

# Executive

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## SPECIAL REPORT

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# Infamous infrastructures



The need for conquering multiple barriers

**The future of farming will involve escalations of aquaculture and urban farming.** These are ancient forms of food cultivation that are or can be decoupled from soil. As such, they have become increasingly viable and important in a world that has limited resources, while it is populated by billions of humans, in addition to the gazillions of micro-organisms that have always been around as the vast and silent majority of life species. Yet, from the limited perspective of the contemporary human specimen, we still associate the bulk of food production with soil-based cultivation. In this sense, one can think of land as the ultimate infrastructure of agriculture, the prefix “infra” meaning that what is beneath.

However, for our human ability to feed ourselves in the billions, rich soil that is able to guarantee subsistence to those who work it does not

suffice as agricultural infrastructure (otherwise Lebanon with its soil and accommodating climate and microclimate situation would be one of the most food-secure areas on the planet). Agriculture in the 21st century involves and depends on a range of interconnected infrastructures, hard ones and soft ones, or in broad terms, on systems for the economic and sustainable production of food as physical and mental assets.

The overriding problem of agricultural infrastructure in Lebanon is the impact of the economic and social crisis in its manifestations of power cuts and water supply shortages. This combination of high cost and insufficiency in the most basic supplies is as debilitating as it is obvious for households, but it is also extremely bad for agriculture. This is because demand increases and supply bottlenecks for water, energy, and food

can translate into destructive synergies where high demand for energy – a top resource needed in food production – and high demand for water, also a leading input – endanger food supplies and make food prices balloon.

High demand for food likewise can translate into price increases of water and energy, in a triangle of interdependence where agriculture and food production gobble up water and energy (according to some reports to the tune of 69 percent of global fresh water consumption and 30 percent of global energy consumption). At the same time, energy production requires massive water inputs, and some forms of water production are highly energy-intensive.

Not accounting and strategizing for what is known as the Water, Energy and Food Security (WEF) Nexus exacerbates the interconnectedness of water, energy and food production and can transpire as a fateful cycle of negative interdependence. In Lebanon's case, understanding the WEF Nexus gives us the reason why the economic shocks of power cuts and the high cost and low availability of water translate into problems with food security. And that is even without mentioning other cost boosters, such as the suboptimal means of transportation and bad roads.

## DELIVERING FOOD TO THE MARKETS

Getting food to the people in a market economy requires logistics and the expense of transportation costs. Spiking fuel costs are reportedly responsible for more than 12 percent of product prices on supermarket shelves (see interview with the director general at the Ministry of Economy and Trade in Executive's special report on Food Security in Lebanon). But the transportation infrastructure dilemma is not only domestic, nor is it limited to a function of the fuel price shock that was generated by the withdrawal of socially and economically detrimental fuel subsidies.

The transportation problem for export-seeking agricultural and agro-industrial producers has historically extended to underperforming export infrastructures, most notably the vital port operations. Since 2000, container terminal construction and its development under a private operator at the port of Beirut actually was improving incrementally to a level of comparatively high performance, until the 2020 catastrophe of the port blast.

Although the blast did not impact the container terminal as badly as other portions, while a partial recovery of the container handling capacity was achieved within days and expanded

over the following months, the loss of capacity was immense. This relative added cost burden on exporters, many of whom are agricultural and agro-industrial producers, has actually recently been measured in the performance rankings of container ports around the world.

A comparison of the World Bank affiliated Container Port Performance Index (CPPI), which covered over 350 large, medium, and small container ports, the port of Beirut's CPPI position in the inaugural report of 2020 was very respectable, by a metric called administrative performance that saw Beirut in 66th place worldwide. Under a second, and perhaps even more relevant metric of statistical performance, Beirut's container terminal even ranked near the top of the world – in 11th place out of 351 measured ports.

That, however, is history. In the 2021 CPPI, which was released earlier this year and is based on performance values in the year 2020, Beirut's position collapsed to 356 out of 370. Some ports in North America and Africa performed worse – the Los Angeles and Long Beach port pair were the worst of all container terminals due to pandemic-related disruptions; reasons for the bottom performances of several major African ports were alleged by African and international media to point towards corruption.

But the blast-hit Beirut port was the worst performing container operation in the Europe and Mediterranean region for the whole year. The CPPI ranking of Tripoli port, classified as a small operation by global throughput versus Beirut port's medium size, also deteriorated but by a much smaller margin, slipping from positions in the 60s and 70s, to positions in the 90s.

The performance of a container port is a major influence on the cost of shipping. This means that agricultural exporters in developing countries will see their international competitive positions suffer because of bureaucratic hurdles, and worsen further if the infrastructure in their main national ports is enmeshed in corruption.

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Problems of corruption and bureaucracy were obviously not the factors that devastated Beirut's container handling performance in 2020. But one has to assume that the steep slide in performance did add to the other cost drivers that agriculture and agro-industry has had to cope with; impedi-

■ Energy production requires massive water inputs, and some forms of water production are highly energy-intensive

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ments that will persist over the term of several years, even if the CPPI performance values of Beirut port in the coming years will not remain as depressed as they were in 2020.

### THE GRANULAR PICTURE

In the emerging post-crisis economy of Lebanon, one can also detect improvements of agricultural infrastructures. Springing up as renewable energy installations in rural areas, these improvements appear as evidence of agriculturalists' coping practices in the short term but more importantly, they are promising with regard to the long-term sustainability transition of the sector. Renewable energy deployment, a prime requirement under a constructive strategy for taming the WEF Nexus and a core need for better management of climate risks in the decades to come, has in the past two years not been happening under governmental master-plans. Renewable energy matters existed before the economic crisis, but were aborted and for now can be judged with skepticism until they are fully and finally implemented. The overwhelming visual evidence can be seen during any excursions into rural Lebanon in the form of new solar photovoltaic (PV) installations and even the occasional wind turbine.

Moreover, renewable energy statistics by the Lebanese Center for Energy Conservation (LCEC) – a rare institution in that it has maintained a high profile of awareness building and apparent transparency – show that the increase in deployment of solar PV capacities in the past year has been the strongest in the agricultural sector, when compared to industrial, commercial, and residential sector deployments. Accounting for 17 percent of last year's added total solar PV capacity, the agricultural sector leapt, according to the latest LCEC State of Solar report, from 10.33 to 15.57 megawatts peak.

New solar PV installations were implemented in all sectors, to an extent of an estimated increase – from the 100 megawatts that had been implemented in all of the preceding decade – by over 100 percent in 18 months from the beginning of 2021. This increase in renewable energy capacities happened with such speed because of the pressures of a vanishing state electricity supply. In the agricultural sector, informality is considered to be the highest among all economic sectors, and exceeds 80 percent. This could be interpreted as an example of the agro-sector need to replace Electricité du Liban's power supply, which has led to renewable

■ Renewable energy matters existed before the economic crisis, but were aborted



energy capacities being installed even beyond the measurable context of the formal economy, though not always in line with highest standards nor top efficiencies in solar electricity generation.

Such vagaries pale, however, against the certainty that in the past two years a litany of promises for an improved state supply turned out to be hot air. Public sector promises have lost every last ounce of credibility and the economic pressure of having to replace the absent supply seems here to stay, giving reason to think that decentralized renewable energy in rural economic use will grow stronger in the future. For the recklessly daring, there can be the additional hope that Lebanon, as a renewable energy republic, can achieve further dramatic improvements when utility-scale solar farms are finally realized, which would allow the impoverished population such luxuries as widespread usage of fridges and electric lighting, while simultaneously the country would be delivering on its Nationally Determined Contributions to climate risk mitigation under the United Nation's COP framework.

While nurturing such dreams, the positive renewable energy perspective still cannot detract from the shadier reality that the problems of agro-food sector infrastructure do not end with transportation, export systems, and WEF Nexus problems that have been amplified during the past three years. There are also problems with hard infrastructures specifically for the agro-food sector. For example, deficiencies in the supply of cold storage facilities and lack of sophisticated agricultural equipment for harvesting and transporting



crops at maximum levels of efficiency and quality preservation. This deficiency, according to farmers and agro-experts, impairs values of anything that is grown from bananas and citrus fruit in the lowlands, to apples and cherries that thrive, against an international comparison, at high elevations.

Stakeholders in the agro-food sector further testify to inefficiency, inactivity, and undersupply when it comes to testing labs and research facilities. Likewise, on the supply end of the food value chain, seed banks and nurseries need to be developed much further. In the matter of the most needed and potentially most useful agro-industrial infrastructure, special economic zones for agro-industry or any other manufacturing industry can be spotted in the Bekaa valley. And, to name just two examples of downstream holes in the food value chain, the producers on the farms are forced to contend with a systemic lack of fair and efficient market organization, at the level of distribution and wholesale.

This entire anti-system of dysfunctional infrastructures, which in soft infrastructures also includes paucity of vocational training, lack of insurance, historical under-investment and since the economic crisis completely insufficient access to capital, is too vast and too fragmented to be the result of some powerful conspiracy. The anti-system also is far too deeply entrenched to have been produced by the economic crisis of the past three years – which, by the way, had the ambiguous function of exacerbating the woes of agriculturalists and agro-industrialists, but at the same time opening new economic opportunities to agile stakeholders in the agro-food sector.

## DIGGING UP THE GDP EVIDENCE

Short-term comparisons of agricultural export data between 2019 and 2021 show strong increases when seen through the lens of an internationally funded initiative called Business Innovation and Enhance Exports for Lebanon (BIEEL). Predicting an expansion of agro-food exports of products “in BIEEL scope” – covering live animals and animal products, vegetable products, prepared foodstuffs, beverages and tobacco, and animal or vegetable fats and oils – by \$50 million at the end of 2023 in comparison to a 2019 baseline, the initiative said that exports in these four categories showed an improvement of \$387 million: from \$627 million in 2019 to \$1.01 billion in 2021, a 62 percent increase.

However, BIEEL conceded that exports in the category of prepared foodstuffs experienced a juxtaposition of decrease in volume and increase in

value. It also acknowledged that export achievements to EU markets have been limited by qualitative and quantitative restrictions and noted that 50 percent in agro-food exports in 2019 went to a total of seven countries, four of which are in the Gulf region and two in the Mashriq, with the geographic destination outlier being the United States.

While promising as indications of agro-food export potentials, such short-term numbers may be questionable from sustainability and data integrity angles. They also reveal little to nothing on the background and role of infrastructures in the sector's efficient and sustainable performance of churning out agro-food products and delivering them to domestic and international markets.

Digging into the history of the Lebanese pre-conflict, conflict, and contemporary post-conflict economy uncovers how the present weakness of dedicated agricultural infrastructures appears to have been caused by the preoccupations with the development of mercantile services, especially financial intermediation. This is the known mindset of the post-conflict period of the 1990s which has lingered since reconstruction, and illuminates but does not explain the degree of attention that was withheld from the agriculture sector. This

■ Stakeholders further testify to inefficiency, inactivity, and undersupply when it comes to testing labs

disregard for real economy can be traced through things such as budget allocations, investments, and the contribution of agriculture to the GDP.

The contribution of agriculture to Lebanese GDP shows a somewhat counterintuitive trajectory for a country that is part of the global south. The trajectory seems more congruent with a small and ambitious services-driven economy that has somehow not succeeded to break into the top ranks of upper middle-income countries. But perhaps the fluctuations in the Lebanese Gross National Agricultural Product (GNAP), as displayed in a paper authored by Riad Saade, the founding president of the Centre De Recherches et d'Etudes Agricoles Libanais (CREAL), have to be seen firstly in the context of a country that was at an epicenter of regional and geopolitical tensions during the Cold War, while also being situated in a bridge position between overdeveloped Europe, struggling Africa, and rapidly developing Arabia.

CREAL numbers say that between 1962 and 1966, the GNAP of Lebanon increased by 48 percent.

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cent. This was during a period when agricultural productivity in developed countries was progressing by scientific leaps and bounds, due to the introduction of new farming techniques and high-yield crop varieties (wheat, rice, maize, and others). But shortly thereafter, at the time when crop yield transformations along with corporate dominance over agriculture were spreading from developed countries to emerging markets in the late 1960s, Lebanon seems to have experienced a phase of stagnation or stabilization. For several years before the outbreak of internal conflict in the mid-1970s, Lebanese GNAP remained approximately at the 1966 level.

From the mid-1970s, during Lebanon's canonization over 15 years of externally induced, internal conflict, the contribution of agriculture to GDP seems to have reached output levels never seen before or after. But in the waning years of the Lebanese conflict, GNAP crashed in 1988, leading Saade to conclude in his writings that destruction of the agricultural sector was taking place during the war. Indeed, a comparison of GNAP in 1988 against 1976 shows a significant drop, despite the peaks of the intervening years when agro output appears to have been easily twice that seen in 2002 or 2004.

■ Agriculture was clearly playing a lesser and lesser role in the priority lists of Lebanese political decision makers

The GNAP performance in the post-conflict decades has been fluctuating, with agricultural performance perhaps being in line with the volatility of GDP growth for the country overall. There was a

relative peak in GNAP in the first part of 2010s, a crash in 2020, and a chaotic situation thereafter. The post-conflict period saw a country with population growth that was below that of many other emerging markets, especially that of large neigh-

bors such as Egypt, Yemen, Syria, and Iraq. Against this subdued demographic development, Lebanese agriculture approached a societal position emulating those seen in developed markets, but without the very high agro-food sector productivity gains seen in Western Europe. In summary, agriculture was clearly playing a lesser and lesser role in the priority lists of Lebanese political and economic decision makers when compared to services and financial intermediation.

The state's relative disinterest in the achievement of agricultural productivity increases apparently affected both agriculture and agro-industry, which aligns with the narrative that all manufacturing industry during the post-war years was handicapped by increasing comparative disadvantages when compared to peer countries. On top of internal and regional economic and policy competitiveness impediments of all industries, the public administration and institutional integrity of Lebanon were sinking into patterns which were increasingly bad for doing business.

Corruption either had been present since Ottoman Empire days or crept in during the late 1960s, followed by bad institution building and bureaucratization, which in turn preceded the total absence of effective public administrative power from the agro-food sector in the 1970s and 80s, and into the 90s. "Since 1992, the launching year of Lebanon's reconstruction, and until today, in 2021, the Lebanese agriculture has been literally ignored by the state of Lebanon and even considered as unnecessary by certain political currents," Saade opined last year.

According to his more recent introduction to CREAL's report for agricultural production in 2021, last year saw farm gate prices influenced adversely as well as advantageously by factors ranging from good harvests in Lebanon to a crop crisis in Syria





which restricted outflows of produce to Lebanon. The combination of “random export markets” and demand conditions that were “shamefully exploited by the domestic wholesale markets” increased the sector’s fragility, Saade lamented.

Although the value of crops in agriculture improved by 19 percent between 2020 and 2021, they remained, according to CREAL, below the valuations achieved in 2017, ‘18, and ‘19. On the side of animal husbandry, the results in 2021 remained on a worsening trajectory, with a 35 percent loss over 2020 and a halving when compared to 2019. “This affected all sectors from poultry to cattle, sheep and goats. Only beekeeping benefited from an exceptional year in 2021, confirming the economic and biological importance of this production,” the organization’s yearly report on Lebanese Agriculture for 2021 said. In terms of total value of production in crops and animals last year, it stated a contraction of 8 percent and a continuing downward trend.

#### A GOOD PERCENTAGE?

It is anyone’s guess if agriculture will rise in the wake of the economic crisis to contribute more than the current 3.1 percent to the Lebanese economy – which must be assumed to have a very significant margin of uncertainty due to the informality in the sector. It is also anyone’s assumption what would be an optimal level of agricultural GDP for this country with all its historic and current contradictions and peculiarities.

There are 183 countries for which official but not necessarily perfect data for the role of agriculture in GDP – given the intrinsic weakness of the GDP gauge and the substantial presence of informality in agriculture that exists not just in Lebanon – is easily available. Among these 183 countries, the average contribution of agriculture to GDP is 9.9 percent (world average) and the median value, with half of the countries above and half below, is 6.4 to 6.5 percent.

Developed countries – whose populations may have suffered in their cultural integrities more than recognized in their decoupling from their agrarian and pastoral roots – are mostly in the approximate third of countries that show below 1 percent of agricultural contributions to GDPs. Some of the countries that achieve between 10 and 60 percent of GDP through agriculture, are tragically unable to feed and give decent livelihoods to all their people. Could there be a sweet GNAP spot, perhaps located somewhere between the global median and

average rate for the ratio of agriculture to GDP?

The questions and collective human survival challenges that underlie the quagmire of what an optimal agricultural contribution to GDP might be, are related to the latter two-thirds of the word “agriculture”. Societies have to define what structures they want to exist in, and how far the “culture of the field” should take precedence over patterns of behavior that are detached from the land through a breakdown of societal communication in traps of digital anonymity, and the embrace of virtual dreamscapes fraught with dangers of isolating people from their social contracts and existences. All the while, globalized man is still caught up in old blind races for economic growth in industrial and also agricultural outputs which have contributed massively to the need for 21st century climate action and correction attempts.

Irrespective of the many infrastructure barriers that exist, the agricultural and agro-industrial landscape of Lebanon has been marked from the

■ Societies have to define what structures they want to exist in, and how far the “culture of the field” should take precedence

beginning of the crisis years with entrepreneurial energies (an energy that is not subject to the WEF Nexus dilemma) in well-established agro-industrial minds and a vibrant start-up scene concentrated in highly visible innovation centers that have been supported by international

networks, away from dependency on the whims of corrupt bureaucracies, dysfunctional institutions and an impotent state. How innovative agriculturalists, agro-industrialists, and vibrant entrepreneurial startups will prevail against rising global challenges is impossible to predict.

But even if they evade climate disaster, corruption and systemic perils, a wide-ranging infrastructure reboot is a change that has to come. This departure from the old system has to involve the state as a stakeholder and large international enterprises and accountable state-owned enterprises, and joint venture companies in the construction of strategic infrastructure assets from utility-scale renewable energy plants and strategic new grain silos, to distinct facilities such as functioning labs and affordable warehousing of harvests. It is the move from the infamy of an infrastructure that consists of nothing but gaps, to one that can carry agricultural production and reduce unnecessary losses of food. ■



## LEBANON: ARE THE HUNGER GAMES BEHIND US?



Government absence is placing farmers and agro-industrialists in the hands of foreign donors

**Food insecurity is at the forefront of global threats and its prevalence is intensifying.** An estimated 54.5 million people are severely food-insecure in the Eastern Mediterranean region as a result of the impact of the Covid-19 pandemic, according to the World Food Programme. In Lebanon, a combination of economic, political, health and social factors are deterring the country's ability to combat hunger risks. While the financial downturn has had an exorbitant impact on the daily lives of citizens and business, the country's existing agriculture infrastructure was already calling out for greater attention, with too much dependence on foreign aid, organizations, and United Nations (UN) agencies. The situation has become even more challenging for a country hosting approximately 1.5 million Palestinian and Syrian refugees, adding further pressure to fragile socio-economic conditions.

The UN's Food and Agriculture Organization (FAO) points out that food security encompasses four components: availability, meaning the supply of food in an area; access, including the physi-

cal and economic ability of people to obtain food; utilization, in the sense of proper consumption of food; and stability, which refers to the sustainability of food production and supply. But where does Lebanon really stand?

### AGRICULTURE: A STRATEGIC SECTOR NEGLECTED FOR DECADES

The great famine of Mount Lebanon between 1915 and 1918 pushed policy makers at that time to add the predominantly agricultural areas of Akkar, the Bekaa Valley, and South Lebanon, over to Mount Lebanon to ensure that the latter is not susceptible to hunger again.

For agricultural engineer Hanna Mikhael, successive governments from 1992 onwards failed to address agriculture in the same context as other productive sectors, he tells Executive. "With the limited budget allocated for the Ministry of Agriculture, the sector has been adopting a "begging" policy, counting on the non-sustainable financial support of the UN's Food and Agriculture Organi-



zation, World Bank and non-governmental organizations (NGOs) rather than on a long-term national strategy,” Mikhael says, who also co-founded Izraa, a Facebook page providing agricultural and technical advice to 139,000 members.

The losses incurred in 2020 when Lebanon’s grain silos at Beirut’s port were pulverized by a deadly blast, and the outbreak of war in Ukraine, exerted additional pressure on the country’s wheat reserves. Mikhael advocates for the decentralization of grain silos to mitigate such risks. He also requests from municipalities and religious authorities to offer the vast areas of unutilized land that they possess to increase grain production.

Agricultural economist Souhad Abou Zaki considers that increasing the local production of wheat and pulses is possible; if targeted, well-communicated, and timely subsidies are provided to give financial incentives to farmers to produce them, she tells Executive. While this would improve the local food safety status, it will not by itself ensure food sufficiency. According to Mikhael, the decades-long absence of an efficiently implemented agricultural strategy has exacerbated the sector’s fall amidst the crisis: “Ironically, the Ministry of Agriculture’s NAS [National Agriculture Strategy] for 2020-2025 is a replication of the previous two strategies of which almost no achievements were recorded.”

First and foremost, the failed energy sector has been severely harming agro-industry. Long before the crisis, the sector suffered from recurrent electricity outages, and this has worsened in the last two years. “In terms of fuel, the global increase in prices combined with the rapid devaluation of the local currency and removal of subsidies led to a sharp surge from \$2.64-3 per liter (at a rate of \$1,507/LL1,000) in the late 1990s, to around \$20-22 per liter at the exchange rate on the parallel market. This sharp increase added additional pressures on farmers and increased the cost of transportation of agricultural and food products,” Abou Zaki says. The irregular supply of energy places the sector at risk, given that power is a key input in all stages of agriculture, from production (equipment, machinery, water pumping), to grading, storage, packaging, transportation, and selling.

The state of water supply and networks, which are essential for irrigation, are not much better. “The vast majority of small-scale farmers use traditional irrigation systems which leads to inefficiencies and waste,” Abou Zaki says, before adding that water pollution and contamination emanating

from inadequate water pipes and sewage draining have significantly affected soil properties and quality. “Not only production losses are probable, but the productivity, quality, and safety of the locally consumed products are at risk,” she says.

Road facilities play a significant role in the improvement of agricultural production, but with the lack of proper maintenance, costs and losses certainly increase. Abou Zaki considers that the post-harvest infrastructure, practices, and management are weak and way below international standards. For instance, wholesale markets are not organized or monitored, which

generates large amounts of food waste. “Adequate agricultural storage facilities are either limited or very costly to rent. A significant number of small-scale farmers and agricultural cooperatives rely on assistance from local or international NGOs to invest in infrastructure

(greenhouses, machines walls, irrigation) given their inability to secure funds from their own limited profits, nonetheless this support may not be always sufficient or suitable,” she adds.

The deteriorating situation of farmers, the sector’s human capital, should not go unnoticed either. “Feed materials, grains, pesticides, fertilizers, and other agricultural inputs are purchased in US dollars while the farmers are selling in local currency, making them vulnerable to the constant currency fluctuations. To make matters worse, farmers are rarely compensated when their harvests are lost due to bad weather conditions,” Mikhael says. This requires the establishment of emergency funds for farmers and agribusinesses in the event of crop, livestock, or even physical infrastructure losses due to climate change or natural disasters, as per Abou Zaki. Besides, the rental prices of lands have surged. “Rethinking land-related laws such as ownership, land transfer, inheritance, and registration to resolve conflicts over land ownership and incentivize investment in the land and agricultural infrastructure is a major recommendation,” Abou Zaki says. These worsening conditions will not push farmers out of the sector, as most of them are occupationally immobile. But it will impact agricultural production and negatively affect the country’s food security position, according to Mikhael.

■ According to Mikhael, the decades-long absence of an efficiently implemented agricultural strategy has exacerbated the sector’s fall amidst the crisis

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### THE INDUSTRY SECTOR: PRIVATE INITIATIVES ENSURE PRODUCTION VIABILITY

With the devaluation of the Lebanese pound, the Ministry of Industry's budget has become negligible and is barely covering the institution's operating costs, the advisor to the caretaker Industry Minister, Adib Dib tells Executive. The sector is therefore counting on foreign aid, but this is either getting reduced or suspended due to the political impasse across government. A solar energy project with the United States Agency for International Development (USAID) has not materialized and another industrial cities' project with the UN Industrial Development Organization has been halted, he says. Besides, the road conditions have been deteriorating, with Zahle's industrial city being a striking example of such decaying infrastructure. While the Ministry of Public Works and Transport is responsible for highways, internal roads are the municipalities' responsibilities. But again, the accumulated revenues of the latter have lost 90 percent of their value, as per Dib. "The ministry is exerting enormous efforts to improve the infrastructure state of Lebanese factories, but it doesn't possess a magic wand," Dib says, before elaborating that despite protectionist policies adopted to improve local production, external local and regional conditions are creating challenges.

Nicolas Abou Faysal, President of the Association of Bekaa Industrialists, shares a more positive outlook for the industrial sector. "The rate of LL1,500 to the dollar era was an illusion and

therefore our GDP was overestimated. Today, the incurred costs are real, but our production is real too," Abou Faysal tells Executive. He expects the balance of trade deficit to gradually shrink over the next five years and says that there are no major food security risks in Lebanon. The sector is currently booming with over 15 new factories built in the last two years in Zahle, providing high-quality products which are replacing imported ones. On the infrastructure level, Abou Faysal explains that the industrialists adapted to the changing conditions by resorting to solar systems to ensure a consistent source of energy and by installing or enhancing their water purification systems. The decaying road conditions, for Abou Faysal, are not new and therefore do not constitute a factor harming production. Yet, the pan-Arab highway project signed in 2003 and not yet finalized could give a boost to local production.

To minimize corruption, especially on the customs level, Abou Faysal proposes strengthening the roles of economic attaches at Lebanese embassies abroad, by giving them the authority to verify and approve shipments being exported to Lebanon. This will reduce the risk of fraudulent

■ The irregular supply of energy places the sector at risk, given that power is a key input in all stages of agriculture, from production to grading or storage

customs declarations and protect local producers. The establishment of a special economic zone in Zahle, conducive to investments, is also vital to increase the number of local food production companies, Abou Faysal says. A similar plan for Tripoli was approved in 2008. The plan was final-

ized and the funds were secured in 2018, but the government failed to approve its development, as per a statement by Hassan Dennaoui, acting chair and general manager of the Tripoli Special Economic Zone.

Overall, and across the agricultural and industrial sectors, private initiatives and donors' support have kept production ongoing. The latest Ease of Doing Business Index issued by the World Bank ranked Lebanon 143rd out of 190 countries, reflecting a rather weak position on many levels, including infrastructure, which can hinder much-needed investments. If no strategies are put in place, Lebanon's competitiveness will be further weakened, at a time when the global economy's future is looking mixed to say the least.







## TARGETING THE RESILIENCE FACTOR FINAL



From agro-humanitarian distribution to implantation of a sustainable system

**Investing into an agricultural stock or an agricultural infrastructure system is intensely unlike dreaming of instant financial gratification, for example by becoming a financial markets jock.** Imagine being a day trader on multiple stock exchanges or feeling the hourly thrills of seeing your crypto-wallet bursting at its virtual seams with a million dollars or three, made (and lost) in speculative bets on Bitcoin, Ether, Tether, et al.

Now shudder and think about agricultural stocks, from publicly listed farming cooperatives to fertilizer and equipment multinationals. Investments can be rewarding and seem rather safe – agriculture and its distant cousin of consumer staples are among the prime defensive sectors in the terminology of stock markets – but come with agrarian risks and reward profiles. This path to prosperity is staid and slow by the nature of agriculture as a business.

The only investments guaranteed to keep your heartbeat safer from rapid increases and undue exhilaration than stock portfolios in agriculture, would be investments into agricultural infrastructure and systems. Returns of a direct investment into an agro-system are many growing and harvesting seasons away. In financial terms, neither are investments into publicly traded agricultural corporations as addictive as playing the conventional or virtual financial markets, nor are returns on direct investments into agricultural infrastructures and privately held agricultural enterprises, typically as high as those in tech and healthcare companies. At least during boom times.

Yet, the world is not living in boom times anymore, and it is a sign of these recessionary times that the value of the agro-production system and agro-food economic sector is going through the roof. Add in the importance of being able to dif-

ferentiate between value and price, and while you are at it, also rethink and recalibrate your profit orientation by pricing in previously ignored, value-annihilating externalities.

Noting that the distinction between value and price has been demonstrated most impressively in Lebanon's recent but already legendary economic and monetary crisis, you may arrive at the point of reappraising your entire framework and mind-set of productive investment into the real economy in the context of agriculture and livelihoods in rural Lebanon.

## AN OVERDUE DEVELOPMENT ORDER

Against the background of global and local crises in the 2020s, the need to develop Lebanon's agriculture-based economic ecosystem – with its incomplete and dilapidated infrastructures – is dire. Not only have public and private investments into this system over decades been too small by orders of magnitude, but new development projects also face limitations in size, economies of scale and short-term return potential, along with barriers to funding, planning and management capacities, and community acceptance. Thus, equipping rural farmers with an incentive-rich agro-food production system that will encourage them to continue producing and tending the land, while also contributing to the establishment of rural business opportunities, is a tall order indeed. Such a quest needs “time, trust, and lots of effort,” socio-economist and agricultural livelihoods expert Elias Ghadban notes.

Ghadban is involved with the design and supervision of one such development program that is currently being undertaken not by a for-profit corporation or public sector entity, but by a charitable organization, the Order of Malta in Lebanon (OML), under what resembles a public-private-community partnership, or civil society, community, and public partnership. Ghadban speaks to Executive as technical advisor and volunteer board

member of an agro-humanitarian program that was initiated at the cusp of the Lebanese crisis by OML, a unit in the 900-year-old Sovereign Military Hospitaller Order of Saint John of Jerusalem, of Rhodes and of Malta.

The agro-humanitarian program of OML started with a small project that the organization initiated soon after Lebanon's commercial banking channels were paralyzed early on in the financial and economic crisis, which brought down a system of rural credit between suppliers and farmers. Under the hitherto functioning system, farmers would obtain seedlings at planting time from commercial providers and pay for them several months later

■ The conditions during the financial crisis left farmers with the sole option to pay for seedlings with hard cash-on-hand

out of revenues generated from their harvests. The conditions during the financial crisis left farmers with the sole option to pay for seedlings with hard cash-on-hand. In this livelihood emergency, the agro-humanitarian project endeavored to provide

small-hold and part-time farmers with inputs – seedling – that had become impossible for these farmers to obtain. From this point of origin, transforming rural livelihoods has become the gist of OML's agricultural approach.

Under its initial agro-humanitarian thrust, OML has been providing a stopgap answer to this problem through the distribution of seedlings that allowed more than 8,600 farmers to plant enough crops to secure subsistence nutrition for their families and additionally achieve some supplemental income from selling part of their crops. Five vulnerability assessments were undertaken to identify the eligible farmers. “We said that we will target the farmers that are linked to the primary healthcare center in the catchment area of each center [and], working next to the center in close collaboration, will support farmers with seedlings depending on

## OML AGRO-HUMANITARIAN PROJECT

### Duration 2020 - 2022

Rural beneficiaries between 1.1.2020 and 10.31.2022	8,657
Number of seedlings distributed	11.6 million
Land planted partially or fully with OML-distributed seedlings	710 hectares
Average size of supported agricultural production area per farm	0.2 hectares
Working days of short-term rural labor created	36,000
<i>(of which 32 percent female labor share, farmers had committed to refraining from usage of child labor)</i>	



## Food infrastructure



summer or winter season, with organic matter, and irrigation systems,” Ghadban explains.

According to him and his colleague Adel Ghandour, who manages the OML agricultural services team, more than 11 million seedlings with an aggregate value of \$370,000 were distributed between 2020 and the third quarter in 2022. This represents 43 percent of the target clientele of 20,000 farmers that the charity aims to reach by 2025.

The 2025 target is based on an extensive network for OML services provision which includes mobile units, supported centers, and proprietary centers. Catchment areas of services centers are extensive and provide the base for the organization's agricultural support nodes called Services Provision Units (SPUs). Five of these units have been developed to date, out of a targeted total of seven that are to be built on 130,000 square meters (sqm) of land, according to a fact sheet provided by OML.

This distribution model, however, is not a long-term solution. “Because the context has changed, we are moving from the humanitarian distribution, to [targeting] a resilience factor where you support the farmers to continue [farming] but also create economic opportunities in rural areas,” Ghadban explains. In practical terms, this means that the agro-humanitarian project is advancing into its second and third phase, which entails further training and community development efforts. But the project is anchored by horticultural nurseries in a communal operation, and by to-be-imple-

mented processing units for the key crops at SPUs co-located with OML operated or supported centers, found from Kobayat and Ras Baalbek in the north, to Yaroun and Rmeich in the south.

The horticultural nurseries, include a batch of operating nurseries which have to date produced over 2 million seedlings. By the first quarter of 2023, the number of nurseries will be eight, each with projected capacity of around 7 million seedlings per year. “This satisfies around 15 percent of demand, which is significant for us, because this is a pilot project,” Ghadban says. According to him, the first batch of nurseries already provides seedlings at comparable or better quality than those offered in the commercial market, at a price to farmers that is lower by 40 percent when compared with the for-profit market.

They are complemented by crop processing units with equipment for roasting freekeh, or young wheat, and presses for oils and essences. Of the processing units, a pilot freekeh facility has become operational in Yaroun. The investment budget for creation of processing units has been put at \$250,000 to \$300,000 per SPU and a consultative evaluation of further processing unit establishments between OML and farming stakeholders has been initiated. However, such collaborative decision making is a time-consuming undertaking, Ghadban explains. Both components in the food value chain, the nurseries on the upstream side and

the processing units in the post-harvest realm, will operate on basis of a resilience principle by offering their services to farmers at break-even prices, he adds.

The fact sheet on the OML agro-humanitarian program says that it was launched in 2020, “establishing the beginning of

the Association's involvement in agriculture, after 60 years of presence in the country through its network of community health centers.” According to Ghadban, the program was initially devised as a small initiative under the accessibility pillar in the food security matrix and was called agro-humanitarian because it was created in response to a humanitarian crisis in access to food in Lebanon.

From the program's emergence early in the crisis, it is not entirely clear if OML's venturing into agricultural system building came into existence in the form of a sound instinctual reaction to the

■ According to Ghadban, the program was initially devised as a small initiative under the accessibility pillar in the food security matrix

crisis or had a strategic aim from the start, but the key to the entire project is a deep-rooted and long-planning relationship. In developing its SPUs, OML built on both its track record as an operator of primary health care centers in the services to the needy and elderly in rural communities and its partnerships with religious orders, universities and public sector entities.

OML could leverage these bonds of trust and its commitment to building rural resilience into leases for the land plots upon which the SPUs are situated. “The centers will be there for 20 years and all centers were built in partnership with monasteries or public organizations such as [the] Litani Water Authority. The [lands] were taken for free for 20-year leases based on the intention to provide services to farmers at break-even cost,” Ghadban says.

He estimates the values of the plots that were made available for free at seven to ten times the constructed SPU infrastructure, and says the depreciation of SPU assets is calculated on a ten-year horizon. However, he elaborates further that the organization’s efforts under its long-term approach and community presence would not stop if the projects in the current timeline were completed before implementation of a governmental strategy for agricultural development were to commence.

### CLEAR STRATEGY FOR THE SECTOR

Latest at this point it becomes evident that besides the above cited factors of time, trust, and effort – which in the context of tight farming communities and a cautious rural mentality can be

described as core social requirements for winning acceptance – projects aspiring to long-term improvements of agricultural and rural communities will equally depend on a healthy budget, a smart

■ “If you don’t have [funds] to invest, agricultural growth will remain very restricted”

plan, a functional financial and governance infrastructure, and a good organizational infrastructure. “Agriculture needs investment, I mean. If you don’t have [funds] to invest, agricultural growth will remain very restricted and be limited to the people who have cash and can invest,” Ghadban acknowledges.

Asked for his estimate on the growth rates and timeframe of an agricultural renewal, he responds: “I would say that giving a time for phasing out of the crisis would be just throwing a number unless there is a clear financial system. But as someone who has worked in conflict areas, I cannot see a vibrant agricultural sector in Lebanon unless there is clear orientation from the government.” By his reckoning,

### OML SPU PROJECT WITH LONG-TERM RESILIENCE OBJECTIVES

#### Duration 2022 - 2042

**Anchors:** Agricultural services provision units (SPUs) operating under 20-year free land leases

Established	5 SPUs
Target number	7 SPUs
<b>Total surface area of SPUs</b>	130,000 sqm
Of which covered by horticultural nurseries:	
Established	6,320 sqm (4.9%)
Targeted	14,440 sqm
SPU-affiliated horticultural nurseries to be in operation by early 2023	8
Total seedlings produced to date	2.1 million
	(supplied to farmers at break-even price)
Value of seedlings produced at nurseries to date	\$22,700

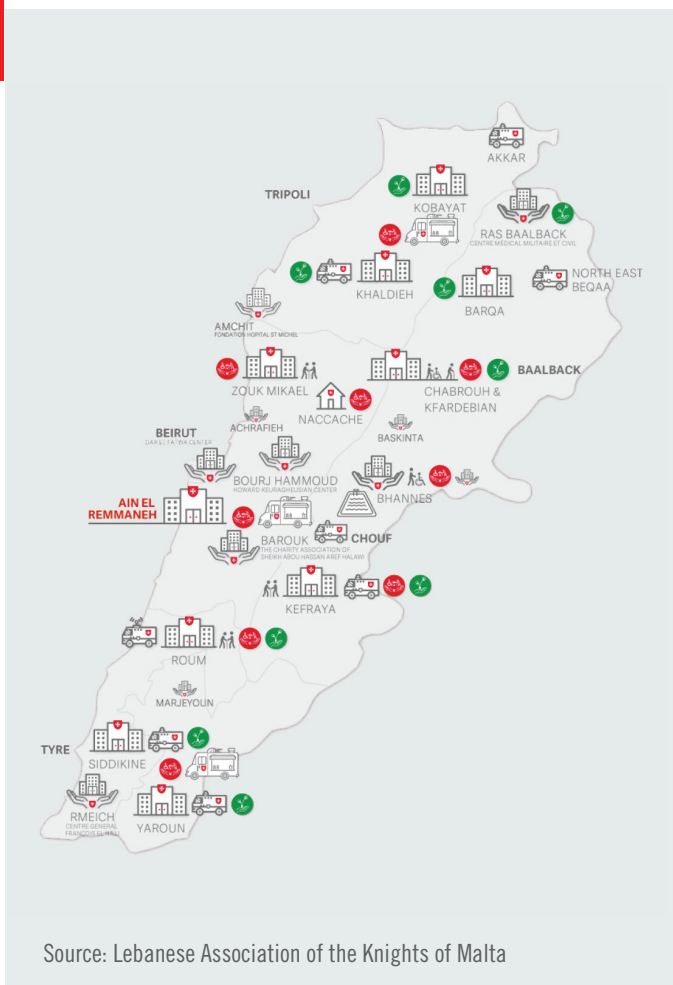
#### Processing units at SPUs

Existing	one unit established as pilot
Target	number yet to be determined in consultative process with farmers
<b>Investment projection for processing units per SPU</b>	\$250,000 to \$300,000
<b>Human capital requirement per SPU</b>	1 SPU manager, 1 technical expert, semi-skilled labor
<b>Number of small hold farmers who have interacted with SPUs as clients</b>	900



## Food infrastructure

## THE ORDER OF MALTA IS PRESENT ACROSS THE LEBANESE TERRITORY



■ “I cannot see a vibrant agricultural sector in Lebanon unless there is clear orientation from the government”



this will not come to pass before ten years.

The program's time line illuminates a notable difference in capacity and approach between OML, as a long-term charitable organization, and the comparatively young civil society organizations in Lebanon. All functioning humans are partial to something; ergo, the agendas of success are driven by determined minorities with partisan interests. In the wake of the Syrian crisis and Arab Spring enthusiasm of the early 2010s, many international NGOs and their local units and derivative local CSOs have emerged onto the Lebanese scene, altering the composition and expanding the focuses of the historic sector of charitable, religious, and social welfare organizations that existed before the dawn of the millennium and its United Nations-determined Sustainable Development Goals.

But while often less media savvy and less outspoken on fashionable causes than their international NGO peers, who are concentrating on rights that were drawn up since the Universal Declaration of Human Rights was adopted by UN member states, the religious charities and legacy organizations of goodwill have continued to play constructive roles in care for the proverbial widows and orphans, the sick, the poor, and almost all who have been economically and socially disadvantaged and overlooked by those in power. OML stands in this deep tradition in the Lebanese space and thus is both predisposed and well positioned for the pursuit of a project that is as challenging and slow-paced as agricultural transformation and recovery of real rural economy as a conduit of stewardship and resilience.

“Strategically, agriculture as a sector will be the main sector creating jobs for economic recovery as well as for business recovery in rural areas,” Ghadban opines confidently, pointing out that by adoption a resilience point of view means that free distribution of services and seedlings has to be replaced with services that are provided on basis of break-even prices.

He says, “Looking at agriculture from a resilience point of view, means the need of addressing the challenges that have existed pre-2019 while taking into consideration the needs of post-2019, through long term approach to change rural communities and make the agricultural system more resilient and feasible.”





## AGRI-FOOD INDUSTRY AND ACADEMIA



Different languages but a common future

**They say Women are from Venus and Men are from Mars, but they can still manage to settle on a common ground, and carry a fruitful relationship which might last for years.** Industry and academia have long been considered as living on two different planets and speaking two different languages, but what if they succeeded in setting a common language? How would they both benefit? And most importantly, how to get there?

Recently, one international beverage company with business in Lebanon decided to explore the possibility of valorizing its by-products by using them as a component for animal feed, as part of its circular economy initiative to decrease its waste disposal cost. A collaborative thesis was agreed upon, and research work started on identifying potential buyers and the nutritional input of these by-products. It went very well and the student was able to successfully defend the thesis. However, when a complementary collaboration was discussed which included production optimization, the collaboration could not move any further since there was a need for access to the production process, and the delicate data it included. Yet such information could not be divulged, so it was impossible to publish any peer reviewed papers; the university lost interest and the collaboration ceased at an early stage. Both parties had their points, the industry

needed to protect its production process which is integral to its success, while the university needed to publish papers to preserve its ranking.

This is just one example of many collaborative initiatives which either were short-lived or failed to launch. Limited access to data, as illustrated in the above case, is only one of various difficulties between the collaboration, which include:

- Timing; universities have their own academic year cycle and research projects are identified usually in September at the beginning of the fall semester, but a company cannot wait if it needs quick answers for technical challenges.
- Intellectual property; for any innovated process, the technology or product is debatable between the industry and the academic institution, and sometimes the researchers themselves, which warrants a serious legal support and collaboration framework.
- Research pace; usually researchers have solidly established protocols and have the ability to accumulate knowledge over years, meaning they have a relatively slow but steady pace. For industry, solutions usually need to be developed quickly and need to be adapted even faster to market variations.
- Objectives; which can be can be contradictory for academia research to industry priorities. So while researchers could be concentrating their efforts on subjects like social responsibility, the greenhouse gas effect, and animal welfare, many companies may prioritize production cost reduction, market access, product quality, etcetera.

### TIME TO COLLOBORATE?

Nevertheless, collaboration between universities and industry through technology or science parks started in developed countries, in 1951 with the Stanford Research Park which emerged later as part of the Silicon Valley and in 1972, Europe's first technology parks were created with the University of Nice Sophia Antipolis in France, and Cambridge University in England. The concept has thrived since then and has become one of the major strengths of modern economies. Can it be applied to the Lebanese agro-economic ecosystem? And is now the right time to reflect on such a collaboration?

At the end of 2019, the dramatic downward

spiral of the Lebanese economic system started, with the agri-food model the fastest to fall apart, although many argue that there was no agro-food model to start with since it was based largely on import input. Access to finance became a nightmare, cultivated land decreased, food processor companies went out of business, and consumers saw their purchasing power disappear in a terrifying pace as many became largely dependent on monthly food basket support from local NGOs.

Universities were also hit hard and fast. In a record time, the value of student tuition evaporated as the Lebanese pound plummeted against the dollar, the same went for the professors' wages, and thus a "brain drain" was triggered. For many, there was nothing to do but to reminisce on the "paradise lost"; but for others, it was the birth of a new era, where anything was possible. But first, it is important to reanalyze the effects of the multidimensional cataclysm and most importantly focus on what can be built now which was impossible before.

The disruption brought by the crisis led agri-food stakeholders to rethink their strategies, and they have since discovered that monetary depreciation could be an actual incentive to produce more price competitive products through accessing foreign markets. But price is not the only parameter to be considered, international markets need specific thresholds of quality, hygiene, packaging, and transportation conditions to be respected. In addition, investing in Research and Development departments within Lebanese agri-food small-to-medium enterprises proved impossible, so the only way to improve products to enter international markets was through access to already available facilities for specific product development. This could not have come at a better time for universities which lacked the needed funds to carry out research activities, with an added bonus to pivot research activities into more practical use with greater emphasis on development. Moreover, the large pool of experts that can be provided by universities offers an immense advantage for industries that seek solutions to their challenges without the need to hire experts on a full-time basis.

The need to collaborate between academia and industry is clear and the benefits for both parties are numerous, especially within the current crisis context. But how is it possible to initiate this collaboration and what is the needed physical and administrative infrastructure?

The first element for the success of the said collaboration is the human element and the need for actual "translators" who can play the role of mediators between academic institutions and industrial companies. These entities would base their interventions

on qualified personnel from both sides who can understand the challenges and the expectations of each and provide a mediation to come up with the best collaboration framework. These "translators" would also work on adapting the mindset of both parties to more collaborative approach while at the same time preserving each party's interests.


There is also a great need in university technology transfer offices who provide support to researcher and student in transforming their research findings into viable products or business models, and to protect them through proper intellectual property frameworks where the university, the researchers and the industry have all their part of the patents ownerships.

Initiating collaboration between academic institutions and industrial companies needs a physical framework where they can meet, exchange ideas and expertise to eventually adopt different collaboration models. This initiative is part of the Agri-Food Innovation

■ The world is full of success stories where industry and academia collaborated

Days organized by Berytech, a local entrepreneurial support system. Over three days, universities and industries met and exchanged ideas, challenges and solutions. This year, six grants were offered by QOOT, the Lebanese Agri-Food cluster, for final year projects in universities to provide answers to challenges faced by different members.

This collaboration could evolve to establish technology parks within university premises, which would also offer a common space for research on technological solutions to agri-food companies, as well as offering both researchers and students direct contact with companies. Through this physical platform agri-food companies would also have access to universities' incubators where start-ups are being created and provide vital input, but also create investment opportunities, and perhaps eventually work with them as sub-contractors or developers.

The world is full of success stories where industry and academia collaborated and the opportunities currently offered by the Lebanese context are immense. The country needs to work its way up to Agriculture 5.0 where artificial intelligence, IoT and machine learning are used in a multidisciplinary approach. This set of diverse human knowledge and equipment is available in universities, and the objectives for their application are determined by industry. To my knowledge, this is a perfect combination for a long-lasting collaboration between two entities which may speak two different languages but share a common future. 

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## CAN LEBANON COMPENSATE?



New agricultural policies are needed to wean Lebanon off imports

**In light of Lebanon's context and current difficulties, food security should focus on the ongoing availability, affordability, and accessibility of nutritious food products that satisfy the dietary needs of every Lebanese.** Furthermore, the Lebanese agrifood industry must be developed to promote competitive exports, value-added activities, employment opportunities, and the expansion of Lebanon's total food system in order to attain self-sufficiency.

Lebanon lacks quality products, modern agricultural practices, proper safety standards, traceability and a reliable certification system, limiting its agricultural potential on the national level, as well as its export potential and its integration into global value chains. Lebanon can be considered self-sufficient when it comes to fruits, vegetables, and wine; however, the country remains highly import dependent, importing more than 80 percent of its food needs. This pattern of behavior causes the country to be highly susceptible to shocks. Agricultural inputs (such as irrigation equipment, seeds, pesticides and fertilizers) are primarily imported, and have all witnessed price hikes, making it more difficult for small-scale farmers to obtain these inputs, and forcing the majority to replace them with agricultural inputs of lesser quality, possibly leading to poorer yields and lower revenue, as per

findings from Scaling-up Agri-Food Innovations, a project implemented by USAID to reduce the agricultural sector's import dependency.

Animal feed is also imported, and is essential for the dairy and poultry industries. According to the World Bank, 1.7 million Lebanese are estimated to have fallen under the poverty line, with 841,000 of those under the food poverty line, as noted during the period between 2019 to 2021. However, food insecurity is more prominent in some regions than others, with the North governorate reporting the highest percentage of 27 percent compared to the Mount Lebanon governorate with 16 percent, as per the United Nations's OCHR 2021 Emergency Response Plan for Lebanon.

### A CLEAR STRATEGY IS OVERDUE

Achieving full self-sufficiency seems overly ambitious; however, this does not mean that Lebanon's local agri-food sector cannot contribute to food security. First and foremost, Lebanon requires a clear

■ The strategy must also capitalize on Lebanon's highly skilled labor pool, as well as incorporate modern technologies and automated systems into farming operations

strategy for its agri-food sector, one that identifies the most resilient sub-sectors and the most vulnerable sub-sectors; the most prominent challenges for every sub-sector; the most prominent challenges for agricultural water supply and availability; and the most prominent challenges limiting export

of agri-food products; paving the way for complementary legislation and projects to improve overall agricultural standards, and provide farmers with the ability to improve their services for both the national and international markets. Generally, the agri-food business possesses two critical functions:


1. Promoting and maintaining food security;
2. Creating jobs and revenue within the industry.

However, the precariousness of Lebanon's socioeconomic climate, the limited access to finance, and the undependable nature of public institutions have impaired the agri-food business' ability to fulfill these functions. Developing an agricultural

strategy necessitates a thorough examination of the interconnections between the agricultural system and the resources that support it (land, energy, water). Decisions across various resource systems are frequently made with insufficient coordination. The strategy must also capitalize on Lebanon's highly skilled labor pool, as well as incorporate modern technologies and automated systems into farming operations. Foreign market demands and criteria must be evaluated in order to develop high-quality foods for these markets. Accordingly, new agricultural policies should be designed to ensure export stability, demand development for local goods and the subsequent introduction of new commodities at the local and international level.

In the short-term, food consumption patterns and food security metrics should be studied to identify important indicators such as domestic production quantities and values, domestic consumption quantities, and exports and imports for each item related to the agri-food industry. Based on these figures, strategic local production sectors, which are most likely those where Lebanon is already self-sufficient such as fruits, vegetables, and bulgur wheat, should be prioritized. Moreover, in-



centivizing farmers to substitute traditional crops for imported produce that is essential for food security (e.g. chickpeas, barley); or substituting crops which operate at a loss with crops containing higher input to the human diet (legumes as sources of proteins and cereals or potato as source of starch), can help limit import dependency. 

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