Towards an innovative olive oil value chain in Beni Khedeche area, Governorate of Medenine, South East of Tunisia

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Abstract

This article defines processes of the olive oil value chain (OVC) in the Governorate of Medenine, south-east of Tunisia. Based on semi structure interviews and participatory multi stakeholders workshops associating main actors, OVC has been analysed and described to establish linkages among chain actors and activities. A SWOT analysis was carried out to evaluate the strengths, weaknesses, opportunities and threats of olive oil value chain. Based on the platform innovation already implemented in a partnership approach with main actors of the value chain, an innovative value chain (IVC) was proposed to strengthen farmers' associations and cooperatives and to increasing profitability of OVC.

Key words: Olive oil Value chain, SWOT analysis, Innovative value chain, Medenine, Tunisia

Introduction

It is widely recognized that the partial failures of development experiences in arid zones stimulate renewing the development approaches. In this context, international community including the United Nations System is working to consolidate exciting development approaches by strengthening a new approaches such the value chain approach (VCA). Indeed, the VCA is increasingly recognized as a promising approach to meet not only the requirements of economic development, job creation and inclusive growth but also the new challenges of social and environmental development. In this framework an informal group of experts has been established by ten UN agencies to explore possibilities of coordination to promote effective development of the value chain. The main purpose of this group was to enhance learning, coordination and collaboration among UN agencies in the formulation and implementation of value chain development initiatives at country and regional level (Stamm and Von Drachenfels, 2011).

Aube (1994) defines the VC as the assembly including actors those involved in the production, distribution, processing and consumption of a given product or group of products and the multiple and complex interrelations between them. Duteurtre et al. (2000) assimilate the VC to a system of agents that work together to produce, process, distribute and consume a product or type of product. It is a set of actors and activities in connection with any product or group of products related to a specific space. IFAD consider that "the value chain development approach is considered as an intervention that finances the necessary activities to address the constraints – or bottlenecks – on the development of a particular agricultural product in a coordinated manner, to benefit the smallholder farmers. A pro-poor value chain intervention is one that addresses the full range of activities and constraints of a particular agricultural product (e.g. input supply, market-oriented technology development and its transfer, infrastructure development, credit, capacity building, processing and marketing) in a coordinated manner, and is explicitly designed to include the rural poor in the resulting benefits" (Stamm & Von Drachenfels, 2011, p.10). The common goals of most FAO work on value chains are to find ways to add value to primary products, achieve higher returns, connect producers to markets, and ensure equitable participation of smallholders without unduly degrading the natural resource base. Essentially all FAO value chains work includes support for building strategic and productive alliances among producers, and between producers and other value chain actors – particularly processors (Stamm & Von Drachenfels, 2011, p.24).

Stamm and Von Drachenfels (2011) argued that promotion of value chains is a complex challenge that requires a holistic and comprehensive approach. This approach involves various sectors (private, public, community, etc.) and different levels, from local to multinational. In fact, increasing household's value added based on local product in developing countries is generally focuses on identifying the different ways in which small-scale farmers can be incorporated in existing chains or new value or can extract greater value from the chain, either by increasing efficiency or by also making longer activities.

The process of developing the value chain could also require the involvement and integration of multiple stakeholders, private, state, producer organizations, etc. as shown in figure 1.

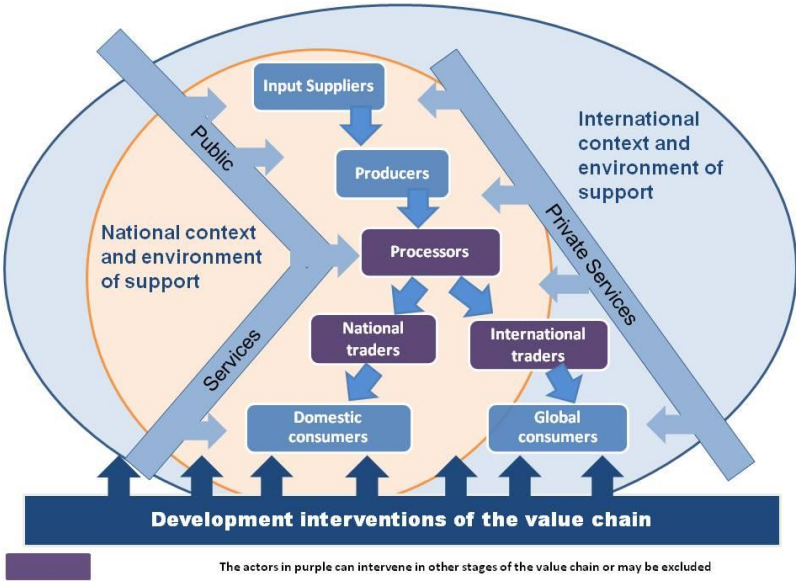

Figure 1. Map of generic value chain

Source: Adapted from Hartwich & Kormawa (2009) in Stamm & Von Drachenfels (2011)

Furthermore, the development of a process based on the value chain will also consider the impacts and interrelationships with other environmental and social dimensions. The process is far from linear.

Moreover, to achieve the main goals of FAO approach, the need for innovation is becoming urgent (Hansen and Birkinshaw, 2007). They argued that innovation value chain is based on three phases: idea generation, conversion, and diffusion. Roper et al., (2008) consider that the introduction of new products or processes representing the end of a process of knowledge sourcing and transformation could play a important role in the development of the innovation value chain.

In this framework, a team work has been established within the CRP-DS program by ICARDA and IRA to explore the opportunities to establish a VCA for olive sector in Medenine governorate in the south east of Tunisia.

In fact, accumulated over time knowledge and rich experience have been in favour of olive trees plantation in Tunisia, giving it an unusual style, harmoniously combining the trees requirement to the potential of natural resources. The cultivation of olive trees in Tunisia extends over the majority of agricultural land and currently holds 1,788,000 hectares representing nearly 80% of the total area devoted to tree crop plantations and 35% of arable land (Karray and Kanoun, 2013). The production average of Tunisian olive oil stands at 180,000 tons (2004 to 2014), this level of production places Tunisia at the 2nd rang in the world after the European Union (ONH, 2015) and olive oil exports are at the top of agricultural exports and representing about 75% of total production in the country.

In arid and semi-arid regions, olive trees are the main component of cropping systems. It boosts economic and industrial activities and plays undeniable social and environmental roles. Olive sector is a key element of regional development and social stability, and one of the factors of population stability especially in arid areas, so that any other activity is doomed to failure (Karray and Abichou, 2007). The environmental role of trees is also essential as it helps to reduce the phenomenon of erosion of fragile soils and reduce desertification. However, climate, soil aridity and fragility of the environment represent a constraint to enhance the productivity of the olive sector. But given the social, economic, cultural and ecological implications, olive remains the irreplaceable activity.

The main goal of this study is to assess the olive oil value chain in Medenine located in south east of Tunisia. The VC map for the olive trees sector will be constructed and described. The main operators and activities will be identified and characterized. Using a participatory and multi stakeholders workshops associating main actors, a SWOT analysis, has been carried out to evaluate the strengths, weaknesses, opportunities and threats of olive oil value chain and to figure out an innovative olive oil value chain with a higher value added.

1. Methodology

1.1. The study area: Medenine governorate, Tunisia

The governorate of Medenine is located in the southeast of the country, and covers an area of 8588 km² that represent 5.2% of the area of Tunisia. It has a population of 432,503 inhabitants (figure 2).

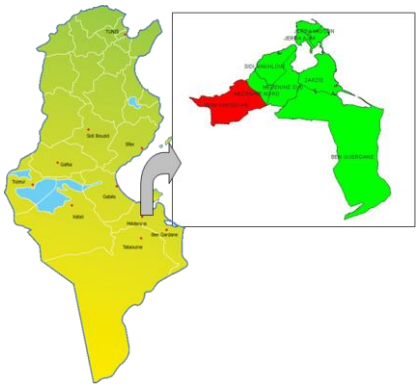

Figure 2. Location of Medenine governorate

Medenine area belongs to the arid bioclimatic stage, in lower level variant mild winter. Rainfall varies between 100 and 200 mm.

The olive is the main agricultural activity in Médenine. It covers 190,000 hectares representing 82.5% of the total cultivable area of the governorate and regroup more than 4 million trees (6.5% of the national total) of different varieties of olive trees called Chemlali, and Zalmati, Zarrazi (table 1). Olive trees are considered as a resistant plant to the most difficult natural conditions such as drought and lack of rain. The olive cropping has not benefited from the technological development and modernization. Traditional techniques of olive picking and crushing are steel used.

Table 1. Olive oil sector in Medenine governorate

Districts	Area of olive trees farms (Ha)	Number of olive trees	Number of mills	Extraction capacities (Ton/day)	Olive oil production (Ton)
Medenine Nord	9345	190500	5	50	600
Beni Khedeche	12722	257700	13	60	1200
Sidi Makhlouf	22500	470160	13	150	2700
Sub total (three districts)	**44567**	**918360 (22%)**	**31 (20%)**	**260 (9%)**	**4500 (21%)**
Medenine Sud	13580	286100	18	250	2000
Ajim	8440	392100	8	90	300
Houmet Souk	4890	217400	14	200	1100
Midoun	4715	227800	3	50	900
Zarzis	62304	1256800	65	1600	9800
Benguardane	51504	875900	18	300	2600
Total	**190000**	**4174460**	**157**	**2750**	**21200**

Source: CRDA Medenine (2014)

As shown in the table 1, the three districts Beni Khedache, Medenine North and Sidi Makhlouf, which belonging the watershed of Oum Zessar, include 22 % of the total olive

trees, 21 % of the olive oil production, 22 % of the total number of oil mills (extraction units of olive oil) and 22 % of the extraction capacities in the governorate of Medenine.

1.2. Method and data collection

The methodological framework was based on a set of integrated approaches.

Firstly a literature review focused on the national context, regional and local conditions has been carried out. Documents provided by the ministry of agriculture, the national office of olive oil, the olive institute, the national observatory of agriculture, south development office and the CRDA of Medenine were useful for our investigation. In accordance with chain actors a secondary data have been collected to specify their activities and the relationships linking actors. Most of the data were provided by the Regional Department of Agricultural Development in Medenine (CRDA), the National Office of Olive oil (ONH), the Olive Institute (IO) and main operators.

Secondly a participatory approach based on semi structured interviews with main operators and multi stakeholder workshops has been followed. The semi structured focus group interviews were targeted to the main stakeholder groups involved in production and marketing. Indeed, the goals of the three main workshops (table 2) held in the study area were; identifying the selected commodity, identifying the main operators of the value chain and analyse the major's challenges and opportunities of the olive oil sector.

Table 2. Workshops description

Date of the workshops	participants	Major outcomes
December 14th, 2013	43 participants (8 female and 35 men)	highlighted the interest and the value of cooperation between research, development actors, civil society local population, and donors Identification of a range of local products and commodities with higher priorities to be promoted throughout the high value chain cluster (Olive oil, livestock, Aromatic and medicinal plants, figs, honey, cultivated barley)
June 3-4 2014	32 Participants (13 women and 19 men)	Confirmation of the priority given to Olive oil and livestock as the most important productions in the area
October 1st, 2014	17 participants representing NGOs and CBOs and administration	Promoting the institutional set-up of an innovation platform based on the high value added produced commodities (olive). Olive oil (variety of Zarrazi) will be the champion commodity of the territory. Analyzing challenges and opportunities of the olive oil sector via SWOT approach
March 17th, 2015	19 participants representing the main stakeholders involved in the implementation of the VC	An innovative VC was conceived and agreed to be implemented throughout a partnership approach

In order to identify the main strengths, weaknesses, opportunities and threats of the OVC in Medenine area, a SWOT analysis was carried out.

3. Results

3.1. Key operators and map of the olive oil value chain in Medenine

Several operators have contributed either directly or indirectly to the implementation of the OVC in the study area. Direct operators are those who ensured the production, storage, packaging, processing, marketing and consumption, thus they are farmers, Industrial processing, traders, consumers, nongovernmental organisations (NGOs) and community based organisations (CBOs). In the following section these operators will be presented and characterized.

Olive growers : The olive production is ensured in Medenine by farmers with an annual average production recorded during the last decade (2000-2010) of 50,000 tons of olive. In the national context, the governorate of Medenine is the fifth largest olive growing areas in Tunisia. Production of the last season (2012/2013) reaches 106,000 tons. The yield levels of olive per hectare remains low and varies from one region to another, the average yields recorded during the past decade is 260 kg ha or 14 kg/tree. The highest levels of performance come from the groves of Zarzis (339 kg / ha) and Beni Khedache (218 kg / ha).

Other results confirm that olive cropping system in Medenine is subject to harsh natural conditions that significantly limit diversification. It is largely conditioned by the water availability, not enough innovative and investments are low (AHMED et al., 2008; Fleskens et al., 2005; Hachani et al., 2015; Karray and Abichou, 2007; Sghaier et al., 2012). Operators, who have the willingness and the ability to undertake and fund development activities of the olive business, are a minority. Karray and Abichou, 2007 confirmed that olive cropping system in the region can only be speculative and complementary to other activities.

Zarzis area is the most important producer of the olive in Medenine. In Zarzis, the olive oil business has a real economic dimension. Indeed, some large olive growers have achieved vertical integration; they have their oil mill and seek to leverage their resources. Major owner-operators have inherited a long experience in the industry, but the experience does not meet the packaging and export stage.

Processors : In the absence of integration and professional organization, most mills just provide services to olive growers who pay either in cash or in kind (olive oil extracted). The recovered oil is sold directly to consumers, to ONH (Olive oil office) or private exporters (figure 3).

The majority of small and medium farmers prefer to grind their olive for their own account. The harvested olives are usually in very advanced stages of maturation and sometimes accumulated over 3 to 4 weeks due to the traditional collecting method to which is added storage and transfer period that are often in poor conditions. This failure of the quality already in collecting is compounded by storage in the mills, to pick up a minimum quantity to start olive crushing. The large farmers usually have their own olive mills to crush their production.

The processing operation is ensured by 156 olive oil mills (classic and super presses and continuous chain) with a theoretical capacity of extraction that reaches 2,800 tons per day of which 55% are located in Zarzis area (table 1).

The current utilization rate of olive mills is 23%, compared to 2003 (35.9%) it recorded a decline of 16%. The production is mainly for home consumption or for retail sale in bulk. The lack of

encouragement and subsidies to produce better quality does not help to the improvement of production techniques or marketing.

Traders : Although very important institutional professionals support accorded to olive sector at the national level, Medenine region does not benefit much to enhance the marketing strategy of their oils. Indeed, small farmers devote part or all of their production of olives for their annual consumption. The mills activities are mainly limited to the first processing of olives oil. They don't pass to olive oil marketing. Large-scale farmers who do not have processing units often sell their product on trees for traders or other olive growers. Olive mills have not developed a more sophisticated packaging or treatment of the extracted oils. So, there is no effort on product differentiation for specific markets niche (such as the flavored oil development or packaged).

Old people still prefer the consumption of olive oil with high acidity for economic reasons (so that the family does not consume too much of vegetable oil) and for health reasons (they consider the olive oil is more healthy). Attachment to consume olive oil is reaming, despite competition from seed oils sold at competitive prices through state subsidy.

Table 3 summarize the distribution of the collected quantity of olive oil from the key regions in the governorate of Medenine. Indeed, the quantity collected by ONH is extremely variable over time due to the fluctuation of productivity which is closely dependent of drought conditions.

This quantity has reached its maximum (537,770 tons) during the season 2008/2009, against only 15,720 tons during the following season (2009/2010).

Table 3. Collected quantity of olive oil by ONH in Medenine governorate (tons)

Districts	2005/2006		2007/2008		2008/2009		2009/2010		2011/2012	
	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%
Zarzis	159,278	57%	230,000	66%	523,000	97%	15,720	100%	113,900	41%
Ben Gardene	62,360	23%	99,140	28%	14,770	3%	-	-	101,240	37%
Sidi Maklouf	55,490	20%	19,420	6%	-	-	-	-	62,200	22%
Total	277,128	100%	348,560	100%	537,770	100%	15,720	100%	277,340	100%

Source: ONH (2014)

Services providers : The olive oil VC in Medenine, benefit from diverse services and facilities provided by different contributors mainly:

- Conveyors of olives, pomace, olive vegetable, oil, and workers;
- Tractors owners: who provide soil maintenance activities (tillage) and transport;
- Specialized workers: ensuring the maintenance of olive trees ;
- Coal cutter: buy the timber from olive growers and ensure the production of coal, which is used as the main source of heating in homes or for the preparation of tea;
- Breeders: buy timber and pomace from olive growers for animal feeding.

The figure 2 provides a synthetic map of the value chain of olive oil in the study area.

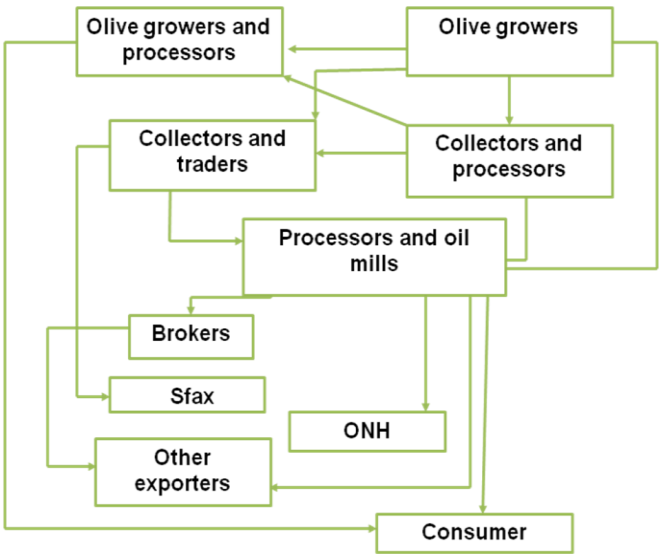

Figure 3. Map of olive oil Value Chain in Medenine

National and regional environmental support for OVC : In view of the important role of olive cultivation in the social and economic life of the country, the state has continued to take measures to encourage sector development. The implementation of the OVC has mobilized a set of support operators who are intervene indirectly and provide administrative and institutional supports: administrations (CRDA, ODS, APIA), Agricultural Development Programs (PGRN, national and regional programs, etc.) and Research institutions (IRA and IO)[1].

3.2. SWOT analysis of olive oil VC in Medenine

The objective of this section is the identification of internal factors (Strengths and Weaknesses) and external factors (Opportunities and Threats) that characterized the OVC in Medenine. The SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis summarizes the main results of the investigations carried out during the stakeholder's workshops, interviews and focus group discussions held within the innovation platform (IP) implementation process.

STRENGHTS

The olive oil sector analysis shows great strengths in terms of production employability and exportation. The most important competitive advantage of Medenine olive oil is its superior quality relative to olive oils being produced in other region within the countries. In fact, Beni khdeche districts localized in the mountains region of Medenine is well known by its superior product based

[1] CRDA (Regional Agriculture Development Department), ODS (South Development Office) APIA (Agency for Agricultural Investment Promotion), ONH (National Olive oil Office), IRA (Arid Regions Institute) and IO (olive Institute).

on the variety of Chemlali. This is can be a crucial element in an effort to increase the value added of olive oil. Without a superior product, it is not possible to turn a commodity into a differentiated product that can be promoted and where premium prices can be attained. In fact, olive oil has been an integral part of the Mediterranean diet. This tradition persists at regional level, and it is strengthening due to a stream of scientific findings. These findings provide a platform upon which to promote olive oil production and commercialization at regional national and international level. Indeed, good quality of olive oil in Medenine can be an important element in a marketing strategy. On the other hand, the important production over the years, mainly within rainy years (can reaches 150,000 tonnes), leads to a dynamic industrial sector containing 157 mills, with a theoretical capacity of crushing that reach 2750 tons of olives per day. In fact, the olive is the main agricultural activity in Medenine. It covers 190,000 hectares representing 82.5% of the total cultivable area and regroups more than 4 million feet (6.5% of the national total). As consequence olive oil production and processing sectors employs directly or indirectly, more than 20,000 people and provide 3,000,000 million workdays per year.

Weaknesses

One of the most important obstacles for agriculture sector in general and particularly olive sector in Medenine is high cost coupled with a low productivity due to several factors. Many olive groves are old, more than 80% of the olive grove is beyond the optimum age (70 years), and therefore their productivity is declining. Irrigation infrastructure is largely absent, further lowering productivity. Input costs tend to be higher due to the increase of labour wages mainly after the revolution of 14 January. High labour costs are coupled with the absence of skilled labourers. Another crucial factor causing poor competitiveness of olive sector is the large number of small farm that represents obstacle for mechanization of agriculture sector and the introducing of innovative ideas. The majority of exports oils, at national and regional level (more then 90%) are in the form of bulk generic oil that is subsequently packaged in Italy as well as some other countries. Bulk generic oil cannot garner price premiums; thus the potential of what is a superior quality product is wasted. This situation is aggravated by the lack of operators and negotiators with a long-term business strategy, the lack of adequate development approach for indirect exports, nearly a million tourists visiting the southern regions, and the lack of activities supports and technical assistance in the region.

Opportunities

Two main opportunities for olive oil sector can be mentioned here. Firstly, the great interest presented by public policies to promote olive oil sector and secondly the national and international growing markets that represent a potential export destination. In fact, a lot of subsidy schemes are provided by government since many years to increase quantities and quality of production. Among other government provides financial support for farmers to ensure supplemental irrigation in dry years, and encourages promoters to implement crushing units.

On other hand, an international trend with considerable potential impact is the increasing consumer's adoption of aspects of the Mediterranean diet based on olive oil. The consumer's habit change is coupled with a significant increase in tourism in the region (more than one millions). During their sojourn, tourists have the opportunity to taste the product and become familiar with it. This opportunity should be used to increase the fidelity of international consumers to olive oil and by consequence to increase export. The recent gradual revaluation of the Euro against the Tunisian

dinars has meant an environment for exports to the UE. Further, Tunisia can utilize this situation to their advantage and become more prices competitive.

Threats

First, the growing demand of olive oil has motivated countries with favourable climates to plant olive trees. Olive groves have proliferated in the Americas as well as in South Africa and in some Asian countries (FAO, 2006). This news olive producers can partially satisfy the increased demand for olive oil and reduce the demand for imports from traditional olive oil– producing countries like Tunisia.

Second, climate change may lead to declines in yields. Over the last years a series of extreme dry years have damaged millions of trees and caused considerable fluctuations in olive production. Climate changes can decrease the quantity and quality of olive oil in Medenine given that it is by nature a dry and degraded area. On other hand, alternative and more lucrative employment activities, mainly the growing tourism sector in Djerba and the informal traffic with Libya have led many owners of olive groves to abandon them.

Table 4. SWOT analysis matrix

STRENGHTS	WEAKNESSES
- The olive is the main agricultural activity in Médenine. It covers 190,000 hectares representing 82.5% of the total cultivable area - Olive sector regroup more than 4 million trees (6.5% of the national total) with different varieties of olive trees called chemlali, and Zalmati, zarrazi. - Existing varieties considered as a resistant to the most difficult natural conditions such as drought and fragile soil - Importance of olive oil production that can reach 150,000 tons - The olive sector in the region employs, directly or indirectly, more than 20,000 people and provide 3,000,000 million workdays per year - The soil and climatic conditions are relatively favourable and suitable especially in the area of Zarzis. - The olive trees boost an industrial sector containing 157 mills, with a theoretical capacity of crushing that reach 2750 tons of olives per day - Emergence of new private operators in the collection and the commercialization of olive oil - Attachment of local population to the olive trees - Ability of the local population to the adaptation to climate change - Existence of rural tradition in olive growing - Possibility of application of some adaptation	**Production level** - Aging and depletion of the olive trees; more than 80% of the olive grove are beyond the optimum age (70 years) - Very low yields per hectare compared to the national level. - Lack of skilled and unskilled labour force - Low knowledge of production techniques. - Extreme fluctuation of production **Processing level** - Artisanal production of olive oil for domestic consumption - Lack of control of processing and packaging - 25% of the local production are triturated outside the region (in Sfax) - Lack of training for unskilled labourers - Failure to develop sub-olive products with high value added (vegetable water, pomace, twigs, leaves, bios size) **Marketing level** - Lack of operators and negotiators with a long-term business strategy - Lack of adequate development approach for indirect exports, nearly a million tourists visiting the southern regions - The major producers are limited to sell their oil to

practices of the olive trees to climate change initiated by the Institute of olive: - Use the most rustic genetic (variety Chemlali) as rootstock for other varieties perform more in yield and quality. - Use of the vegetable water to improve the surface structure of the soil - Possibility to introduce mechanization for harvesting and tillage	the ONH - Lack of support activities and technical assistance in the region
OPPORTUNITIES - Long experience in international marketing and export - Policy of encouraging and prompting promoters at the different segments of the sector. - Importance of the tourism sector in Region (annual presence of about one million tourists) - Existing of institutional support (CRDA, IO, ONH, ODS, APIA, etc.) - Possibility of initiating development projects with international donors to fight against poverty - Possibility of make use of space as the introduction of the fig tree intercropped with olive, aimed to improved the income of the farmer - Creation of tourism circuits and farm houses on the mountainous area (delegation Benikdèche) - Interesting for organic oil, flavored oils and cosmetic oils	**THREATS** - The emergence of new countries producers and exporters of olive who can benefit from certain tariff preferences on the European market (increase of external competition in the international market); - Decrease of aid to production granted to European producers. - Adoption of norms of quality and commercialization (traceability, labeling, packing, etc.) more and more restraining. - Climate change effects (Advanced of flowering, Fall in production, Degradation of the oil quality, etc.) - Low organic matter and low biological activity in the soil - Low dissemination of results of research and technology and absence of special interest for olive cultivation in arid zones

3.3. Innovative VC, IP and action plan

The IP and the learning alliance processes which has been carried out with the involvement and the participation of major actors in Medenine area have contributed to have a common agreement to focus the process of olive oil VC (OIVC) design in the Beni Khedeche area. This area is located in the north ouest of the governorate of Medenine (see figure 2) with and area of 1381 Km2 and 30000 inhabitants. It is characterized by a relief dominated by the mountainous chain of Matmata.

This choice was argued by the social innovation process already implemented by the previous research for development programs carried out by IRA with the partnership of main regional and local actors of development (Sghaier et al., 2014). This partnership has taken advantage from the local dynamic of multi-stakeholders in the region. In fact there are several NGO's, CBO's, women and youth organisations which are very actives. These local organisations has expressed a real interest and commitment to build a strong partnership and can lead an innovative process based on social innovation and new effective governance.

Furthermore, Beni Khedache is characterized by two specificities of olive sector, which are the biological products and the high quality of olive oil. This incites for promotion of this sector in order to be more efficient and to have a higher value added (exportation to international markets with specific label). Indeed, the Zarrazi variety presents a great adaptation capacity to drought and it has

the specificity of Djebel and biologic product. This specificity can be valorised by creating a label for the olive oil of Beni Khedeche.

The objective of this innovative value chain is to better manage the sector of olive oil from production to market, in order to create new opportunities, new products, new markets, new institutions, new jobs, be more innovative, productive and competitive to enhance livelihoods, stabilize incomes and food security. Furthermore, it has the advantage to realize a better effectiveness of the role and functioning of the local institutions, policy makers, farmers, local actors, research, etc., around social innovations.

The design of the IVC is started by two workshops held in Beni Khedeche in October 2014 and March 2015, which were taken advantage to promote the institutional set-up of a learning alliance process and an IP based on the high value added produced commodities (olive). Olive oil (variety of Zarrazi) will be the champion commodity of the territory.

The objective here is to simultaneously meet economic, social and environmental goals of the innovation process with the inclusion of all affected groups and interests (farmers, local actors, development actors, NGO's, policy makers, private actors, enterprises, researchers, etc.) in learning and acting processes (choice, management and coordination of involved stakeholders/institutions, process facilitator, learning alliance with stakeholders, business and enterprises which can be involved, rules, value chain processes, etc.). Thus, the improvement of the resilience of production systems and livelihoods and the economic performance in Beni Khedeche can be realized by the management of the actual olive value chain in a more sustainable, efficient and integrated manner (for example, open new and diversified markets in food and bio-based products).

In the framework of an innovative value chain (IVC) of olive sector in Beni Khedeche, this new partnership, can be realized by dynamic local multi-stakeholders engagement (such as SMSA de Beni Khedeche, NGO's: AJZ, women association Bhayra, GDA Bhayra, and other Community Based Organisations CBO's) in an effective participatory process (figure 5). The idea is to create a new collection center leaded by the Mutual Agricultural Services Society (SMSA) in Beni Khedeche which plays the role of collection of olive products, management of products (diffusion to mills, conservation, etc.). It has also the role of diffusion of products to new packaging and labelling units, and sub-products of olives (pomace) to new transformation units. These two new units will be created in the framework of IVC. The idea is to reduce the role of intermediaries and encourage farmers (producers) to buy their products to the SMSA, who take the responsibility to ensure the processing, packaging and marketing operations. The farmers could also benefit from some facilities provided by the SMSA (small credits, training, etc.) and the others support actors (research institutes, administrations, etc.). The SMSA could play an active role to facilitate a local alliance process with the contribution of local NGOs (AJZ (Youth Zammour organisation, Women Behayra NGO) and CBOs (Agricultural development grouping of Behayra, Agricultural development grouping of Beni Khedeche).

The objective behind the creation of a new processing unit of olives sub-product is to find innovative ways and new opportunities (social innovation). It consists on a transition towards an optimal/more efficient use of the renewable biological resources, and a shift to an economy based on local or biological resources residues, sub-products, etc. In fact, we particularly focus on pomace and wood which are used as bio-energy for heating for long time ago. Our choice is based also on the fact that the Governorate of Medenine has a great potential of olive trees (4 million trees), 200 000 tons of

wood cutted from olive trees and about 40000 tons/year of pomace. The olive pomace is a sub-product of the extraction process of the olive oil composed of skins, residues of the pulp and fragments of nuclei. It is the solid residues resulting from the extraction of oil. The main current and actual uses of pomace are 1) Delivery to refineries to the extraction of oil, 2) Spreading as amendment on the agricultural land, 3) Employment in the livestock feeding, in particular the sheep, 4) The pomace is a very appropriate additive for the units of gasification for the production of bio-gaz. In fact, the pure pomace are presented as a very good fuel, easy to use and with a high calorific value, which can be used as substitute of wood heating in granules for boilers and stoves. It is used in the oil mills to heat the water used in the phase-mixing or marketed as a substitute for wood pellets. Currently, the market price is significantly the half of that of the granules, for equivalent benefits.

The main issue of bio-transformation of pomace in the framework of the IVC is to produce bio-energy, with fewer inputs, less environmental impact and reduced greenhouse gas emissions: low carbon economy. This bio-economy can maintain and create economic growth, provide jobs and business opportunities (new activities, industries, enterprises, employment).

The new partnership which will be implemented around the IVC will be supported and guided by several local and regional institutions and organizations, such as IRA, IO, ONH, APEX (national agency for export promoting). These latter will support all the IVC processes (production, collection, processing, packaging, marketing) by innovative researches and scientific results, but also by capacity building, technical supports, etc (figure 5). The objective is to rely a good and participative governance and management of the institutional framework to support the development of an IVC.

In fact, this IVC is designed in the framework of the IP and the learning alliance process which combine the different efforts of actors to success this new opportunity. This is by 1) enhancing private sector engagement in the innovation processes (implementation and involvement of existing institutions with better management, governance, participation, efficiency, etc., but also new specific institutions, policies, strategies and approaches to handle for example the bio-economy issues), 2) enhancing civil sector engagement in the innovation processes (NGO's, local Associations, regional directions of agriculture development, National office of oil, Olive institute, research institutions…), 3) implementation of new and effective strategies by government related to improvement of the actual value chain and valorization of bio-resources (in Tunisia there is a strategy of olive sector development, but not for valorization of sub-products to bio-energy for example), and 4) by reorganizing the relations between government, civil sector and private sector (Facilities, implementation of new and effective strategies, legislations, better management, organization, confidence, cooperation, partnerships, etc.).

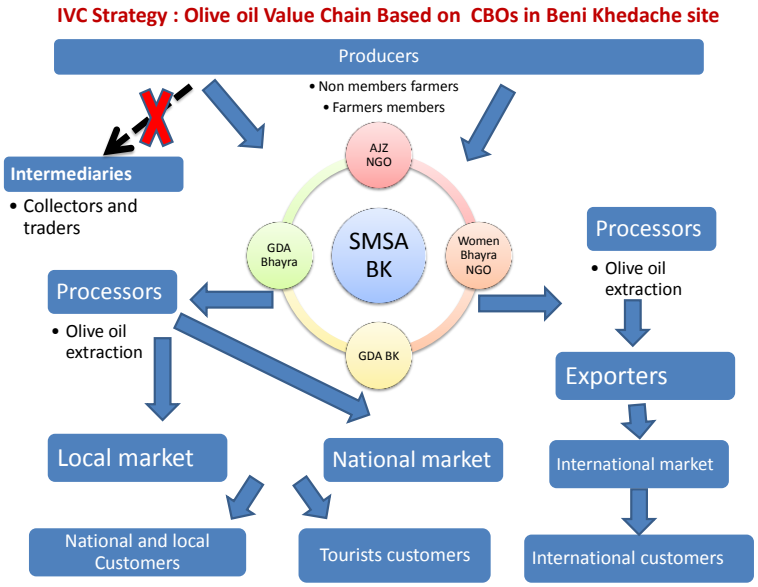

Figure 4. Innovation Olive oil Value Chain in Beni Khedache (governorate of Medenine)

4. Discussion and conclusion

This research tried to analysis post harvest and olive oil value chain in Medenine governorate. The main objectives were to diagnostic and selection of the relevant stakeholders (main players) in the value chain, to map the challenges for smallholder market access and to evaluate the internal and external factors that determine the performances of olive oil sector in Medenine, pointing out the major opportunities, threats, strengths and weaknesses (SWOT) that can be present with their actual and future evolution. The ultimate goals planned for the next phase is to assist stakeholders (men, women and youth) to develop their driven strategies for improving the marketing efficiency, postharvest management and value addition for the olive oil.

The post harvest analysis based on literature review, statistic data collecting and the direct contact with key stakeholders revealed that the olive farming system is very interesting activities in Medenine.

The diagnostic of the relevant stakeholders (main players) in the value chain shows several operators that contribute either directly or indirectly to the implementation of the olive sector in the study area. Direct operators are those who ensured the production, storage, packaging, processing, marketing and consumption, thus they are farmers, Industrial processing, traders, consumers, UTAP and the institutions of agricultural development in the governorate of Medenine. Indirect operators are those who have contributed to supervision and administrative and institutional support for the olive oil value chain implementation. A set of indirect operators can be mentioned; administrations (CRDA, ODS, APIA); the Agricultural Development Programme (RDP, PGRN, PRODEFIL, etc.) and the research institutions (IRA and olive Institute).

The SWOT method showed great strengths of olive oil sector in terms of production employability and exportation. Competitive advantage of Medenine olive oil is its superior quality relative to olive oils being produced in other region within the countries and the important production. This is can be a crucial element in an effort to increase the value added of olive oil and promote export. A lot of weakness of agriculture sector in general and particularly olive sector in Medenine can be obstacles for sector development (old olive groves, small farms, declining productivity, absence of irrigation

infrastructure, absence of skilled labourers, high input costs etc.). Despite the weakness, two main opportunities for olive oil sector can be mentioned. Firstly, the great interest presented by public policies to promote olive oil sector and secondly the national and international growing markets that represent a potential export destination. Firstly the proliferated of olive grove in countries with similar climate condition, that can partially satisfy the increased demand for olive oil, and secondly climate change that may lead to declines in yields, represent the main threat that faced olive oil sector in Medenine.

Furthermore, the IP and the learning alliance processes which has been carried out with the involvement and the participation of major actors in Beni Khedeche area had led to the design of an IVC focused on the specific and local product of the olive variety of Zarrazi. A strategic action plan was designed in order to enhance a strong partnership and an innovative process based on social innovation and new effective governance. The objective of this innovative value chain is to better manage the sector of olive oil from production to market, in order to create new opportunities, new products, new markets, new institutions, new jobs, be more innovative, productive and competitive to enhance livelihoods, stabilize incomes and food security. Furthermore, it has the advantage to realize a better effectiveness of the role and functioning of the local institutions, policy makers, farmers, local actors, research, etc., around social innovations. Thus, the improvement of the resilience of production systems and livelihoods and the economic performance in Beni Khedeche can be realized by the management of the actual olive value chain in a more sustainable, efficient and integrated manner (for example, open new and diversified markets in food and bio-based products).

However, the process has just started with many advantages but also with some risks including sustainability of the process, the perseverance of local actors to continue to really take over moderation of the committed social innovation process.

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