# STUDY FOR A SUSTAINABLE MODEL OF SOCIAL IMPACT INVESTMENTS AIMED AT IMPROVING REFUGEES' WORKING CONDITIONS IN LEBANON

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## Abstract

Social, economic and environmental analysis about the Lebanese agricultural sector are correlated to identify those fields in which a sustainable model of social impact investments can combine ecosystem restoration and dignified working opportunities, while enabling a solid development of farm businesses in Lebanon. The analysis of the social and historical context, worsened by the 2011 Refugee Crisis, shows a critical situation of exploitation of Syrian Farmhands, in parallel with an intense stress on natural resources and a stagnant investment and innovation phase. Six different fields of intervention are presented to illustrate the potential of investing on Lebanese agricultural farms with a pre-agreed distribution of the added value gained. Cropping strategies to increase yields, soil protection techniques, compost production, wastewater treatment and renewable energy production can be combined with financial education on business management and product diversification to generate new resources through ethical investments based on social responsibility.

Analisi socioeconomiche e ambientali del settore agricolo libanese vengono correlate per identificare i settori in cui un modello sostenibile di investimenti ad impatto sociale possa combinare ripristino ambientale e condizioni lavorative dignitose, permettendo al contempo il rafforzamento e lo sviluppo delle imprese agricole in Libano. Il contesto sociale e storico, fortemente influenzato dalla crisi dei rifugiati del 2011, mostra una situazione critica di sfruttamento dei lavoratori siriani, contemporaneamente ad un eccessivo sfruttamento delle risorse naturale e ad una fase economica stagnante in termini di innovazione e investimenti. Sei diversi campi di intervento vengono analizzati per identificare il potenziale di un sostegno finanziario a favore di imprese agricole libanesi attraverso una redistribuzione concordata del valore aggiunto generato. Tecniche per incrementare la resa agricola e l'efficienza produttiva, produzione di compost, trattamento delle acque reflue e produzione di energia rinnovabile possono essere combinate con percorsi di educazione finanziaria sulla gestione d'impresa e diversificazione delle attività economiche per generare fonti di reddito attraverso investimenti fondati sull'etica e sulla responsabilità sociale.

**Keywords**
Agriculture, refugees, investment, social impact, sustainability.

## Introduction

The status of protracted displacement of Syrian refugees in the Middle East, particularly in Lebanon, leads to a situation of severe economic instability and labor exploitation, especially in

those areas with high density of refugee population coupled with the presence of sectors – such as agriculture – requiring low-cost labor force.

This context, while enabling an economic advantage for a few producers and landowners, exacerbates a situation of local conflict among communities due to a fierce competition on unskilled jobs. In some areas of the Bekaa Valley, for example, a Lebanese farmhand daily wage amounts to 25$ against the 13$ for a Syrian male farmhand and 4$ for a Syrian female (Scalco 2017).

The informal agricultural work system in these areas is complex and involves different counterparts. In extensive productive systems, the refugees' job demand goes through the "Shawish", a consolidated network of Syrian supervisors managing also child labor (Mawad 2018). They are the main intermediary channel between refugee farmhands and agricultural producers and landowners (Scalco 2017).

The study here proposed aims to verify potential improvements in the agricultural system, e.g. in terms of consumption reduction and production efficiency, to increase the economical revenue of the existing fields. The final goal is to evaluate the feasibility conditions of a social investment model able to restore decent working conditions for Syrian refugees and creating at the same time growth-opportunities for the Lebanese agricultural producers and landowners.

## The Refugee Crisis

The Syrian crisis has displaced millions of people, most of whom have moved into neighboring countries such as Jordan, Lebanon and Turkey. The Lebanese government, faced with a longer history of Palestinian camps and their militarization, has refused to allow the establishment of official refugee camps for Syrians, forcing them to either live in private rented accommodation in towns and cities throughout the country, or in informal settlements built on private, often agricultural land. These informal settlements are built and developed through a complex assemblage of humanitarianism, hospitality, security, economic and political considerations (Sanyal 2017).

According to Human Rights Watch, Lebanon hosts approximately 270,000 Palestinians and more than 1 million Syrian refugees are registered with the United Nations High Commissioner for Refugees (Unhcr) (Human Rights Watch 2017). The government estimates the true number to be 1.5 million., As a non-signatory to the 1951 UN Refugee Convention, Lebanon’s residency policy makes it difficult for Syrians and Palestinians to maintain legal status, heightening potential exploitation and abuse and restricting access to work, education, and healthcare (Human Rights Watch 2017). The areas most affected by the refugee crisis are the Bekaa Valley and Akkar Region (Unhcr 2018).

*Impacts of the Syrian Crisis on natural resources*

The immediate response to the Syrian crisis from the Lebanese Government and the international community focused primarily on humanitarian assistance programs. Especially in those areas where large refugee settlements are established, this approach caused depletion of natural resources, alteration of habitats of fauna and flora as well as pollution (Moe 2014, Moe 2015). The situation is resulting in a dramatic increase of solid waste along rivers and coastline. An additional environmental impact resides in water pollution by leakage from sewage tanks built in informal settlements or dumping into rivers. Solid wastes accumulated in channels also results in obstruction of drainage systems which increases flood risks during winter. To cover the increasing local demand for food commodities, potatoes and vegetables growers extended their planted surface. Such increase in land cultivated for irrigated crops as well as the increase in domestic use has accentuated groundwater depletion (Moe 2014, Moe 2015).

## Lebanon's agriculture

The agricultural sector has always been an essential component of the Lebanese economy although its contribution to Gdp does not exceed 4% (World Bank 2017). About 30% of the Lebanese population is involved in agriculture and agri-food businesses. Only 34% of this sub-population is entirely counting on agriculture. Out of the total Lebanese area, about 36% are agricultural lands, 13.6% are covered by forests and 57% are non-cultivated lands or natural pastures (Chalak 2015).
Despite its limited extension of 10,452 $km^2$, Lebanon has a great topographical and landscape diversity: the presence of high mountains close to the coast and oriented north-south with numerous perpendicular valleys gives rise to around 22 bioclimatic zones and different types of habitats. The ecosystem's diversity allows the cohabitation of cold requiring crops and subtropical crops within a distance of less than 20 km. Moreover, due to the high population density and the mountainous landscape of the country, the arable land per capita is very limited (Chalak 2015).

*Land fragmentation and production*

According to the Agricultural Production Survey, conducted by the Ministry of Agriculture between 2008 and 2009, the total cultivated area was 251,600 ha. In the last ten years, the cultivated area has increased by 5%, with more than 23% increase of irrigated agriculture (Salman et al 2016). The

results of the agriculture census conducted by the Ministry in 2010 showed that almost 70% of total farm holders have less than 1 ha and cultivate less than 20% of the total agricultural area. The average holding size is around 1.36 ha. The fragmentation did not allow economies of scale for production and marketing.

The Bekaa valley is the main agricultural region that produces wheat and most of the cultivated crops in Lebanon. The coastal zone and the Akkar region support intensive production of citrus, fruits, bananas and vegetables. Lebanon exports fruits and vegetables, it is self-sufficient in poultry and produces only part of the needed pulses, wheat and sugar (Salman et al 2016). The evolution of the agricultural sector can be observed through Fao's historical data series (Fao 2018). Fresh fruit crops rapidly expanded between 2010 and 2012, though cropping yields have dropped preventing the growth of produced volumes. The same happened to fresh vegetables: even if harvested areas saw a positive trend through the last four years, yields have been decreasing since the beginning of this century, intensely affecting volumes generated.

*Water Resources*

Lebanon's net exploitable surface water and groundwater resources, water that Lebanon can technically and economically recover during average rainfall years, are estimated at 2.08 $km^3$, consisting of 1.58 $km^3$ of surface water and 0.50 $km^3$ of groundwater (Fao 2017).

a. Water availability, scarcity and development

Annual rainfalls vary from 700 mm/year along the coastal zones and to 1500 mm/year on the high mountains, decreasing to 400 mm/year in the eastern parts and to less than 200 mm/year in the northeast. Above 2000 m, precipitation is essentially niveus and helps to sustain a base yield for about 2000 springs during dry periods. Precipitation in dry years can be as little as 50% of the average. Mean annual potential evapotranspiration ranges from 1100 mm on the coast to 1200 mm in the Bekaa Valley, with maximum values recorded in July (Fao 2017).

Constraints for development consist in the limited availability of water during dry months due to the very low water storage capacity, the difficulty of capturing the water close to the sea, and the shortcomings of the existing water delivery systems and networks. Annual internal renewable water resources were estimated at about 4.8 $km^3$. Annual surface runoff was around 4.1 $km^3$ and groundwater recharge 3.2 $km^3$, of which 2.5 $km^3$ constituted the base flow of the rivers. About 1 $km^3$ of this flow came from the over 2000 springs, sustaining a perennial flow for 17 of the 40 major streams in the country. About 75% of the annual flow occurs in the five-month period from

January to May. A drastic decrease has been recorded in the last three decades. The geological conditions make construction of storage dams difficult, and the largest artificial lake in Lebanon is located in the south of the fertile Bekaa Valley on the Litani River, known as the Qaraoun Reservoir (Fao 2017).

b. Irrigation

According to Aquastat, Fao's Global Water Information System, surface irrigation, mainly of the basin and furrow type, is practiced on around 60,000 ha (Fao 2017). It usually comprises diversion or simple intake structures on streams or springs, open concrete main canals, and earth or concrete secondary canals (Fao 2016). Sprinkler irrigation is practiced on around 28,000 ha, especially where potatoes and sugar beet are cultivated in the central Bekaa Plain. Localized irrigation is practiced on less than 28,000 ha, especially in North Bekaa and in the coastal region. The main sources are surface water and groundwater (Fao 2016).

A survey conducted with Farmers in Al Qaa confirmed that the water table - usually situated at 150 meters at the beginning of winter - has dropped by 10 to 20 meters. Beside the environmental impact of depleted water resources, there has been an economic impact due to additional costs for energy to pump water from deeper aquifers. Farmers in the Hermel area indicated that the cost of pumping water from Assi River or underground wells depended on the price for diesel (Fao 2016).

*Soils and land degradation*

Several natural and human-induced factors contributed to land degradation in the country. Natural elements like a rugged topography and steep slopes, poor drainage, weak lithology and torrential rainfalls cause flash floods, erosion and landslides. These problems are boosted by human impacts, related to several activities such as deforestation, urban development and chaotic sprawl, inappropriate irrigation, soil pollution and groundwater depletion (Francis 2012). Potential erosion hazard maps (basing on soil depth, structure, texture, organic matter content and structural stability) show that most of the country faces high geomorphological risks (Cnrs 2018).

Soil salinity has increased due to water extraction on coastal regions, where groundwater meets the incoming saline wedge of the Mediterranean Sea; secondary soil salinity is caused by mismanaged crop rotation, poor fertilization and crop policies (Darwish 2005). Intensive agricultural practices led to pollution issues such as nitrate accumulation during the agricultural season followed by pollutant leaching in spring (Cnrs 2018).

## A social investment model

Starting from the analysis conducted and the experience of Microfinanza Srl and Associazione Microfinanza e Sviluppo ONLUS in Lebanon, this work aims to verify the feasibility conditions of an investment model focused both on social and economic impacts, therefore able to improve the working conditions of Syrian refugees and generating at the same time opportunities of growth for agricultural producers and landowners in Lebanon.

*Project assumptions*

The envisaged model is based on three different aspects of the current situation, partially determined by the Syrian Crisis. First, Lebanon has faced an increase in production (Fao 2018) and consumption, due to the refugees hosted and the growing population (Gpd 2018). This factor is combined to a technological stasis and lack in investments, thus an increasing need in adequate technical and business resources (Agrytech 2018). These two aspects are strictly depending on the last one, which is the deterioration of the environment in terms of resource depletion, land fragmentation and pollution.
Targeted investments in local agricultural value chains can increase the gross economic yield of such sectors, their efficiency and at the same time their sustainability. The observed increase in needs and production, can be combined with financial instruments oriented to lessening pressures on both workers and ecosystems, minimizing those impacts which affect society and environment.

*Existing Social Structure*

The complexity of the agricultural system is related to the great variety of actors involved, to external factors hardly controlled and to a diversity of products, knowledge and techniques. Farmers and farm hands are at the last stages of value chains, and their income is strongly affected by actors who invest in each agricultural season. Corruption and exploitation are denounced at all stages, and a clear lack of transparency exacerbates the pressure on agricultural entrepreneurs. The social structure presented has been reconstructed through formal qualitative and quantitative interviews conducted in Bekaa Valley with 15 farmers and informal meetings with retailers, farmers, Ngos and others, Figure 1.

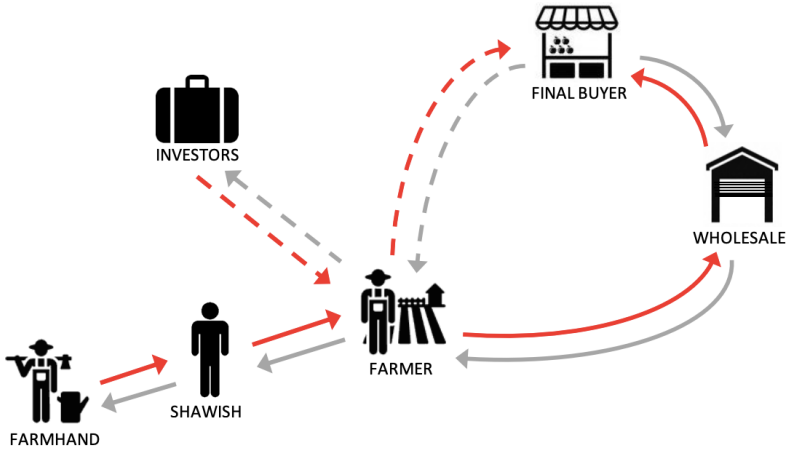


*Figure 1. The complex agricultural system observed in Lebanon and the role of the Shawish and Wholesales as social actors.*

Farmhands are the most abundant actors: workers are always needed to assist from sow to collection, with more than 90% of them being Syrian females ranging from 12 to 60 years old (underage kids are often found in crops that do not require particular skills). They are gathered through the Shawish, responsible for providing workers and handling all financial transactions between them and farmers. Generally, the Shawish is the person in charge of informal refugee camps, handling relations with landowners and sub-renting the area to Syrian families, having a strong control on their life.

This figure evolved from the previous *Wakil*, the community chief that was handling farmhands' villages before the refugee crisis. Lebanese agriculture, in fact, relies on Syrian workers since more than 15 years, but seasonal employees living in informal settlements moved permanently when conflicts started in their country. The situation is therefore worsened because of a high number of workers available.

a. Lebanese Farmers and cropping expenses

Lebanese farmers can be very different: some are landowners, although many of them only own a small percentage of the farmed land, generally less than 30%, with the majority usually needing to rent a piece of land. Some pay around 1,500$/acre, although the amount can reach 2,500$/acre for lands with access to river water and 3,750$/acre for lands relying on private water sources. Small entrepreneurs barely sustain themselves due to the inconsistency in profit, and farming is generally their only source of income.

One of the main issues in agriculture is starting a new season: different inputs are needed to prepare fields and to sow new crops. In summer, purchasing water can be expensive and complicated, some municipalities have an annual rotation scheme for water distribution and in other cases water needs

to be pumped from wells or transported through water trucks. External inputs such as compost and fertilizers are also needed to support production capacity.

b. Investors, wholesalers and buyers

Most farmers don't have the necessary amount of money to start a new season, therefore an external support is usually indispensable. Wholesale markets are the most common investors, funding between 50% and 80% of the total cost, given that all of their harvested crops will be sold in the wholesale itself. Wholesales are also the main buyer, who will then reach final purchasers possibly having more than 200% profit. They are generally perceived as the most corrupted step exploiting small entrepreneurs, increasing the cost of inputs needed for a new season, charging up to 10% on each sale or cheating on the price or amount sold.

Landowners are also common investors; they share the land and pay for water, 50% of fertilizers, chemicals, seeds, fuel, transportation in exchange for 50% of the production or losses. Suppliers sometimes present seeds, chemicals e fertilizers needed for the farmer on credit (based on the market owner's demand), with a 15% to 20% interest rate.

c. External Factors

Many external factors have a huge impact on agriculture. Crops smuggled from Syria affect the price of local products since hiring farmers, renting and purchasing the inputs needed is strongly cheaper than in Lebanon. Legal imports can also affect trading, for example products imported from Egypt are often cheaper than Lebanese ones. Only some crops are supported by the government, providing funds for wheat and tobacco. Farmers can receive 250,000 Lebanese Pounds per acre of wheat.

*Involving the main actors*

Following a clear negotiation and the definition of ex-ante social and economic rules subscribed by all the actors, the added value gained from responsible investments should be redistributed among the stakeholders: producers (farmers), landowners, refugee farmhands and, possibly, the social investor. Changing the existing hierarchies and schemes which connect farm-laborers to working positions in agriculture is the key to strengthen the relations between agricultural entrepreneurs, intermediaries and singularly hired employees. This shared economical allocation aims to ensure an improvement in the economic conditions of each counterpart, not only safeguarding a financial redistribution but also a fair, unbiased work environment, thanks to the agreement established in

advance with the social investor, Figure 2. The final goal will be reviewing the role of each link of the commercial chain, from producer to consumer, with greater respect to human dignity.

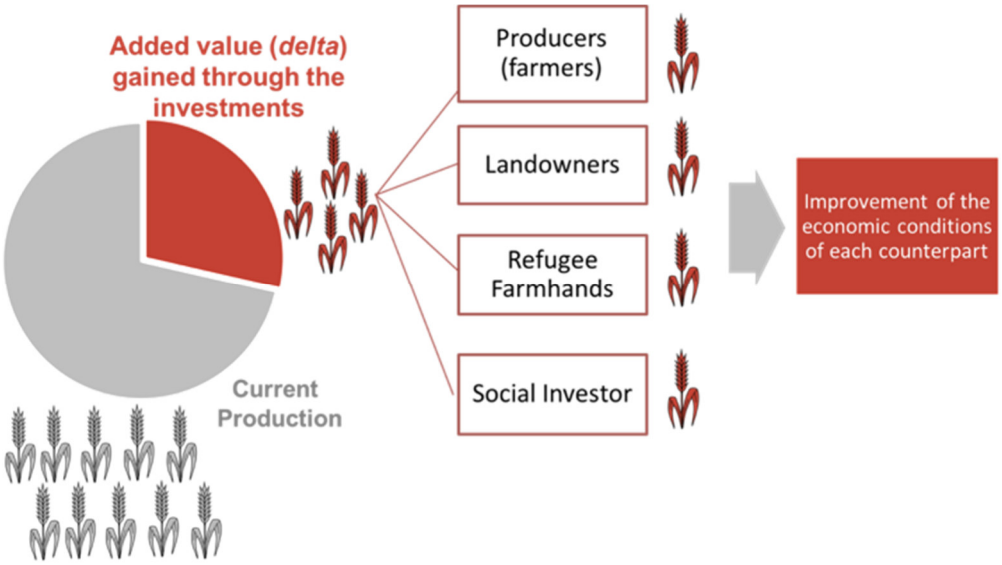


*Figure 2. Graphical explanation of the pre-agreed distribution of the added value generated by sustainable investments.*

## Sustainable investment fields

To gain this added value through social investments, different sectors and action plans can be investigated. Environmental sustainability and agricultural efficiency are the key factors, their achievement is possible through different options.

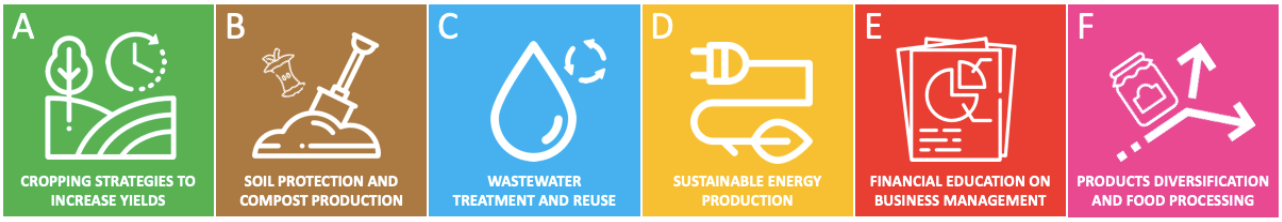


*Figure 3. Fields of intervention for potential sustainable investments*

### *Cropping strategies to increase yields*

Traditional cropping relies on simple tools and knowledge often handed down from one generation to another. Needed are innovative systems that protect and enhance the natural resource base, while increasing productivity (Fao 2 2017). Different strategies can be adopted to increase agricultural

yields, focusing on soil analysis, climate studies, crop selection and assortment, scheduling and extension techniques.

One of the most important parameters to evaluate cropping yields is the water irrigation request $W_{irr}$, which is related to the water request $W_{rew}$ of each plant, the effective rainfall $R_{eff}$ and the effectiveness of the irrigation supply $E_i$.

$$W_{irr} = (W_{req} - R_{eff})/E_i$$

The water demand is the amount that each crop needs to get the agronomic desired outcome and coincides with the effective Evapotranspiration ($ET$). On the other hand, the irrigation water demand represents the difference between the crop water requirement and the effective rainfall. In fact, when the balance between water demand and effective rainfall is negative, an artificial input, irrigation, must be dispensed (Fao 2006). $ET$ converts water from liquid to vapor, and it is based on the combination of the simultaneous surface evaporation and plant transpiration, influenced by several parameters:

- Weather (rainfall, radiation, air temperature, humidity, wind speed);
- Soil (chemical composition, drainage capacity, water retention, stratification);
- Crop factor (development necessities for different grow phases and species);
- Management and environmental conditions (fertilizers use, techniques/technologies adopted, etc.).

Evapotranspiration can be computed using meteorological data and the dependence on the species and phenological stages of the cultivation. Influencing the cited parameters, it is possible to mitigate the water demand for each crop and to increase the efficiency and suitability of the evaluated setting. Therefore, new agronomic strategies and approaches can be identified, and simple studies can support farmers in increasing yields, including:

- Soil Analysis - A soil characterization allows to investigate the agricultural potential for different crops, strictly depending on chemical and physical properties (Bonfante 2017); executing soil surveys when planning agronomic investments is a strategy to select the most appropriate crops in terms of roots adaptation and nutrient needs;
- Climate studies - Humidity, evapotranspiration and rainfalls are key factors when planning a cropping season and will affect production rates from sowing to harvesting; for an optimal

crop management, farmers can introduce agro-meteorological weather stations, varying from simple mechanical tools to automated sampling technologies, for example to schedule irrigation basing on soil water content and climate forecasts;

- Crop selection and assortment - It is not only important to identify the most suitable crops but also to introduce a wide species diversification through varied crop sequences and associations; a well-designed crop rotation or inter-cropping system promotes good soil structure, fosters a diverse range of soil flora and fauna that contributes to nutrient cycling and improved plant nutrition, and helps to prevent pests and diseases (Fao 3 2017);
- Season extension techniques - Season extension refers to any practice that allows a crop to be cultivated or harvested outside its normal production season; benefits from an extended production season include: higher productivity and income; retention of or gain in customers; extended employment for skilled farm-hands; an example can be the introduction of raised beds, biodegradable mulches or greenhouses (Pool 2010, Vox 2010).

*Soil protection and compost production*

Soil health is defined by Fao as "the continued capacity of the soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain biological productivity, promote the quality of air and water environments, and maintain plant, animal, and human health" (Fao 2017). Soil management practices bring multiple benefits, they increase the organic matter content, keep soil surfaces vegetated, require fewer chemical inputs, and promote crop biodiversity. These make soils less susceptible to erosion and desertification (Fao 2017).

Intensive crop production depletes soil nutrients and requires external inputs, often resupplied with synthetic products. According to Faostat, Lebanon imported all of the amount of fertilizers used in agriculture until 2016 and distributes on soils chemicals such as Nitrogen $N$, Phosphate $P_2O_5$ and Potash $K_2O$, with time variable consumption rates (Fao 2018).

Organic waste, representing almost 50% of Lebanese waste production (Gmi 2018), can be treated and composted, through a well-known natural process. Compost is a rich source of organic matter, which plays an important role in maintaining soil fertility, and hence in sustainable agricultural production. In addition to being a source of plant nutrients, it improves the physic, chemical and biological properties of the soil (Fao 2 2015).

Investing in compost production is a good strategy to produce a valuable product for agriculture and to reduce environmental impacts of rural and municipal solid waste. A local example in Lebanon is Cedar Environmental Dynamic Composting, an accelerated technique which turns organic waste

into a humus like material through a reaction that takes only three days compared with up to ninety days in traditional composting techniques (Cedar Environmental 2015).

*Wastewater treatment and reuse*

In 2006, Lebanon generated more than 310 million $m^3$ of wastewater and the amount treated was only 4 million $m^3$, of which 2 million $m^3$ were destined for agricultural purposes, and the rest disposed in rivers, or infiltrated by deep seepage to groundwater (Salman et al 2016) The potential for reuse of domestic wastewater is estimated at around 100 million $m^3$/year.

Wastewater treatment is therefore an opportunity to have a local source for irrigation, possibly obtained through different technologies (Sswm 2018). One of these is anaerobic digestion, a simple biochemical process by which wastewater and organic products can be treated while producing energy in different scale plants. Combining wastewater with manure, crop residue, food scraps or other organic waste products, two key by-products can be obtained: biogas and digestate (Rich 2010). Output solids and liquids may be used as soil amendments or liquid fertilizers. Biogas can be used to fuel a variety of cooking, heating, and lighting applications, as well as to generate electricity.

*Sustainable energy production*

Lebanon suffers from a major gap between energy demand and supply, resulting in a 23% energy deficit. This gap is being supplied by privately owned generators providing electricity during cut-off hours. All these generators work on gas or diesel oil bought either directly from private fuel distributors or from gas stations. According to the Lebanese Ministry of the Environment (Moe), the energy sector is the main source (56%) of greenhouse gas emissions (Moe 2018).

Mitigation measures offer co-benefits to the sector through ensuring less reliance on imported fuel and reducing energy costs, air pollution and related health effects. The country is on track to provide 12% of its energy from renewable sources, currently mostly deriving from hydroelectric plants (Moe 2018). In order to increase the share of wind and solar energy in Lebanon's energy mix, a Derisking Renewable Energy Investment study for both technologies was conducted by the Lebanese Moe and Ministry of Energy and Water (Moew) to promote private sector investments in wind energy and solar applications (Moew 2018).

In particular, Lebanon has a favorable climate for photovoltaic power plants given the solar irradiance levels, the relative lack of dust or sand, and a relatively mild climate that ensures a more

optimal operation in terms of efficiency. Solar energy farms represent an option to weaken Lebanon's 'Generator Mafias', strongly opposing the energetic transition (Dziadosz 2018).
An example of linking agriculture and photovoltaic energy is an initiative by the World Bank, the Lebanon Municipal Service Emergency Project, aiming to ease the load on the municipal services, areas, and communities hosting Syrian refugees. The initiative funds photovoltaic systems connected to water pumps in the Bekaa area, replacing diesel engines (Moew 2018). Solar farms disconnect pumping costs from fuels market fluctuation and can overcome the need of fossil oils for water extraction.

*Financial education on business management*

An organized, innovative and effective approach is the key to keep an agricultural enterprise growing. According to Fao, most farmers believe that their major problems relate to three main sectors (Kahan 2013):

- Management: small-scale farmers often lack the skills needed to manage their farm as a business;
- Marketing: farmers sell their products at favourable and often undifferentiated prices in high competition markets, often being less able to satisfy high quantity or quality products demands and strongly needing marketing skills;
- Access to finance: it is often hard to receive agricultural credit; the main problem perceived is capital shortage, though the problem is often managing available resources through proper financial skills.

Financial education and literacy training can empower farmers and teach them how to reduce risks (World Bank 2011) and simple farm management diagnostic techniques can be applied at farm level to help recognize the critical problems limiting farm profitability (Kahan 2013), including:

- Constraints and opportunities analysis: identifying weaknesses and potentials to develop strategies for overcoming vulnerabilities and building on identified potentials.
- Enterprise budget evaluation: estimating of the output, cost and profitability of individual crops, cropping patterns or livestock enterprises.
- Gross margin evaluation: calculating an indicator of the profitability of farm activities and technologies, to analyze the ongoing performance and to estimate profitability activities.

- Benchmarking: studying and comparing the actual performance with others of similar size and farming system for financial and technical analysis to identify steps to improve performance.

Training in basic farm economics, financial literacy, organization, governance, business management, and financial skills also promotes the development of economically-oriented farmer associations or cooperatives. Effective organization allows to pool resources for purchasing and marketing, supports collective risk management efforts and provides a counter-party through which financial institutions may finance production of smaller farmers (Ifc 2011).

*Products diversification and food processing*

Products diversification represents a change in the underlying characteristics of a farm system, establishing a dynamic optimal mixture of farm production alternatives capitalizing on between-farm heterogeneity in terms of resource availability and qualities (Barghouti 2004). Successful diversification often results in a varied mix of activities leading to new input markets and emerging processing activities. This reduces community dependency on a narrow range of outputs and, as a result, vulnerability to shocks from climatic variability and market volatility (Barghouti 2004). Several diversification possibilities and strategies can be adopted by farmers; three of the 20 examples proposed by Fao in 2012 will be presented (Fao 2012).

*Beekeeping*: bees offer a large potential with minimal investments, not requiring land ownership or rental, and possibly started with equipment and tools sourced locally. Beekeeping offers diverse products, honey and wax among others, which can be sold in local markets as a source of income, but also provides complementary services such as crop pollination (Fao 2012). Local farmers can access export markets producing high-quality honey, if proper techniques are adopted and marketing strategies are strengthened. There is already an increase in honey sales in Gulf Countries, Europe, and Us (Acted 2018). There is scope for increasing honey production capitalizing on export markets of both Gulf Council Countries (Gcc) and of the countries of the Lebanese diaspora (Hamade 2016).

*Growing Mushrooms*: mushroom cultivation is a fast yielding source of food and a reliable source of income. Small-scale growing does not include any significant capital investment: mushroom substrate can be prepared from any clean agricultural waste. Mushrooms can be produced in temporary clean shelters and cultivated on a part-time basis, requiring little maintenance. Indirectly, mushroom cultivation provides opportunities for improving the sustainability of small farming

systems through the recycling of organic matter, which can be used as a growing substrate, and then returned to the land as fertilizer (Fao 2012).

*Food processing*: the processing of foods brings many benefits to small-scale farmers. It slows down the natural decay of foods, preserves them for extended periods and acts as a reserve against times of shortage, increasing food security. Processing adds value to crops and animal products and provides farmers with a portfolio of diverse products. Farmers can sell processed foods out of season when prices are higher, creating opportunities for additional income generation thus enabling them to earn an income over a longer period then solely at harvest time (Fao 2012).

## Conclusions

The Lebanese agricultural sector has an expansion opportunity given by a potential increase in market demand, even though the system relies on a large-scale exploitation scheme. A strong impact on natural resources and a structured social scheme for taking advantage of low skill farmhands are the main existing issues, in parallel with the economic instability of Lebanese agricultural entrepreneurs.

Innovations and investments are needed to develop a sustainable increase in production, creating at the same time ethical growth opportunities for both Syrian Refugees and Lebanese Farmhands. The core of a social investment model needs to envisage improvements and diversification of local value chains, taking particular care of both social and environmental impacts.

The identification of six different sectors of investments shows the variety of chances to generate an added value in existing agricultural enterprises, which needs to be pre-esteemed through further numerical studies to evaluate the scale and the real virtuosity of any intervention. Investing in new strategies to increase cropping efficiency and extend agricultural seasons can be a strategy, which can be related to a diversification of products, possibly followed by processing. Working on available resources, ranging from organic fractions to wastewater, and on sustainable energy production allows to improve farm enterprises with a main-streaming approach. Every investment must be supported through financial education, which is the key to develop business management capabilities and to increase access to finance.

The complexity of this sector shows the need for external support: proposing Business Development Services represent a precious opportunity to sustain the economic growth and resilience of both refugees and host communities on an ethical basis.

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## Acronyms

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| Aquastat | Food and Agriculture Organization of the United Nations Global Information Service on Water and Agriculture |
| Et | Evapotranspiration |
| Fao | Food and Agriculture Organization of the United Nations |
| Faostat | Food and Agriculture Organization of the United Nations Statistic Division |
| Gdp | Gross Domestic Product |
| Moe | Ministry of Environment of Lebanon |
| Moew | Ministry of Energy and Water of Lebanon |
| Ngo | Non-Governmental Organization |
| Unhcr | United Nation High Commissioner for Refugees |