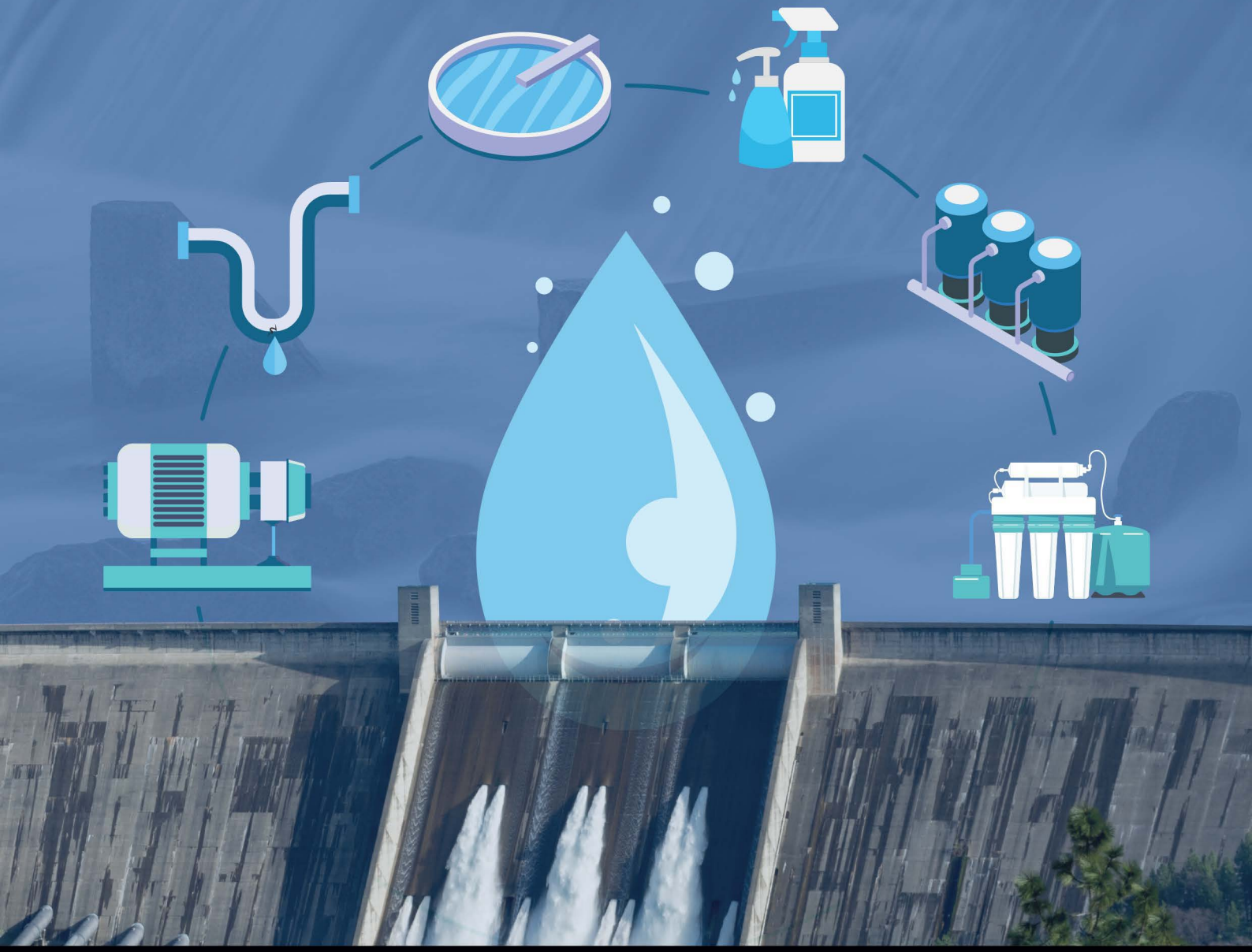
ENABLING ENVIRONMENT FOR INNOVATION IN CLEANTECH

WATER

RESEARCH REPORT



AMERICAN UNIVERSITY OF BEIRUT
ISSAM FARES INSTITUTE FOR PUBLIC POLICY & INTERNATIONAL AFFAIRS
معهد عصام فارس للسياسات العامة والشؤون الدولية

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Kingdom of the Netherlands

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Introduction

The agriculture, food, water, and energy sectors in Lebanon have been acquiring growing attention and support from entrepreneurs during the last decade. Berytech, the leading provider of innovation, technology and entrepreneurship ecosystem in Lebanon, launched in January 2020 the ACT Smart Innovation Hub, funded by the Kingdom of The Netherlands. ACT Smart (acronym for Agri-Food & CleanTech) Innovation Hub applies a sector-wide approach for economic growth by stimulating innovators and entrepreneurs to put their creativity and energy at the service of these sectors and encouraging them to develop local solutions to the environmental and food security challenges faced by the Lebanese and refugee communities. It represents a new out-of-the-box approach for strengthening business advancement and job creation in Agri-food and Cleantech sectors in Lebanon. Cleantech, an acronym for Clean Technology, has emerged as an umbrella term encompassing the investment asset class, technology, and business sectors, which include clean energy, environmental, and sustainable or green, products and services. It refers to various companies and technologies that aim to improve and enhance environmental sustainability. Cleantech is a sector that encompasses the pressing urgency of climate action, the need for innovations to reduce energy consumption, to manage waste more effectively, to embrace renewable energy sources, and to maintain a cleaner and greener environment. Areas of focus include water, wastewater, renewable energy sources, solid waste management and valorization, agriculture, and transportation. Clean technologies are taking center stage in creating smarter and more sustainable ways of living in the face of quick evolving environmental challenges. The aim of "cleantech" is exploring/developing technologies to protect the environment, repair damage done to the environment, and conserve and preserve earth's natural resources. Examples of 'Cleantech' surround three main sectors: (a) Energy, (b) water, and (c) solid waste (Klenton, 2020). The three main goals of Cleantech include:

1. Providing a higher performance at lower costs.
2. Reducing negative implications on the environment by eliminating harmful waste, and repair damage done to the environment.
3. Using, conserving and preserving the earth's natural resources efficiently.

Cleantech spans many industry sectors and includes the following segments: energy generation, energy storage, energy infrastructure, energy efficiency, transportation, water and wastewater, air and environment, materials, manufacturing/industrial, agriculture, and recycling and waste (Dikeman, 2015). Figure 1 reflects different domains included in the Cleantech Industry for a better understanding of this domain.

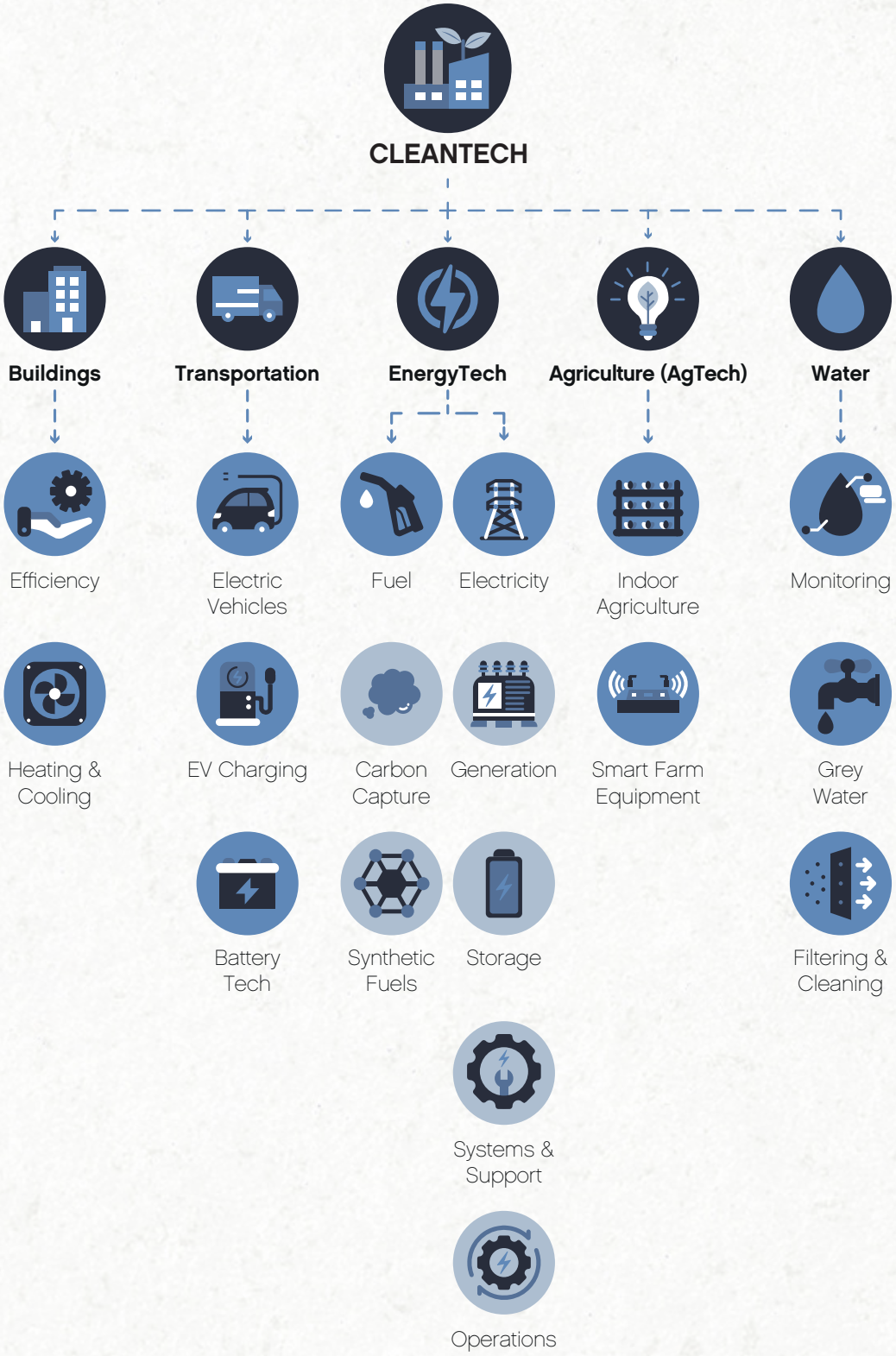

Figure 1: Cleantech industry (Nussey, 2019)

As shown in Figure 2, Cleantech has been found to increase employment across nearly all SMEs. Some important contributors to this increase are solar panel installers, civil and process engineers, technicians, and manufacturing personnel. Reports show that this shift towards cleantech is cited as a fast-growing area of employment with nearly 20% higher national average. An example on this is reflected in fig.1 in Canada where cleantech SMEs were large and well-established companies that tend to have more employees and to have been in operation longer that other SMEs (Huang, 2020)

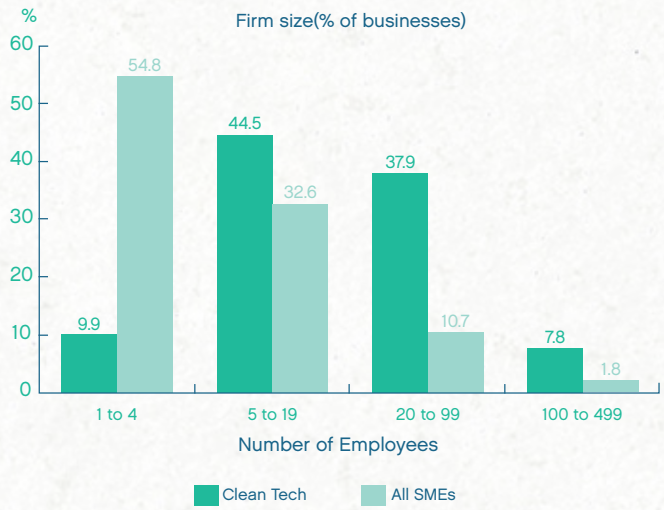

Figure 2: Comparison of number of employees in cleantech SMEs vs all SMEs

The market for such term is relatively young; however, it has garnered a significant number of investors interested in in this sector due to the increasing awareness about the impact of climate change and the depletion of natural resources. Understanding "cleantech" means exploring products and services that improve operational performance while also reducing costs, energy consumption, waste, or negative effects on the environment (Klenton, 2020).

As part of its involvement in the ACT Smart project, the Issam Fares Institute for Public Policy and International Affairs (IFI) at the American University of Beirut (AUB) established working groups in the water, solid waste and energy sectors based on a mapping of stakeholders it had undertaken. The working groups aimed to discuss industry needs and priorities for improving entrepreneurship and business landscape in their respective sectors and functioned as a platform to lobby for an enabling environment for innovation and growth. There is a growing trend to address systemic social, economic and environmental problems from a "nexus" perspective, which takes into consideration the interrelatedness and interdependencies between different sectors. The complex linkages between the water, energy, and solid waste sectors, require an integrated approach to ensuring water, energy, and food security, and sustainable agriculture and energy production worldwide.

The enabling environment around the Cleantech sector in Lebanon is nearly nonexistent, with various actors working in silos despite the obvious added value of collaboration. Improving the enabling environment from a sector-wide perspective may be achieved through the creation of policy lobbying and business development platforms that allow for collective work and exchange of expertise and know-how. This is what Berytech and IFI are aiming to accomplish through this project.

Overview of the Water Sector

Lebanon receives an average annual rainfall estimated at around 800 mm (MEW, 2012). The total volume of water resulting from precipitation is estimated to average about 8,600 million m3 annually, of which 50% is evapo-transpired to the atmosphere (Fawaz, 1969; Mallat, 1982; Comair, 1998; MEW, 2012). Additional committed outflows include surface water flows to neighboring countries (8%), and groundwater seepage (12%). Despite the relative abundance of annual rainfall and the investment of billions of US dollars in the water sector in Lebanon since 1990, the availability of water is limited in quantity and quality due to poor management, aging infrastructure and inadequate investments. Current net available water is estimated at 2,000-2,700 million m3 per year, which is more than the projected water demand of about 1,800 million m3 in 2035 (MoE, UNDP & Ecodit, 2011). Widespread pollution and substandard water infrastructure have restricted the water utilities' ability to meet future water demands. Figure 3 shows the Lebanese water sector value chain as described in the National Water Sector Strategy published by MEW in 2012.

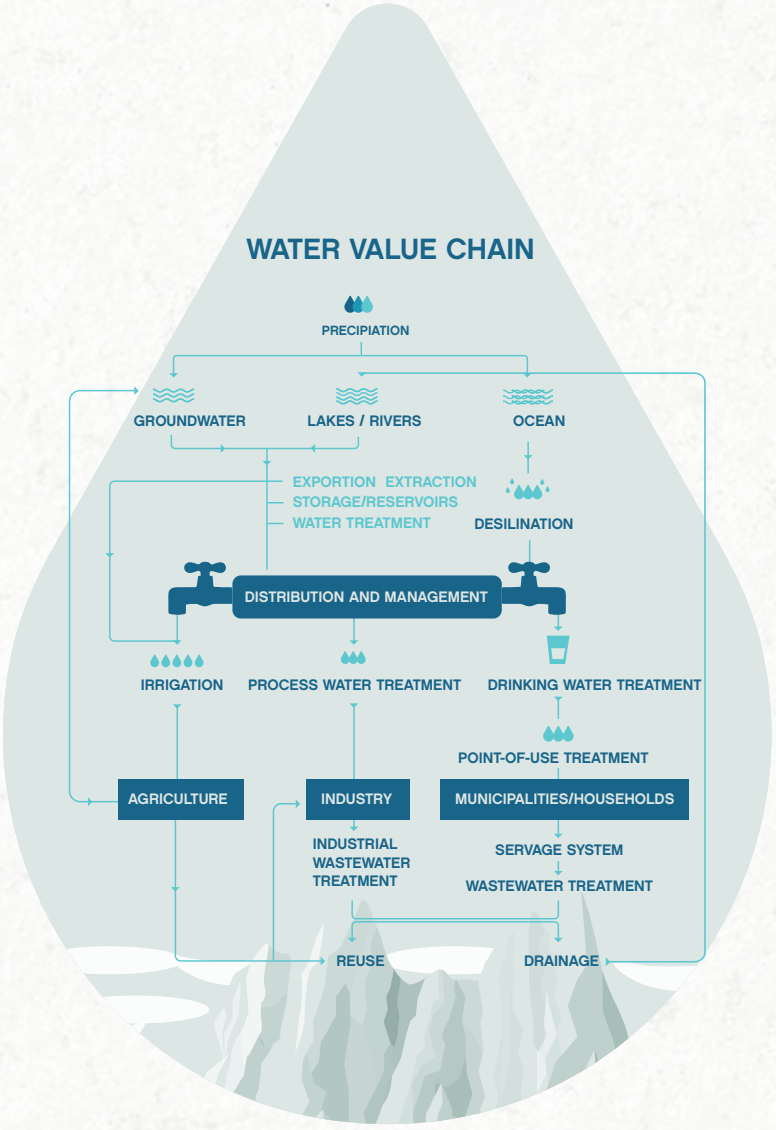

Figure 3: Water Sector Value Chain (focusingfuture.com, 2022)

Lebanon's water sector has undergone several reforms throughout its history, each of which has had a considerable impact on the country's overall management of its water resources and on the behavior of water users (Gharios & Farajalla, 2019a). Since the adoption of the Ottoman Mecelle in 1877, and until the elaboration in 1999 of a ten-year Water Master Plan (WMP) by the Ministry of Hydraulic and Electric Resources, a series of codes and laws were adopted to organize and institutionalize the water sector (Gharios & Farajalla, 2019a). In 2000, a set of reforms were instituted that the reorganized the public water institutions and the merging of the 22 existing Autonomous Water Offices (AWOs) and 209 Local Committees (LCs) into four autonomous Regional Water Establishments (RWEs)[1] and the Litani River Authority (LRA). In 2012, the Lebanese government adopted the National Water Sector Strategy (NWSS) and National Strategy for the Wastewater Sector (NSWS), which were developed by the Ministry of Energy and Water (MEW) in collaboration with more than thirty national and international stakeholders (MEW, 2012). In 2018, the Water Code was promulgated under Law 77. Thus, the current water management framework in Lebanon is the result of administrative reforms that were set in place in 2000. The chief government authority responsible for water and sanitation in Lebanon is the MEW, which oversees the four autonomous RWEs. Other organizations involved in the water management in Lebanon, whether officially mandated or by imposing themselves, include: a variety of ministries and councils , governors, municipalities, UN agencies, non-governmental organizations, institutes and water users. The responsibilities of many of the official entities are interrelated, and as a result, in some cases it is difficult to discern a clear authoritative system linking promulgated decrees to the corresponding and appropriate agencies (Comair, 2006).

Water resources in Lebanon are subjected to severe pressures acting on both the quantity aspect in terms of over exploitation and wasteful use and on the quality of resources with polluting practices proliferating in all sectors (Comair, 2008). In 2015, it was estimated that the total renewable resources (drinking, industrial and irrigation) at 839m3 per capita per year (MoE, UNDP & Ecodit, 2011); lower than one of the international benchmarks[2] of 1,000 m3 per capita per year (World Bank, 2009). Growing water-stress poses a threat to the economic development and human livelihoods, mainly among the poorest and most vulnerable populations living in semi-arid rural areas (Comair, 2008). According to the Intergovernmental Panel for Climate Change (IPCC, 2008), the MENA region will experience for the next century drastic changes where rainfall will decrease by 10-25%, runoff will decline by 10-40% and evaporation will increase by 5-20%. The Ministry of Energy and Water (2012) estimated that out of the total water withdrawal, 61% was utilized for agricultural purposes, 30% for municipal use and 9% for the industry. The share of water withdrawal for agriculture was forecasted to decrease in the coming years and diverted for municipal and industrial use. Recycled irrigation drainage is only at 12.6% and reused treated wastewater at 0.2%. Environmental risks also put pressure on the water sector with agricultural, industrial and domestic activities contributing through runoff and the discharge of untreated effluent directly into rivers and streams. Increasing water pollution causes the deterioration of water quality and threatens human and aquatic ecosystems health, economic development and social prosperity. In addition, the extreme variations in rainfalls and water flows whether due to climatic changes or other reasons, have led to droughts and floods in the Bekaa and Akkar areas causing damage to economic, social, cultural and environmental assets.

1 Beirut and Mount-Lebanon (BMLWE), North (NLWE), South (SLWE), and Beqaa (BWE).
2 The Falkenmark Index

The water sector's problems are not just related to shortage and availability in the long term, they are also about the mismanagement of the resources and lack of transparency in the practices carried by the different sector stakeholders. The overlap in the roles and responsibilities within the various governmental institutions, the irregular permits provided for well digging and over-abstraction, the lack of national water information data, the absence of clear budgeting, and the human resources-related problems are the main challenges leading to the mismanagement of the water sector. These issues need to be resolved in order to create a healthy ecosystem and enabling environment for the water and wastewater sector in Lebanon.

Innovation in the Water Sector and current business landscape

The purpose of developing clean technologies is to create products that are more efficient and cost-effective; to reduce the negative impact of fossil fuels on the environment; and to improve the use of natural and renewable resources. Globally, the clean tech water sector was generating average profits of 12.9% in 2014 (Lux Research, 2014). Venture Capital (VC) and corporate investors from around the world placed over US$ 41 billion towards the funding of cleantech and energy startups during the 2009-2014 period (IDAL, 2018). In 2014, the market value of the cleantech sector soared to US$ 601 billion, and it is expected to increase to US$ 2.5 trillion by 2022. Many cleantech startups are developing means to build smarter homes and cities which would improve water quality and quantity as well as aid in valorizing wastewater. Due to the MENA region's climate and its rapidly growing population, water and wastewater dominate the opportunities in clean tech in this region. According to The International Renewable Energy Agency (IRENA), in 2016, US$ 11 billion were invested in renewable energy across the Arab region. The Levant region (Lebanon, Syria, Jordan, and Palestine) rates water as the top technology for the future followed by wind technology, alongside energy efficiency and green buildings, as awareness of water's potential grows. Figure 4 shows the different types of technology involved in by water startups. Technology types are directly linked to the water sector value chain described previously in Figure 3. Innovative intervention is needed at every step of the value chain, from storage to distribution, to drainage and treatment.

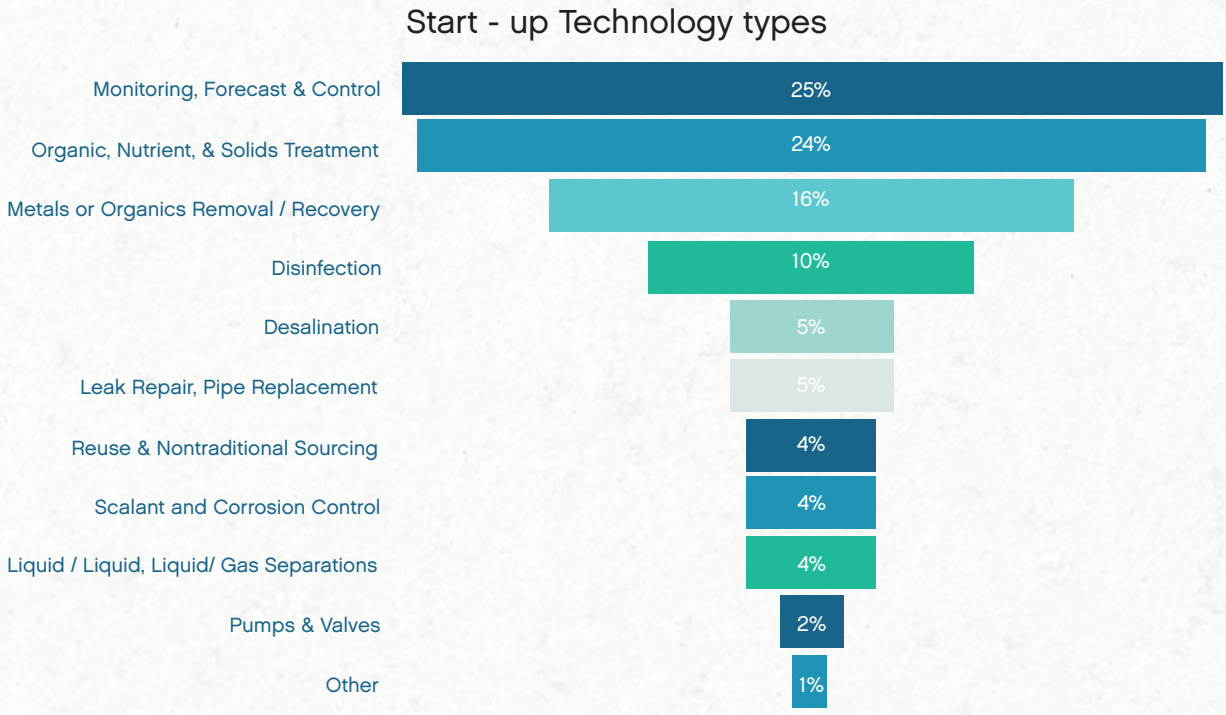

Figure 4: Water Startup Technology Types (Lux Research, 2014)

Globally the cleantech water sector focuses on five main areas (Lux Research, 2014): monitoring; forecasts and process controls; organic nutrients and solids treatment; metals or organics removal/ recovery; disinfection and desalination. Nearly 25% of startups working in the clean tech water sector are focusing on monitoring, forecasts and process controls (through sensors and IoT applications), 24% of startups globally are working on basic wastewater treatment, and 16% of startups globally are working on these technologies (Lux Research, 2014). The situation in Lebanon differs from the global environment in that Lebanon has developed few technologies for water and wastewater management (IDAL, 2018).

In Lebanon, hydropower is the most established renewable energy resource and contributes to around 4.5% of the energy mix with a nominal capacity of 280 MW. However, hydraulic energy production has largely been inconsistent due to increasing variability in rainfall and poor maintenance of existing systems. In a country burdened with challenges that cover the entire cleantech spectrum, innovative entrepreneurs are presented with a surplus of opportunities, topped with scaling potential to the MENA region whose economic growth; rising population and increased urbanization are powering the demand for clean technologies. Startups in the cleantech sector have started to bud in the local ecosystem from car-sharing solutions to drone solutions, to cleantech solutions using Artificial Intelligence (AI) and Internet of Things (IoT) to bio-chemical innovations in managing waste.

Actors in the Sector

AUB-IFI conducted an in-depth mapping of existing SMEs in the water, energy and waste sectors in Lebanon to develop better insight on the existing landscape. With the absence of any comprehensive or exhaustive list/s or database/s of SMEs in Lebanon in general, AUB-IFI consolidated available lists of the various institutions/organizations to map those in the cleantech sectors. Based on the mapping exercise and on the three working group meetings held in 2020-2021, more than 700 SMEs in the water sector were identified. Of those 170 responded to a survey. The areas of expertise which they associated themselves with included: distribution, supply, treatment, management, consultancy, engineering, manufacturer, were trading, design, maintenance, building, contracting, wastewater treatment, filtration, sterilization, plumbing and swimming pools installation.

Of the firms that responded to the survey 12% have work experience of five years or less and 32% have 20+ years which means that the business landscape is dominated by well-established companies with very few 'start-up's able to break through. When considering the number of employees in companies that operate in the water sector, it becomes apparent that small firms dominate with 65% of respondents having between two and ten employees. This is larger than that found in other cleantech sectors where 55% of companies had two to ten employees. Larger sized companies, more than 50 employees, make up 10% of those operating in the water. Figure 5 further illustrates this distribution and comparison

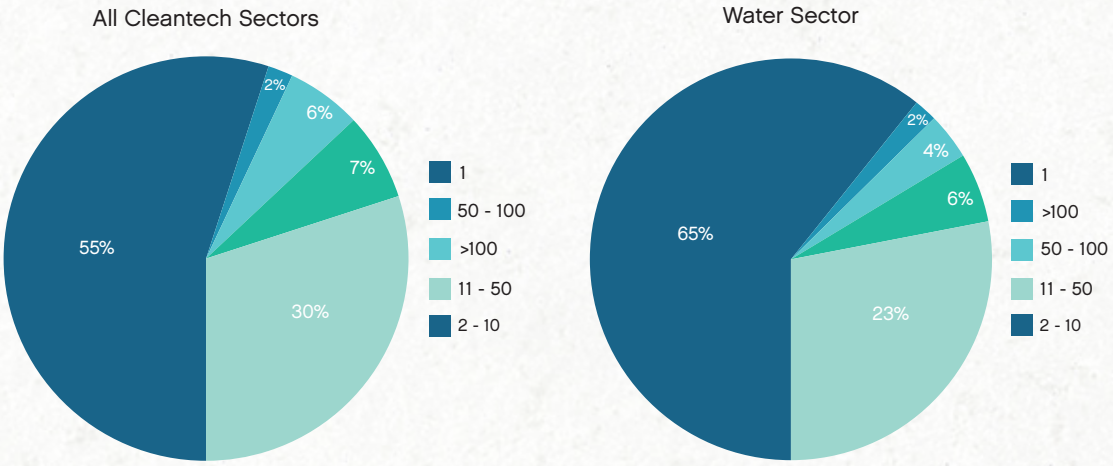

Figure 5: Number of Employees of Companies Operating in the Water Sector Compared to those of other Cleantech Sectors

Nearly 50% of companies operating in the water sector have a turnover of more than LL5,000,000,000[3] compared to 42% operating in other cleantech sectors. Equally notable is that fewer companies have a turnover of less than LL500,000,000 when compared to companies in the cleantech sector (see Figure 6).

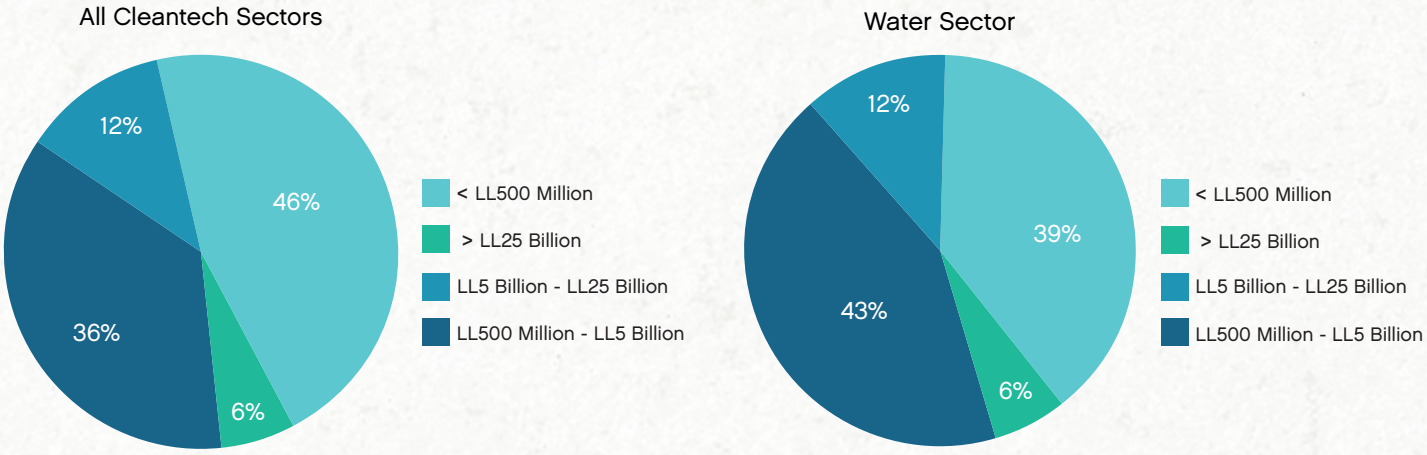

Figure 6: Turnover of companies operating in the water sector

3 The exchange rate used here is before the collapse of the Lebanese Lira

As shown in Figure 7, the focus of these companies seems to be on the treatment water and wastewater and the reuse of the former. Water supply in general and more specifically drinking water and irrigation water come behind the treatment and reuse component. Significantly, and when compared to the other cleantech sector companies, fewer are involved in innovation (Figure 8).

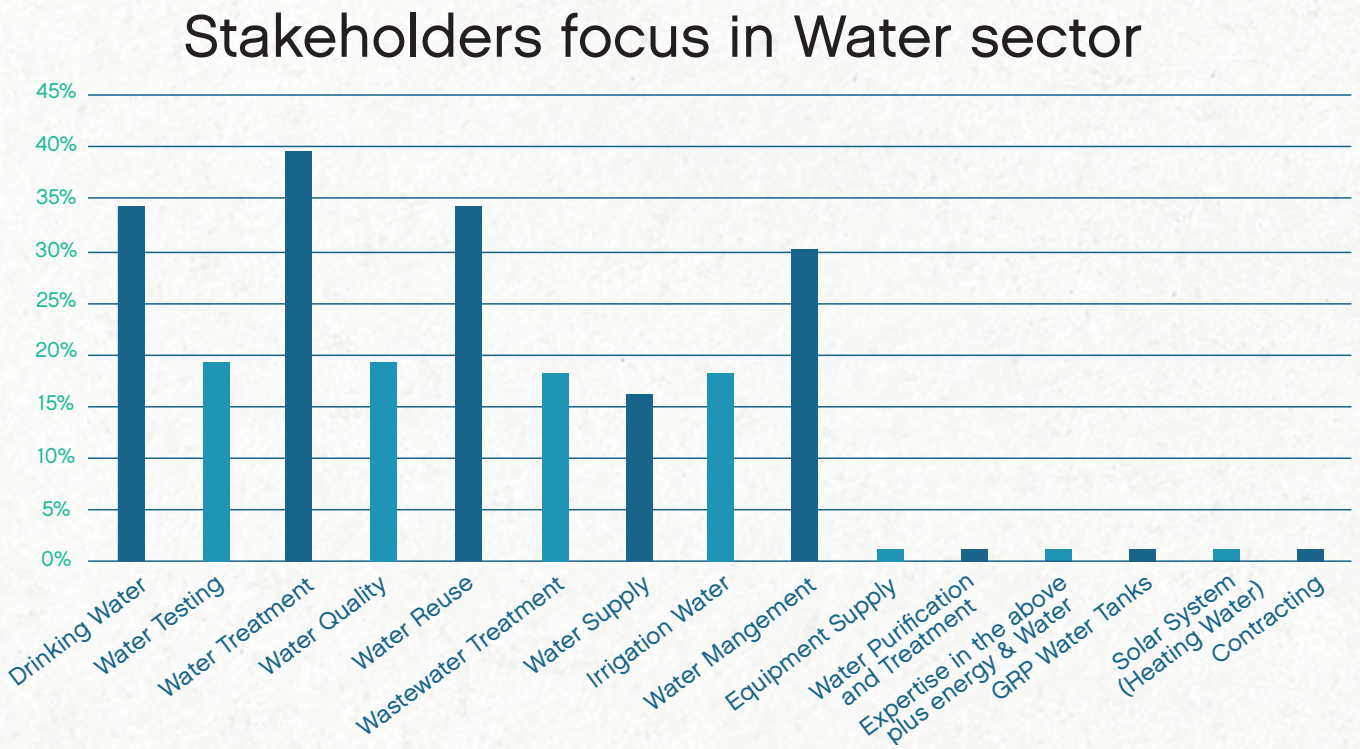

Figure 7: Areas of focus of companies in the water sector

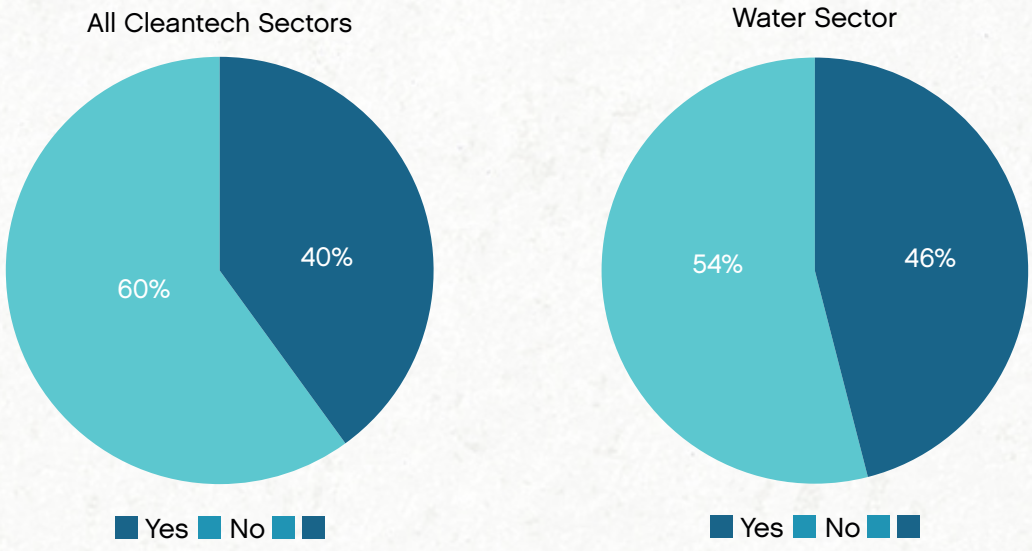

Figure 8: Figure 8. Water sector companies involved in innovation.

The focus of companies' business development is more or less in the same fields (water quality, recreational water, etc.), and using the same technologies (filtration, UV, RO, etc.). There is a clear lack of diversification in the water sector when compared to other cleantech sectors. While there is diversity in the business type (consultancy, engineering, trading...), the size of the SME, their annual turnovers, and their years of experience; the type of intervention remains traditional with very little room for innovation.

From the companies that responded to the survey/questionnaire[4], 26 SMEs were selected to participate in two working group meetings that were held on September 16, 2020 and December 15, 2020. Of the 26 SMEs three have five years or less of experience; eight have 20+ years reflecting the fact that the water sector in Lebanon is dominated by well established companies with very few active start-ups. The majority of participating firms (16/26) indicated that they were investing in innovation such as: conserving and recovering energy, re-use of treated wastewater, improving access to safe water, greening of water infrastructure, improving techniques for water monitoring, and improving water quality of water bodies.

For most of the start-ups involved in the workshops that were organized, the financial side was not a major issue at the beginning of their venture, since they had either won a financial prize or were able to self-finance. But after October 2019, the situation changed drastically due to the financial and political instability that ensued and the collapse of the Lebanese Lira. A main concern that was raised was the corporate environment and the attitude of governmental institutions towards startups. The corporate environment in Lebanon is very bureaucratic, involving extensive and redundant paperwork requirements that are time consuming. Corruption was also mentioned by many of the participating firms as being an obstacle. This drawn-out process is forcing many SMEs to dedicate an employee to follow up with governmental paperwork; something that startups cannot afford. Finally, most participating firms indicated that the move from a startup to an SME would have been near impossible were it not for the support of incubators such as Berytech.

4 The main criteria used in selecting the firms were: Business type, number of employees and years of experience; annual turnover, main line of work, focus in the water sector, and involvement in innovation.

Integrating innovation and entrepreneurship in the water sector

In Lebanon, SMEs represent 90% of the registered firms, engaging 50% of the working population but contribute only 27% of total revenues. SMEs face several challenges, hindering their development, growth and long-term sustainability. The obstacles stem from different factors such as culture, capabilities, capital, market structure, legal and regulatory framework, and research and innovation (MoET, 2014). A survey involving 110 firms, indicated that the most prominent obstacles faced by SMEs are the political/economic and security situation (combining for 26%) along with the government's regulations, SME protection policies, and bureaucracy (combining for 27%). Interestingly, competition from large firms and acquiring finance, 8% and 7% respectively, were of least concern (Malaeb, 2018). Figure 9 illustrates these findings in more detail.

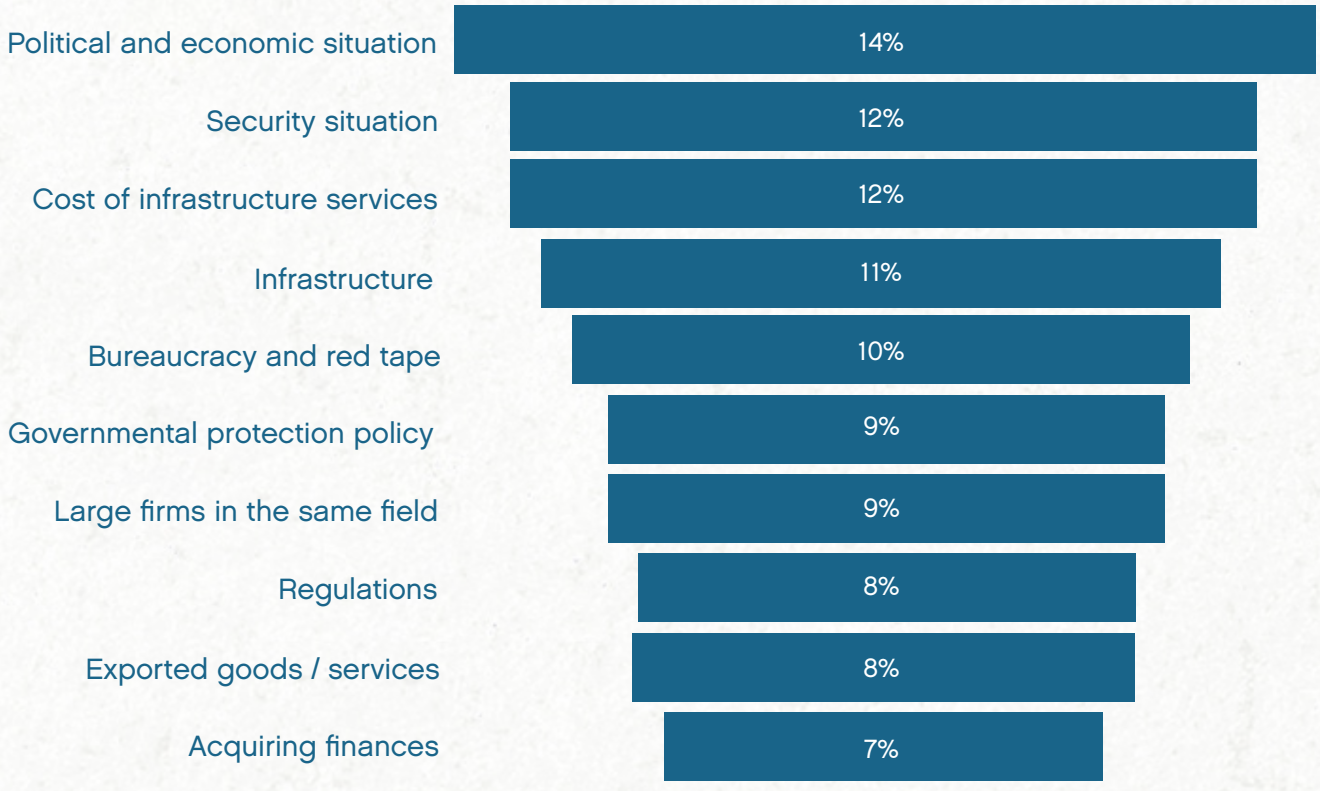

Figure 9: Most common obstacles faced by SMEs

SMEs' development, prosperity and long-term sustainability require an appropriate enabling environment which encourages creativity allows for the growth of enterprises in a sustainable manner. Such a conducive environment must have four important pillars, considered as "interdependent and mutually reinforcing": political, economic, social and environmental (ILO, 2019). The sections below describe these pillars

Political

Several indicators fall under the political element umbrella and are critical in determining the vulnerability of the political aspect in the development of sustainable enterprises. Peace and political stability determine the stability of the government involved and are considered a critical condition for the development of SMEs to attract foreign investment (ILO, 2019; OECD, 2004).

Good governance highlights the importance of controlling the extent of corruption exercised for public gain, the government effectiveness in providing good public services, policy formulation and implementation and its trustworthiness to commit to such policies (ILO, 2019; IMF, 2019). In addition, International Labor Organization (ILO) emphasizes the enhancement of social dialogue and relations, or cooperation between the labor force and the employer, while respecting universal human rights and international labor standards (ILO, 2019).

Economic

The enabling business environment for SMEs relies heavily on the economic aspect in enhancing the work environment. Indicators for the economic aspect include **"enabling policy and regulatory environment"** as a major and important factor for SMEs' conducive environment (ILO, 2019; IMF, 2019; OECD, 2004; UN-ESCAP, 2011). The enforcement of a transparent policy and regulatory environment guarantees the simplification of operation, promulgation, access to resources and markets and exit. While governments should address the different obstacles SMEs face which dampen their activity and limit their innovative capabilities, SMEs' business strategies should be cross-cutting relying on sound **macroeconomic policies and good management of the economy** (ILO, 2019; OECD, 2004). These policies are set to ensure a stable and predictable economic situation.

Another major factor easing the development and sustainability of SMEs is **access to finance** (ILO, 2019; IMF, 2019; OECD, 2004; UN-ESCAP, 2011). SMEs' growth and strengthening potential rely heavily on their capability to invest in reorganization, innovation, enhancement and diversification. Financial services should be improved to become more available and accessible to SMEs and entrepreneurs (UN-ESCAP, 2011). **Infrastructure** plays an important role in SMEs' competitiveness and development (ILO, 2019; OECD, 2004; UN-ESCAP, 2011). Enhancing transportation, telecommunication, energy, water and sanitation can provide SMEs with accessibility to local, regional and global markets (ILO, 2019) The quality of the infrastructure smooths the production of services and goods and can lead to an improved competitive business environment. One final indicator is **Technology or technological capability** which can affect greatly the competitiveness of enterprises (UN-ESCAP, 2011). Information and communication technologies (ICT) are considered a fundamental element for the sustainability of enterprises (ILO, 2019). Its affordability and accessibility provide a better competitive and innovative environment for SMEs.

Social

From a social perspective, the most important factor is the development of an **entrepreneurial culture** (ILO, 2019; UN-ESCAP, 2011). Entrepreneurs contribute significantly to the enhancement of the GDP in several countries and are considered as the main engine for global economic development. SMEs are the engine of economic growth and judged as key to development. Local production and innovation opportunities should always be grasped whenever possible (ILO, 2019). Government policies should help and support entrepreneurs, which entails developing their technical skills, given that entrepreneurs are vital and essential for the economy. Policy measures should include entrepreneurship training and education, youth entrepreneurial programs, new business incubation and women entrepreneurship development. Developing these measures stimulates an entrepreneurial culture, inclusive of all genders and ages. External funding plays a significant role in developing the entrepreneurial culture in needed areas (UN-ESCAP, 2011).

To fulfill and enhance an entrepreneurial culture, human capabilities should be developed through high-quality systems of **education, training and lifelong learning** (ILO, 2019; IMF, 2019; OECD, 2004). The lack of a well-educated and skilled labor force is one of the most significant challenges faced by developing countries (OECD, 2004).

Another factor hindering the development and growth of sustainable enterprises is social **justice and inclusion** (ILO, 2019). Inequality and discrimination are impeding the growth of SMEs. Policies should target and aim for provision of social justice, inclusion and equality of employment opportunities that are needed to enhance the enabling environment of SMEs.

Adequate social protection provides citizens with access to vital services needed to improve productivity such as health care, unemployment benefits, maternity protection and basic pension (ILO, 2019). These factors are essential for the development and productivity of SMEs.

Strengths, weaknesses, opportunities and threats for the water sector SMEs

A SWOT analysis was conducted as part of the AUB-IFI survey of SMEs in the water sector. The results of this analysis gave a comprehensive picture of the sector's main concerns and opportunities. A major strength of the water business sector is the active and continuous presence of several companies with 50+ years of experience. These firms have a lot of experience in Lebanon and in the region. They have strong relationships with the public sector and have continuously supported it in various manners. A second strength is the existence of many emerging start-ups in the water sector that are bringing a new blood to the business environment with their novel ideas and innovative solutions. Several weaknesses were identified. The major weakness that was identified was at the state-level where Terms of Reference and guidelines, designed by the governmental organizations include conditions that make it very difficult for local SMEs win bids, especially those that are based on innovations. Other identified weaknesses were the feeble Intellectual Property system in place in the country; and the SMEs' inability to generate enough funds to invest in Research and Development. The opportunities in the water sector that were identified were related to geographic areas namely the Litani river Basin where more than 250 factories, mills, farms, refugee camps, and municipalities along the river have been identified as polluters and the treatment of their generated effluent would require the services of SMEs. The wastewater sector was identified as an undeveloped area

where SMEs can be engaged and be able to offer innovative solutions and processes. Irrigation system design and management approaches were also identified as opportunity areas for SMEs to grow in. A system of SMEs rankings to facilitate the accession to projects and tenders and to enhance professionalism in the sector was viewed as an opportunity that would enable SMEs to build up trust and confidence with public and private sector stakeholders and would consequently allow them to land projects. Finally, the most critical threats that were identified were the lack of local standards for company rankings, (in comparison with international standards); the absence of monitoring and control over quality of performance (products and deliverables); and the bureaucracy of governmental (and other) institutions and corruption.

Challenges to SMEs

Further, the survey that was conducted by AUB-IFI of SMEs in the water sector sought to identify and prioritize key challenges according to the following criteria: (i) importance of improving the enabling environment for innovation;(ii) urgency of action; (iii) impact on business; and (iv) potential for creating a ripple effect on the overall business landscape. The following challenges were identified and prioritized as below:

1. Absence governmental policies stimulating and encouraging innovation and cleantech incentives
2. Lack of technical capabilities and facilities for research and development
3. Lack of financial resources for innovation
4. Lengthy bureaucratic procedures for approvals of new technologies
5. Limited networking between SMEs and academia
6. Absence of a clear and proper classification/ ranking criteria for SMEs
7. Lack of trained personnel in the water sector

These challenges were very much aligned with the findings of the SWOT analysis and can be grouped into three main areas: incentives and stimulations for innovation, infrastructure and outreach for research and development, governmental policies and procedures.

Creating the enabling environment

During the dialogue with non-SMEs organizations, the dialogue revolved around the need for the governmental institutions to be more receptive of innovation. Also, more cooperation was asked from the SMEs with the public sector to develop local standards and guidelines, introduce ranking systems, and enforce monitoring and quality control, in order to protect the SMEs working in the sector and raise the professionalism bar.

In a more focused approach that was followed through after the administration of the survey by AUB-IFI, respondents were asked to propose measures for improving the water sector work environment for SMEs. The basis for this assessment was to first identify the low hanging fruit and its relevance to Lebanon. Next came the issue of cost and required time to execute. The identified measures are shown in Table 1 in order of priority and ease of implementation.

Table 1: Results of the feedback survey on proposed solutions in the Water Sector

	Proposed Solutions to Create an Enabling Environment for SMEs in the Water Sector
1	Increase the participation of SMEs in governmental decisions through a dialogue between SMEs and non-SMEs
2	Establish, in collaboration with MoEW, the National Council for Water, with clear definition of the qualifications of the board and its mix of expertise (its composition).
3	Establish clear classification criteria for SMEs in the Water sector to enhance credibility and accountability and ensure good quality services.
4	Streamline bureaucratic measures to avoid delays in the implementation of laws/regulations, decisions or decrees
5	Create partnerships with universities to design, study and test innovative material and solutions for the cleantech industry. Qualify and certify laboratories used in testing
6	Identify and use areas of innovation for cleantech in the water sector to guide Donors' agenda and attract fresh grants and funds.
7	Collaborate with the MoI and MoF in the development of an SME Master Plan to develop the Enabling Environment.
8	Re-launch, in coordination with MoEW, the Center for Information and Training for Water Professionals (CIFME) in order to train people in Lebanon instead of paying the cost of trainings abroad.
9	Introduce tools to improve the enabling environment in collaboration with the MoF or BDL: tax incentives, tax breaks, exemptions, VAT, tariff restructure to have high users pay more in a nonlinear manner, etc. such Circular 331 of BDL for the High-tech and start-ups companies

Amongst those surveyed, the initiative to form small follow-up committees between SMEs and non-SMEs scored the highest amongst the solutions to create an enabling environment. This solution had a high score mainly because of its ease of implementation and associated low cost. The next two solutions, establishment of the National Council for Water, as stated in the new Water Code, and the implementation of clear classification criteria for SMEs in the Water sector, also scored relatively high scores for the same reasons. The latter was brought up by the majority of SMEs to enhance credibility and accountability and ensure good quality services, especially when it comes to ToRs/Calls launched by the MEW or the Water Establishments. Solutions 8 and 9 in Table 1 received the lowest scores due to the difficulty (namely political interference) in their implementation; associated high cost, and long enactment timeframe. Indeed, launching the Center for Information and Training for Water Professionals (CIFME) in order to train people in Lebanon instead of paying the cost of trainings abroad, is an issue that was raised by many participants. Also, Solution 10, is seen by many as the most imminent solution to enhance the business landscape of SMEs working in the water sector in Lebanon.

The key institutions that should be involved in implementing the proposed solutions, are all ministries, namely: MoI, MoF, MoE, MEW, MoET, and MoA. The other institutions mentioned were technical and financial support agencies such as LCEC, IRI, Libnor, IDAL and Kafalat. Surprisingly, none of those surveyed mentioned the Economic and Social Fund for Lebanon (within CDR), despite its high potential, and no one mentioned the role of the independent micro-loans institutions Al-Majmoua, Al Tamkeen, Emkan Finance, Ibdaa Microfinance, etc. This probably reflects the poor outreach or visibility of the latter regarding the services that they provide.

Way Forward

While the current political and economic crisis is blurring any forward-thinking other than getting over the present situation, it remains imperative that a strong foundation be set for a sustainable and innovative future in the management of the water sector. Such an endeavor requires the creation of an enabling environment that would allow SMEs to better and more constructively engage in the water sector. The various meetings conducted within the project on which this paper is based have indicated what the key pillars for such a move are.

There are some readily accessible low-hanging fruits that are available at low to no cost to the government. One would be the development a set of criteria to qualify and certify SMEs. Such an undertaking would ensure the quality of service that would be delivered by SMEs in the water sector and improve accountability. Another low-hanging fruit is the creation of partnerships with universities to design, study and test innovative material and solutions for the cleantech industry. This would also require the qualification and certification of laboratories (within and outside universities) that will be involved in the water sector.

It is imperative that bureaucratic measures be streamlined to avoid delays in the implementation of laws/regulations, decisions or decrees, especially those that would establish the previously stated recommendation. Part of this streamlining is the significant improvement in the cooperation and coordination between ministries. One such example would be the collaboration between the Ministries of Industry and Finance in the creation of an SME Master Plan that would allow for the implementation of the above-mentioned action. Another example is the coperation between the Ministry of Finance and the Central Bank in promoting tax incentives, tax breaks, exemptions, VAT, tariff restructure.

Further improvement in coordination maybe achieved through the establishment and operation of the Center for Information and Training for Water Professionals. One of the center's mandates is to centralize hydro-climatic data and the other to carry out a variety of trainings on various aspects of the water sector. Such training and data availability would enable innovators in the sector to better interface with governmental agencies.

Finally, both the public and private sector should collectively identify and use areas of innovation for cleantech in the water sector to guide Donors' agendas and attract fresh grants and funds

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