporary, unskilled, with low social protection benefits and low female representation (ownership and employee share) throughout the nodes. Further, there is no employment remuneration parity. Youth have a fair representation of the permanent workforce throughout the nodes (~15-20 percent) but are less likely skilled workers in the manufacturing and distribution nodes. Furthermore, most jobs are concentrated in the agriculture node (~98 percent), where labor intensity is high. Production in the manufacturing node is for higher value products compared to the agriculture node as fewer working hours and more value is extracted per liter of olive oil produced. Based on the current structure of firms and employment, there needs to be a major qualitative change along the different nodes of the Olive Oil VC for higher quality job creation.

The analysis has revealed large a potential for growth in the Olive Oil VC in the NW region. Productivity constraints translating into low yields despite high input usage relative to peers (e.g. percent of utilized land for current output) can, if resolved, help Tunisia consolidate and grow its position as a leading

producer of olive oil. Tunisia does have the potential to produce up to 2-3 times the current production levels and by so doing create more and better jobs. However, there seems to be a discrepancy between the agriculture and manufacturing and distribution nodes when asked about future expectations of production from existing resources. This could indicate a misalignment in future resource planning along the different nodes going forward.

Based on survey responses, in the hypothetical case of doubling output, output growth will largely be driven by relatively more increases in capital spend than labor growth other than in the agricultural node for general labor where it will be driven by relatively more labor growth. Given Tunisia's and particularly the NW regions' competitive advantages, this potential could likely be seized through a gradual shift towards, and increase in, the production and supply of gourmet/premium and higher-value bottled olive oil. Given the specialized skills required when producing for this market segment, these potential jobs would likely be of better quality. That is, higher paid with a higher share of permanent positions, implying greater access to benefits as was seen in the jobs profile of the VC analysis. These projections are based on current production processes and assume a linear relationship of production factors. In practice, efficiency gains through capital investments might be realized with increased labor productivity which may affect labor utilization in some nodes. Such factors might reduce the potential number of new jobs created but could further increase their quality.

To seize further market opportunities and increase output, the NW olive oil sector would need to address constraints to its current production first. As per the empirical analysis, the most prevalent constraints highlighted by the surveyed firms and actors across all nodes are access to finance (which seems to have adverse ripple effects into the VC related to achieving consistently high-quality olive oil and to seizing the output growth potential) and access to markets as well as transportation and logistics. These are critical, especially for a potential focus on expanding and diversifying olive oil exports. Furthermore, the sector is constrained by the quality of bottles it receives domestically for packaging, costs of importing high quality bottles or tanks, and coordination around standardization of products, marketing, and investment in production technologies that meet the requirements of big international food chains and networks. Ultimately, it will be the perceived value of Tunisia olive oil for customers that will matter; quality will need to be above minimum IOC and ONH quality standards for extra virgin olive oil and delivery of products on time in reliable packaging.

ANNEX

Annex 1: Survey sample design and weighting procedure

Sample Design for Tunisia's Jobs in Value Chains Survey

The Tunisia Jobs in Value Chain Survey was designed to cover the value chains for Olive Oil and Medicinal and Aromatic Plants (MAP) in the four governorates of the Northwest Region (Beja, Jendouba, El Kef and Siliana). Some nodes of these value chains were also covered in the governorates of Nabeul, Sfax and Ben Arous. The overall sampling plan is described in the report on "Sampling Strategy Value Chain Development for Jobs in Lagging Regions in Tunisia – Survey Data Collection". A summary of the sample design for the different nodes for each value chain is provided here as a background for describing the weighting procedures.

The main source of the sampling frame of firms was the business register from the National Statistical Institute (INS) of Tunisia. Given that the INS maintains this sampling frame, they were responsible for selecting the sample of firms and a reserve of replacements based on specifications provided by the survey contractor. The largest node in the Olive Oil value chain was the olive growers, with an estimated population of about 50,000 households growing olives. Given the large number and dispersion of these olive growers, a stratified two-stage sample design was used for selecting the sample of olive growers. In this case the INS selected the first stage sample of clusters and a reserve of replacement clusters based on a national household sampling frame.

The sampling frame for each value chain was stratified by node and region. The strata for the Olive Oil VC are specified in Table 1, and the strata for the MAP VC are identified in Table 2. The largest firms in some nodes were selected with certainty, so they were classified as self-representing (SR). Within each stratum the non-self-representing (NSR) sample firms were selected by the INS with equal probability. An additional sample of firms in each stratum was selected as a reserve for possible replacements. In a few small strata it was not possible to interview any NSR sample firms. Given that some nodes had few firms and the response rate was low, additional firms were identified from other sources in a type of mapping exercise. These sample firms that were identified outside of the INS frame were classified as "other source" and treated as self-representing since no information was available on the distribution of the corresponding frame.

Table 1. Stratification of sampling frame for Olive Oil Value Chain by node and region

Stratum	Node	Region
111	Nurseries	Northwest
112	Nurseries	Nabeul
121	Olive growers listed by INS	Northwest
	Olive growers from two stage sample	Northwest
131	Traders and exporters	Northwest
132	Traders and exporters	Sfax
141	Olive oil mills	Northwest
142	Olive oil mills	Sfax
151	Independent olive oil bottlers	All
161	Soaps and cosmetics	Northwest
162	Soaps and cosmetics	Sfax

Table 2. Total sample group by node/actors in the Olive Oil Value Chain

Segment	**Node**	**Number of respondents (unweighted)**
Agriculture	• Olive growers from two-stage sample • Olive growers listed by INS	• 504 • 4
Manufacturing	• Independent olive oil bottlers • Olive oil mills • Soap and cosmetics (olive oil) manufacturers	• 20 • 163 • 9
Distribution	• Traders and exporters	• 125

Table 3. Stratification of sampling frame for MAP Value Chain by node and region

Stratum	Node	Region
201	Bidders/collectors of wild plants	Northwest
202	Bidders/collectors of wild plants	Nabeul/Ben Arous
211	Technical services proividers to bidders/collectors of wild plants	Northwest
221	Growers horticulture and MAPS from INS data	Northwest
222	Growers horticulture and MAPS from CRDA data	Northwest
231	Traders and exporters	Northwest
232	Traders and exporters	Ben Arous
241	Manufacturer of essential oils	Nabeul
242	Manufacturer of essential oils	Northwest
243	Manufacturer of essential oils	Sfax
251	Herb and spice manufacturers	Nabeul
252	Herb and spice manufacturers	Northwest
261	Independent labels	Nabeul
262	Independent labels	Northwest
263	Independent labels	Sfax

271	Soaps and cosmetics	Northwest
272	Soaps and cosmetics	Sfax
281	Perfumes and toiletry products	Northwest
282	Perfumes and toiletry products	Nabeul
283	Perfumes and toiletry products	Ben Arous
291	Domestic retail market (specialized)	Nabeul
292	Domestic retail market (specialized)	Northwest

In the case of the two-stage sample of olive growers, the sampling frame was stratified by delegation within each of the four governorates of the Northwest Region. Only the delegations with the highest concentration of olive growers, accounting for a combined total of 80% of the total olive oil production in each governorate, were included in the frame. A total of 25 delegations were included in the frame, and between 1 and 4 sample clusters were allocated to each delegation in proportion to the estimated total olive oil production. In this way a total of 37 sample clusters were allocated to the 25 delegations. The sample clusters were selected at the first stage with probability proportional to size (PPS) within each delegation, based on the number of households in the frame for each cluster. An additional 28 clusters were selected as a reserve for replacements. Within each sample cluster a list of eligible olive growers was identified to be interviewed at the second stage. A random walk type of approach was used to screen households to identify eligible olive growers in each sample cluster. An average of about 15 eligible households with olive growers were interviewed in each sample cluster. Information on the eligibility status of each contacted household was used to estimate the proportion of eligible households in each sample cluster.

Weighting Procedures for Tunisia's Jobs in Value Chains Survey

In order for the sample estimates from the Tunisia Jobs in Value Chains Survey data to be representative of the population of firms in each VC node, it is necessary to multiply the data by a sampling weight, or expansion factor. The basic weight for each sample firm is equal to the inverse of its probability of selection.

The overall probability of selection for the olive growers is based on the stratified two-stage sample design described previously, and can be expressed as follows:

$$p_{OGhi} = \frac{n_h \times M_{hi}}{M_h} \times \frac{m_{OGhi}}{M'_{OGhi}}$$

where:

p_{OGhi} = probability of selection for the sample olive growers in the i-th sample cluster of stratum (délégation) h

n_h = number of sample clusters selected in stratum h

M_{hi} = total number of households in the frame for the i-th sample cluster in stratum h

M_h = total number of households in the rural sampling frame for stratum h

m_{OGhi} = number of eligible olive growers selected and interviewed in the i-th sample cluster in stratum h

M'_{OGhi} = estimated total number of eligible olive growers in the i-th sample cluster in stratum h

The two components of this probability correspond to the probabilities for the first and second sampling stages. Given that a complete listing of households was not conducted in the sample clusters, it was necessary to estimate the total number of eligible olive growers in each sample cluster (M'_{OGhi}) by calculating the proportion of households contacted in the sample cluster that had eligible olive growers, and multiplying this proportion by the number of households in the cluster from the frame. This can be expressed as follows:

$$M'_{OGhi} = M_{hi} \times \frac{m_{OGhi}}{m_{hi}}$$

where:

m_{hi} = number of households contacted in the i-th sample cluster in stratum h, including those without eligible olive growers

The weight for the sample olive growers in each sample cluster is equal to the inverse of the probability, and can be expressed as follows:

$$W_{OGhi} = \frac{M_h}{n_h \times M_{hi}} \times \frac{M'_{OGhi}}{m_{OGhi}}$$

where:

W_{OGhi} = weight of the sample olive growers in the i-th sample cluster of stratum h

Some larger firms in the INS frame for certain nodes were selected with certainty, so they are considered self-representing, and have a weight equal to 1. The remaining (non-self-representing) firms in the INS frame for each stratum (node by region) were selected with equal probability within the stratum. However, a few sample firms were found to be closed or not eligible, so it was necessary to make a corresponding adjustment of the total number of firms in the frame for each stratum to calculate the corresponding weights. Based on the stratified one-

stage sample design, the weight for the non-self-representing (NSR) firms in each stratum was calculated as follows:

$$W_{NSRh} = \frac{N'_{NSRh}}{n_{NSRh}}$$

where:

W_{NSRh} = weight for the sample NSR firms from the INS frame for stratum (node, region) h

N'_{NSRh} = estimated total number of eligible NSR firms in the INS frame for stratum h

n_{NSRh} = number of sample NSR firms in the INS frame with completed interviews for stratum h

The total number of firms from the INS frame for each stratum was obtained from a table in the Sampling Strategy report. The proportion of eligible NSR firms in the frame for each stratum was estimated based on the interview status information for all the sample firms that were contacted. This proportion was then used to adjust the total number of NSR firms in the frame for each stratum as follows:

$$N'_{NSRh} = N_{NSRh} \times \frac{n_{ENSRh}}{n_{CNSRh}}$$

where:

N_{NSRh} = total number of NSR firms in the INS frame for stratum h

n_{ENSRh} = total number of eligible NSR sample firms from INS frame for stratum h that were contacted (including refusals and not found or not available, but excluding closed or not eligible)

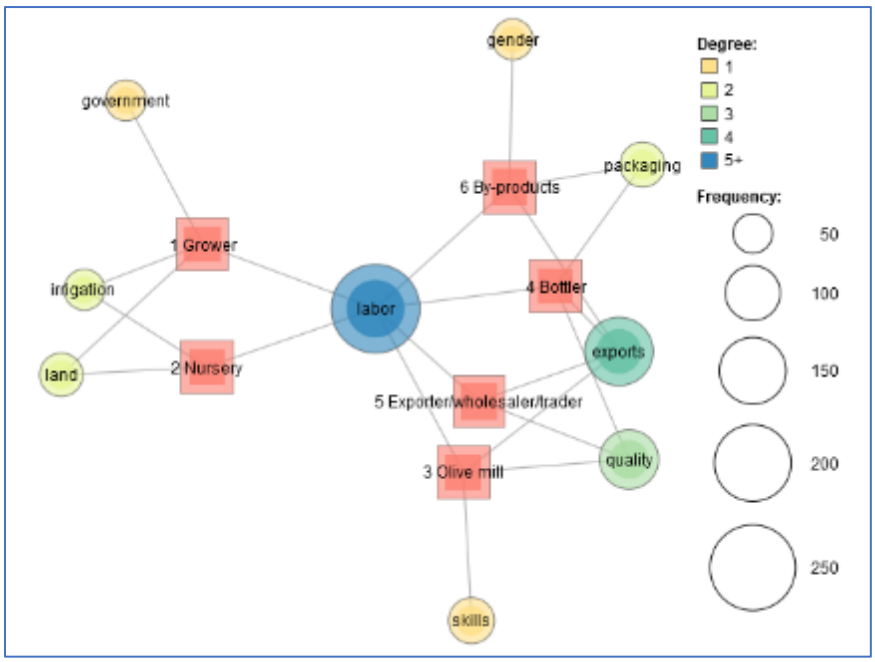
n_{CNSRh} = total number of NSR sample firms from INS frame for stratum h that were contacted (including those that were closed or not eligible)

As described previously, given that some strata had few firms in the INS frame and the corresponding response rate was low, additional firms for some nodes were identified from different sources and interviewed during the fieldwork in order to complete the required number of interviews. Since no frame is available for those additional interviewed firms, they were assigned a weight of 1.

Annex 2: Qualitative data analysis

Labor-related issues are a key topic of concern throughout the value chain. KH Coder, a text mining and qualitative content analysis software, was used to code the interviews with representatives of all the nodes, as described in section 3.2. It helped to identify policy topics or themes relevant for each of the actors in the nodes. Figure 16 illustrates a network co-occurrence chart, where topics are shown in circles, and nodes in squares. The size of the circles reflects the importance of each topic, i.e. how many times it is mentioned in interviews. Labor is clearly the key topic that all the nodes have in common and exports and quality are key topics for the actors in the distribution and manufacturing nodes. Skills issues is particularly pronounced for olive mills. For the agriculture node, inputs to production (land and irrigation) and government (includes subsidies, regulation, regional agricultural bureau, etc.) are key topics.

Figure 16: Co-occurrence network – labor is the biggest concern



Note: Lines indicate a strong relation between topics. The size of the bubbles indicates how often the topics are mentioned.

Annex 3: Olive Oil Standards

Olive oil is obtained from the fruit of the olive tree (Olea europea L.) The olive past is the product obtained after crushing the olives at the mill. Crushing is one of the processes performed prior to oil extraction. Virgin olive oils are the oils obtained from the fruit of the olive tree solely by mechanical or other physical means under conditions (mainly thermal) that do not altered the oil and without any treatment such as washing, decantation, centrifugation or filtration. The requirements for olive oil applying to producers worldwide are specified in the **Codex Alimentarious Standard for Olive Oils and Olive Pomace Oils (CODEX STAN 33-1982).** This standard refers to composition and quality factors such as food addictives, contaminants, hygiene, labelling, physical characteristics and methods of analysis and sampling for each type of olive oil. Organoleptic properties are very important for the valuation of the quality of Virgin Olive Oil (VOO). The commercial quality of virgin olive oils is defined by the European Legislation (EEC 2568/91 and its Amendments - version 01/01/2015), the IOC and the Codex Alimentarius (CODEX STAN 33-1981), including parameters for oil genuineness, though not the markers for sensory and health attributes. The latter are strongly related to the content of monounsaturated fatty acids and phenolic compounds as well as volatile compounds responsible for flavors. The main antioxidants are the lipophilic and hydrophilic phenolic compounds. The concentration of fatty acids, phenols and volatile compounds is strongly affected by agronomic and extraction conditions, especially temperature and oxygen concentration during processing operations (Servili, 2013). The nutritional content is mainly attributed to oil's high content of monounsaturated fatty acids, in particular oleic acid. Olive oil's high content of fatty acids increases levels of good cholesterol (HDL) and maintains low levels of bad cholesterol (LDL).

Annex 4: Cost comparison of farming systems in major olive oil producing countries

	Spain	Italy	Greece	Tunisia
Traditional rainfed on steep slopes (gradient > 20% and < 180 trees/ha)				
Harvesting (€/ha)	362	307	210	57
Pruning (€/ha)	158	212	85	51
Soil management (€/ha)	244	53	10	30
Fertilization (€/ha)	43	244	50	10
Plant protection (€/ha)	129	96	15	8
Indirect costs (€/ha)	94	0	2	39
Amortization costs (€/ha)	29	0	40	142
Total costs (€/ha)	**1059**	**911**	**412**	**336**
Yield (kg olive/ha)	1437	1721	1100	730
Total cost kg olives (€)	**0.74**	**0.53**	**0.37**	**0.46**
Processing costs (€/kg olive milled)	0.030	0.100	0.065	0.036
Total cost kg olive oil (€)	**3.56**	**3.97**	**2.54**	**2.36**
Traditional rainfed on moderate slopes (gradient < 20% and < 180 trees/ha)				
Harvesting (€/ha)	288	271	470	63
Pruning (€/ha)	115	262	180	38
Soil management (€/ha)	187	66	180	49
Fertilization (€/ha)	29	252	255	18
Plant protection (€/ha)	63	88	260	17
Indirect costs (€/ha)	68	0	11	55
Amortization costs (€/ha)	43	0	200	103
Total costs (€/ha)	**793**	**939**	**1556**	**342**
Yield (kg olive/ha)	1438	1829	3240	797
Total cost kg olives (€)	**0.55**	**0.51**	**0.48**	**0.43**
Processing costs (€/kg olive milled)	0.030	0.100	0.065	0.036
Total cost kg olive oil (€)	**2.71**	**4.01**	**2.34**	**2.22**
Intensive irrigated (180–800 trees/ha)				
Irrigation (€/ha)	476	360	375	85
Harvesting (€/ha)	765	328	680	202
Pruning (€/ha)	408	425	255	112
Soil management (€/ha)	204	129	200	20
Fertilization (€/ha)	102	523	390	175
Plant protection (€/ha)	272	101	370	45
Indirect costs (€/ha)	223	0	23	128
Amortization costs (€/ha)	340	0	300	209

Total costs (€/ha)	**2790**	**1866**	**2593**	**977**
Yield (kg olive/ha)	8500	3611	5500	3000
Total cost kg olives (€)	**0.33**	**0.52**	**0.47**	**0.33**
Processing costs (€/kg olive milled)	0.030	0.100	0.065	0.036
Total cost kg olive oil (€)	**2.07**	**3.84**	**2.13**	**1.75**
Superintensive irrigated (> 800 trees/ha)				
Irrigation	532			148
Harvesting (€/ha)	570	Not	Not	287
Pruning (€/ha)	456	reported	reported	123
Soil management (€/ha)	228	because	because	36
Fertilization (€/ha)	114	not relevant	not relevant	359
Plant protection (€/ha)	304	system	system	45
Indirect costs (€/ha)	220			300
Amortization costs (€/ha)	380			479
Total costs (€/ha)	**2804**			**1778**
Yield (kg olive/ha)	9500			8000
Total cost kg olives (€)	**0.30**			**0.22**
Processing costs (€/kg olive milled)	0.030			0.036
Total cost kg olive oil (€)	**2.19**			**1.60**

Box 6: Intensification of Olive Oil Growing

The new planted areas in the Mediterranean and new producing countries (USA, Australia, Argentina, Chile, South Africa) are mainly intensive and super-intensive groves both. In the EU, especially in Spain, many traditional plantings have been reconverted into more intensive systems. The spreading of intensive olive growing has a significant influence on the olive oil market due to efficiency gains in production although investments in intensive and super-intensive are very high.

New high-density plantations proliferated with the purpose of reducing costs, production volatility and dependency on climate conditions. Smooth landscape and the development of irrigation infrastructures has been a determining factor boosting intensification. Hedgerow plantation system is the most common orchard model in new intensive plantings, designed to facilitate disease and pest control as well as irrigation and fertigation, but especially harvest mechanization and pruning (Tous, 2010; Connor et al., 2014). The process also has been paralleled by the introduction of new varieties specifically designed for intensification.

The major advantages of this system are its ability to dramatically reduce the labor needed for harvesting and the early entrance into commercial production (three years after planting). Faster and earlier harvesting usually has a positive impact on the olive oil quality. The main disadvantages are the high capital intensity and the limited evidence available so far about long-term performance, longevity and the best management required to suitably maintain plantations. In addition, when large areas are planted with intensive systems, high milling capacity should be installed to guarantee rapid processing and hence better oil quality. Another inconvenient is that in many cases the intensification process has been accompanied by the irrational exploitation of natural resources, especially water (Fernández-Escobar et al., 2013).

Generally, the introduction of super intensive crops has transformed the cost structure of the extra-virgin olive oil value chain and market segment, reducing its attractiveness to smaller, less capital intensive, farms, and pushing them into the need to either reorient their production to higher-quality niches (where product differentiation and consumer sophistication is higher), or integrate cooperatives where they can achieve better economies of scale (the Spanish model).

Annex 5: Deriving baseline workforce numbers

Data was extracted from segmentation done by the global VC team on the total labor in each node based on either the survey results or derived FTE labor where the survey results for employed labor was unreliable.

- Permanent workers
    - Extract weighted recorded data by VC node from the survey
- Household labor
    - Use FTE approach used by the global VC team to derive household labor (divide total hours by 2080)
- Temporary workers
    - Use FTE approach used by the global VC team to derive temporary labor for manufacturing and distribution (divide total hours by 2080)
    - In agriculture, team assumed temporary workers work 1/6th of a year for micro/small farms and ¼ of the year for medium and large farms (using the recorded hired temporary workers based on the survey). Data on time worked by temporary workers was not collected in the Agriculture node.
- **Female/Youth labor**:
    - Extracted weighted recorded data by VC node from the survey
    - Reliable data collected only for permanent employees

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