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**The Role of Technology in Sustainable Food Industry:
The Case of Lebanon**

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The Role of Technology in Sustainable Food Industry: The Case of Lebanon

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Abstract

Sustainable development is the greatest challenge of our time. It brings together a number of global problems - pollution and intoxication of the space in which we live; poverty and starvation; climate change; depletion of mineral and organic resources; ecological devastation, and global inequity. Technologies have played an important role in creating the problems that we face, but will also play an important role in solving them. The reason is not that sustainable development is a technological mission. Rather, sustainable development is the mission for the whole of society. However, technology is deeply entrenched in our society; without it, society would immediately collapse. Moreover, technological changes can be perceived as easier to accomplish than lifestyle changes that might be required to solve the problems that we face. Nowadays, the food system faces big challenges when people and companies shift to more sustainable ways of living. Many questions can be asked in this matter; for example, how can mobile phones and social media help connect people more closely with the food that they buy? How do we measure the environmental or social impacts of food production? How can farmers use technology to minimise the use of fertilizers, pesticides and other inputs? Facing increasing population and environmental instability, the human race is challenged with ensuring that there will be enough food to sustain us over time. Technology is playing an important role in finding solutions to today's food production problems. Sustainability practices create a more effective company, adding that they can also lead to out-of-the-box innovations that help a company's bottom line while helping to improve the world. In developed countries, technology provides information for companies to make better decisions and gives consumers the transparency they're looking for in the supply chain; however, in countries like Lebanon, this topic is still new. Therefore, in this paper, we would like to explore the role played by technology in transforming the traditional food industries into sustainable one.

Keywords: Technology, Food Industry, Food Sustainability, Lebanese Food Sector, Sustainable Development.

Introduction

The effects of technology underlie early twenty-first century global challenges. On the one hand, since the enlightenment, technology, especially science-based technology, has offered the promise of a better world through the elimination of disease and material improvements to standards of living. On the other hand, resource extraction, emissions of dangerous materials, and pollution of air, water, and soil have created conditions for unprecedented environmental catastrophe and have already caused irreversible damage to the biosphere. While the future might promise a vast acceleration of technological innovation, the scale and impact of environmental degradation may reflect this vast acceleration as well.

Sustainable issues have become so common in many fields of socio-political- and economic life that it is often forgotten; therefore requirements of new approaches and a change in rules guiding human activity, ways of thinking and governance structures are critical nowadays. Besides the importance of understanding the interactions in institutional change between socio-economic systems, technology and ecosystems, there should be also a great need to research all local governance's capabilities to direct its sustainable development in a world which seems to become more and more governed by different strong stakeholders who are individually more and more difficult to identify. Institutional environments and structures of governance vary from country to country, that is why different approaches to achieving sustainable development may be necessary.

How can we meet today's needs without diminishing the capacity of future generations to meet their own? This is the main challenge of sustainable development. Progress towards sustainable development requires changes at both the domestic and international level. The persisting contradictions between a better life created and supported by technology for the wealthy few, and increasing environmental degradation and persistent poverty for the vast majority call for a deeper exploration and understanding of the nature of technology and its relationship to society, especially to a sustainable society. In the context of the effort to catalyze a Great Transition to a sustainable global society, in which deep changes in culture, values, consumption patterns, governance, business, and institutions are envisaged (Raskin et al., 2002), questions about the role of technology become even more pressing. How to imagine the development of technologically and economically underdeveloped countries, becomes a necessity?

Moreover, sustainable development stresses the importance of institutions that are willing to integrate economic, social and environmental objectives at each level of policy development and decision-making. Where does Lebanon stand from all this and particularly the Lebanese food industries? What is their current situation concerning sustainable development? Are they deploying technology within their industries to attain a sustainable society?

We believe that these are important questions. To this end, investigating the use of technology along with its impact on society in the Lebanese food companies is critical and will establish a strong literature which will be the basis for future research.

From Sustainability to Sustainable Development

A gathering environmental movement taking place in the mid-20th century pointed out that there were environmental costs attached with the many material benefits that we are actually enjoying. Environmental problems became worldwide toward the end of the 20th century. Today, terms such as: “climate change”, “sustainability” and “green” have come into the language, as new ways of discussing the effects of climate change had raised. Moreover, between 1973 and 1979, energy crises complete the alertness on non-renewable energy resources. Revealing that in the 21st century, total awareness has increased dramatically due to the risk posed by the human greenhouse effect, produced mostly by forest reducing and the burning of fossil fuels.

What is sustainability? Sustainability is the capacity to endure: it is the potential for long-term maintenance of well-being, which has ecological, economic, political, and cultural dimensions. Sustainability requires the reconciliation of environmental, social equity and economic demands which referred to as the “three pillars” of sustainability or the 3 Es. The three pillars have served as a common ground for numerous sustainability standards and certification systems in recent years, in particular in the food industry. Sustainability interfaces with economics through the social and environmental consequences of economic activity. In economy, sustainability involves ecological economics where social aspects including cultural, health-related and monetary/financial aspects are integrated. Moving towards sustainability is also considered as a social challenge which requires international and national law, urban planning and transport, local and individual lifestyles and ethical consumerism. Different ways of living more sustainably can take many forms, ranging from reorganizing living conditions like Eco villages, Eco municipalities and Eco cities, reappraising economic sectors like permaculture, green building, using science to develop new technologies like green technologies, renewable energy, to adjustments in individual lifestyles that conserve natural resources. Sustainability can lead to potential benefits including less waste, greater productivity, and higher level of innovation (Porter, M.E. and Kramer, M., 2006). In recent times, a steady increase is seen in both public and private sector recognition of the need to keep and protect the environment as a societal issue. Sustainability is considered as the guiding principle for industrial engineers, operations managers, architects, construction companies, retailers, public relations departments, and public utilities and of course supply chain managers within the society. Moreover, the whole sectors of the economy, from energy and transportation, to food and construction, are now deeply involved with challenges of sustainability.

In spite of the increased popularity of the use of the term sustainability, the possibility that human societies will achieve environmental sustainability has been and continues to be questioned in light of environmental degradation, climate change, overconsumption, and society’s pursuit of indefinite economic growth in a closed system.

Brundtland stated that a sustainable society is a society that meets the needs of the present generation, that does not compromise the ability of future generation to

meet their own needs, and in which each human being has the opportunity to develop itself in freedom, within a well-balanced society and in harmony with its surrounding (Brundtland, 1987).

Another significant meaning of sustainable society stresses on the idea that this society is based on a long-term vision in that it must foresee the consequences of its diverse activities to ensure that they do not break the cycles of renewal; it must avoid the adoption of mutually irreconcilable objectives and focus on preservation and generational concern. Additionally, it must contain social justice since great disparities of wealth or privilege will raise destructive disharmony (Hossain, 1995).

Moreover, a sustainable society is one that can progress without catastrophic hinders in the foreseeable future; from this answer, recognition can be drawn: human beings will not be able to build a perfect society or even to agree upon what is a perfect society for the future generations to come. Therefore, a sustainable society is one that can shun a devastating blow so that societies can continue the long way to reach perfection. For millions of years, the nature had built a huge reserve of resources, and in turn, societies were largely depending on these resources to function. However, people used most of the reserves, where also most cities around the world not only guzzling up the stored resources, but also destroying the planet's capability to produce new resources by polluting the air, water, soil, etc. Noting that, if societies continue with the same rhythm, future generations will pay a severe price.

Among all definitions of sustainable society, the most useful one is of Brundtland. However, extending this definition will lead to the following one: a sustainable society is a society that meets the needs of the present generation, created an atmosphere where each human being has the opportunity to develop itself freely, within a well-balanced society and in harmony with its surroundings and does not compromise the ability of future generations to meet their own needs.

At the end, human beings will be in front of two scenarios. The first one is to continue to use up all the reserved resources and let the coming generations suffer the result of resource starvation; the second one is to move away from non-renewable resources and put ourselves on a sustainable footing once and for all, by balancing between current needs and future needs.

The idea of sustainable society development is usually connected to world ecological problems, environmental protection, sometimes to the idea of the influence of society and culture on the world development, and lately to the world financial and economic crisis. That is why, it is essential to declare that each one of us is responsible to one another, to the greater community of life, and to future generations. On the other side, while many countries around the world still suffer hunger, water shortage and wars, education and awareness can play a significant role in all societies around the globe. Moreover, education is not considered a luxury; it is considered a potential life-saving measure (Bereiter, 2003). It is known that society must undergo a transformation in order to survive physically and to meet the moral needs of the whole population that lives in the environment where democracy equality, social justice, peace and harmony with the natural

environment must be the key words for the future world. The table 1 below highlights some definitions of sustainability and sustainable development.

Table 1. *Definitions of Sustainability and Sustainable Development*

Sustainability	Sustainable development
Using resources to meet the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987)	Sustainable development is a development which meets the needs of the present generation without compromising the capability of future generations to meet their needs. (Brundtland, 1987)
A wise balance among economic development, environmental stewardship, and social equity (Sikdar, 2003)	The sustainable development concept comprises a further elaboration of the close links between economic activity and the conservation of environmental resources. It implies a partnership between the environment and the economy, within which a key element is the legacy of environmental resources that is not unduly reduced. (WCED, Our Common Future, 1987)
A micro-view point on supply chains and balance between the environmental, social and economic dimensions. (Elkington, 1997)	Sustainable development means supporting developmental and environmental policies on a comparison of costs and benefits and on careful economic analysis that will strengthen environmental protection and lead to rising and sustainable levels of welfare. (The world bank annual report, 1992)
An integration of social, environmental, and economic issues (Carter,R. and Rogers, D., 2008)	Sustainable development is likely to achieve lasting satisfaction of human needs and improvement of the quality of human life. (Allen, 1980)

The Link between Technology and Sustainability in the Food Industry

The word technology includes three meanings: tools and instruments for hunting, agriculture, irrigation and water management, and navigation to enhance human ability to shape nature and solve problems, knowledge of how to create things or how to solve problems, a kind of understanding of how to make and use tools and instruments becomes encoded and transmissible as technological knowledge and know-how, and culture which is mean our understanding of the world, our value systems. (Abetti, 1989)

The transition from technology as tool use to knowledge began around the emergence of the first industrial revolution more than two centuries ago. The transition to technology as culture accelerated after the Second World War and is closely related to the rise of information and communication technologies, biotechnology, computers, and the Internet.

Today, the effects of technology inspire global challenges. On the one hand, since the Enlightenment, technology has contributed to a better world through the elimination of disease and improvements of standards of living. On the other hand, resource extraction, emissions of dangerous materials, and pollution of air, water, and soil have caused environmental disaster and have already caused permanent harm to the biosphere. While the future might promise a vast acceleration of technological innovation, the scale and impact of environmental degradation may reflect this vast acceleration as well.

Despite the technological revolution, the majority of the world population still lives in horrible poverty with inadequate food, accommodation, and energy. Also it is attacked by diseases that could be easily treated if clean water can be available.

Unfortunately, for large populations in Africa, Asia, and Latin America the benefits of technology remain a dream, even if new technologies like photovoltaic cells, cellular phones, and the Internet are implemented.

The persisting contradictions between better lives created and supported by technology for the wealthy population, and increasing environmental degradation and persistent poverty for the vast majority call for a deeper exploration and understanding of the nature of technology and its relationship to society, especially to a sustainable society. (Vergragt, 2006)

In the context of the effort to catalyze a *Great Transition* to a sustainable global society, in which deep changes in culture, values, consumption patterns, governance, business, and institutions are envisaged (Raskin, 2002), questions about the role of technology become even more pressing.

Technology is a cause of many environmental problems and a key solution to solving them. Thinking about the negative effects of technology we can find different ones; the machines are seen as a threat to the employment, jobs were lost due to automation and to outsourcing of production to low-wage countries, air pollution, soil pollution, and water pollution are influencing the society and creating serious environmental and health problems.

In order to improve the quality of life and food, we should use technology in a sustainable way. Sustainable agriculture for example will provide plentiful food supplies at prices local populations can afford, at a level of quality that promotes health, and without damage to the environment or reduction of biodiversity. To achieve this goal will require a prudent combination of new technologies and ecological sensitivity.

Ecological agriculture must be practiced as standard throughout the world, taking different forms in different places depending on tradition, local circumstances, and specific opportunities.

Awareness of the harm pesticides should be spread especially in the poor countries where the use of them still high.

The sustainability of food and agriculture production has become a critical issue. Science and technology can, according to FAO, provide the knowledge and tools to meet the challenge of more and better food and agriculture products. Organic farming and biotechnology are new methods for sustainable agriculture.

What are the drivers of technological change?

The present dominant drivers of technological change are business interests and state and military-driven innovations. The main actors that drive technological change are delineated below.

Governments

Governments at all levels rank high among the most important drivers of technological change. Governments will play important roles by regulating adverse technological consequences, investing in research and development (R&D) and in new technological innovative forms, purchasing sustainable products and services in order to pave the way for broad market introduction, setting criteria that foster sustainable and appropriate technologies, curbing excessive private interests-driven research, setting long-term goals, and communicating about science and technology issues with the public at large.

Citizen-Consumers

The second most important drivers of technological change are the citizen-consumers. Shorter working weeks, more walking, biking, and playing, that is to say, less stress and more exercise, have become broadly accepted as desirable consumer products. Consumers became less interested in consuming as such to fulfill their needs (Stutz, 2006) and more in participating in decision-making about issues that are relevant for their own and their children's lives. In this way, they have become citizen-consumers. Citizen-consumers have been empowered to express their demands for products and services in such a way that they reach a balance between personal interests and the public good.

Citizens' Self-organizing Groups (SOGs) and NGOs

Citizen-consumers organize themselves in ways that foster the public good. These organizations and institutions, formerly known as non-governmental organizations (NGOs), have been aptly renamed citizens' self-organizing groups (SOGs), or in some places in the world, like India, as self-help groups (SHGs). SOGs are organized around each and every issue for which a demand exists, from transportation and housing, to sustainable food and shopping, to health and medical care, to environmental issues. The Internet and ICTs are again very instrumental in forming and developing these groups. Early forerunners could be seen in early twenty-first century as eBay and a host of chat groups and email lists. SOGs have a strong influence on R&D and technological innovation by expressing desires and making demands in such a way that governments, existing business, and emerging new business take notice and act accordingly.

Business

Business can be divided into big multinational corporations (MNCs), small and medium-sized enterprises (SMEs), and emerging new firms (mainly

science-based or service-oriented). The World Trade Organization, in combination with the World Court and some parts of the UN have jointly developed into a much more socially oriented world government system that is committed to sustainable development, equity, and justice. This global government system has developed enough strength to force MNCs to adopt global standards of labor, environmental and social sustainability, and reasonable rather than excessive profits.

The world governance system has also curbed the financial markets, applied a Tobin tax on worldwide financial transactions, and tamed unbridled financial speculation to an extent that is within the bounds of what is considered socially beneficial. Because of this, companies are able to look further ahead and develop truly long-term sustainable strategies for their products, services, and labor operations. Technological innovation is redefined as successfully bringing products and processes on the market that fulfill sustainability needs by citizen-consumers, as well as generate a modest profit for the business. Business decisions on R&D and technological innovations are heavily influenced by citizens' self-organizing groups (SOGs), governments on all levels ranging from local to world government, trade unions, environmental groups, and human right groups.

Education and Communication

Deep changes are needed in high school and college education on science, technology, and sustainability. The history of technology, the differences among technologies in various cultures, the social shaping of technological artifacts, the societal processes and decision structures that shape technological innovations and the consequences of technology for society should be taught in ways that engage students in a deeper understanding of technological change processes. Similarly, sustainability needs to be taught in a holistic way, connecting technology with institutions and values, ecology with economy and society, consumers with producers and governments, short term with long term, well-being with equity, and differences between cultures with global values. Communication about really sustainable forms of need fulfillments would be the way to do it. Although how mass communication could be disentangled from the grip of powerful corporations is unclear, the key is probably to reform business itself (White, 2006) to create a better balance between business and other actors in society.

The Lebanese Food Sector

In spite of having survived many years of difficulties due to prolonged conflict, the industrial sector in Lebanon still faces significant challenges. The economic development of Lebanon depends deeply on this sector especially for employment and wealth creation. The irregular distribution of industrial units has long been a feature of economic activity in Lebanon; like other main economic activities, industrial units were not evenly distributed over the Lebanese territory.

The location of main of such industrial establishments is in North Lebanon and Bekaa. Such units are concerned largely with manufacturing activities that operationally require extensive surface areas. Table 2 below shows the distribution of the average number of workers by establishment and industrial establishments by region.

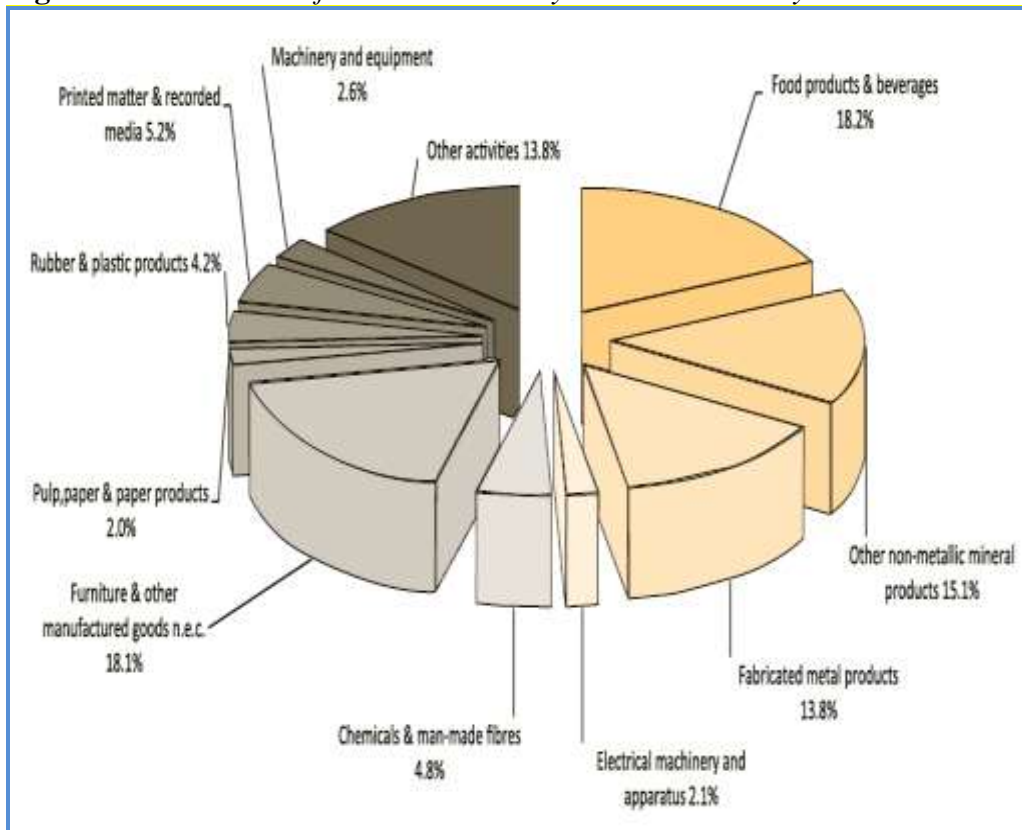
Table 2. *Average Number of Workers by Establishment and Industrial Establishments by Region*

Mohafaza	Beirut	Mount Lebanon	North Lebanon	Bekaa	South Lebanon	Nabatiyeh	Total
Nb. of establish.	239	2,010	518	744	420	102	4,033
% of total	5.9%	49.8%	12.8%	18.4%	10.4%	2.5%	100.0%
Average workers per establish.	19	25	17	18	12	12	21

Source: The Lebanese Industrial Sector Report 2010.

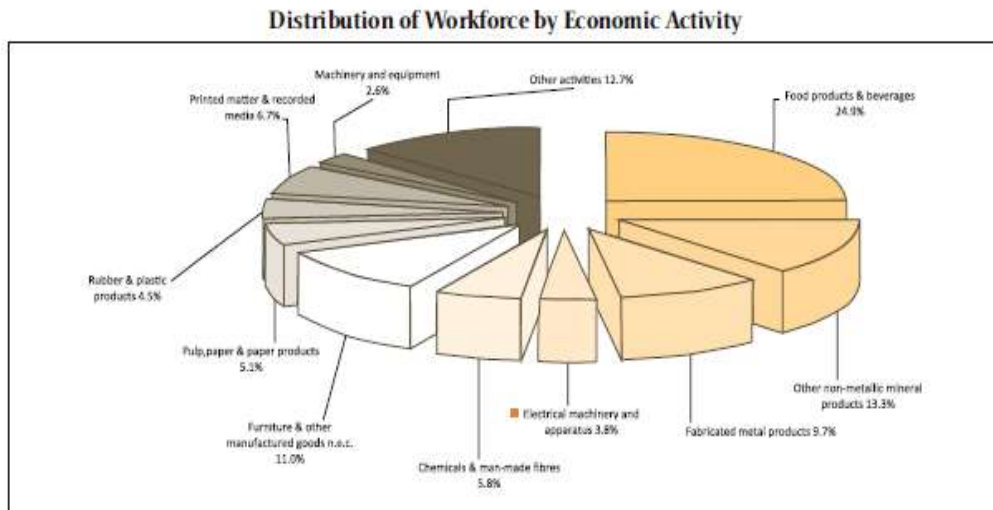
The majority of Lebanese industry (86.1%, as seen in figure 1 below) is centered in 4,033 establishments employing at least 5 workers. It operates across 10 major sectors and demonstrates a relatively low level of diversity, as follows: furniture and other manufactured goods; fabricated metal products; other non-metallic mineral products; plastic products and rubber; pulp, paper and paper products; printed matter and recorded media; machinery and equipment; electrical machinery and apparatus; chemicals and man-made fibers; and, the largest industry in Lebanon, food products and beverages. In 2010, the latter represented 18.2% of all enterprises, making it the country's major industry, a sizeable portion of which (30%) is housed in bakeries. The food and beverage industry evinced a total industrial output of 25.7% (as per the Lebanese Industrial Sector Report, 2010) and employed 24.9% of the total industrial workforce as shown in figure 2; in 2010, out of 119 enterprises employing more than 100 workers, this sector counted 41 enterprises (the bulk of all industrial establishments are small units; 78.2% (51.6% plus 26.6%- as shown in table 3) employed between 5 and 19 workers, and only 2.2% employed more than 100 – see Table 3 below). Thus, only several years ago, the food and beverage industry added more than 26.9% value to the overall Lebanese industrial sector (as per the Lebanese Industrial Sector Report, 2010).

Figure 1. *Distribution of Establishments by Economic Activity*



Source: The Lebanese Industrial Sector Report, 2010.

Figure 2. *Distribution of Workforce by Economic Activity*



Source: The Lebanese Industrial Sector Report, 2010.

Table 3. *The Size of Industrial Establishments*

Workforce by class	5-9	10-19	20-34	35-49	50-99	100-249	≥ 250	Total
Nb. of establish.	2,081	1,072	449	146	166	87	32	4,033
% of total	51.6%	26.6%	11.1%	3.6%	4.1%	2.2%	0.8%	100.0%

Source: The Lebanese Industrial Sector Report, 2010.

In the absence of a legal framework, the food industry in Lebanon is highly fragmented into small enterprises. Aside from a lack of governmental control, difficulties for the industry are many and include a nonexistence of marketing regulations and competition from low-cost imports from neighboring countries.

The several challenges faced by the food and drinks industry put Lebanon's food and drink trade balance in negative territory. Unlike its peer countries, Lebanon benefits from a robust agricultural industry, and can meet certain categories of domestic demand, particularly for fruits and vegetables. This, along with governmental efforts, should boost exports over the longer term, and help meet domestic demand, reducing by that the need for costly imports and helping the industry to grow.

The strengths of this sector reside in the:

Availability of physical resources: climate diversity, soil fertility, and the abundance of water resources and the availability of well trained workforce: many universities (AUB, Lebanese University, USJ and Balamand) offer agriculture and food industry study programs that serve the agro-food supply chain. In addition to the presence of a vocational school specialized in food industry.

The financial support is provided by private and public entities:

Kafalat provides guarantees for loans (up to USD 400,000) granted by commercial banks to SMEs in the agro food sector; IDAL provides a 100% exemption from corporate income and project dividends taxes for up to 10 years provides through "Agro Map" program exporters with the opportunity to market their products in international fairs and introduce local producers to latest technology in the sector and the Economic and Social Development Fund: program funded by EU and the Lebanese Government provides loans (up to USD 50,000) for SMEs in the agro food sector.

While the technical support is possible through the availability of testing and R&D institutions such as LARI, the Agricultural Research Institute of Lebanon which is a governmental organization under Minister of Agriculture Supervision that has eight experimental stations and conducts applied and basic scientific research for the development and advancement of the agricultural sector in Lebanon.

Lebanon is a member of the Greater Arab Free Trade Area (GAFTA), the Euro-Med Partnership as well the European Free Trade Area (EFTA) which have had a positive impact on the improved access to markets for Lebanese exports in external markets. The Lebanese food products' exports to EU and Arab countries have been increasing steadily at a CAGR of 3.65% and 13.80% respectively from 2012 to 2015.

Methodology and Findings

Our research design combines qualitative methods. Specifically, the qualitative approach is used in the content analysis procedure. Qualitative content analysis is one of the classical procedures for analyzing textual material (Bauer, M., and Gaskell, G., 2000). This procedure makes use of categories which are often derived from theoretical models, typically in the literature review. As such the categories are brought to the text and not necessarily developed from it as is the case in grounded theory coding as developed by (Strauss, A. L., and Corbin, J, 1990). Qualitative content analysis procedure is mainly used to analyze subjective viewpoints collected with interviews (Flick, 2009) and thus it suits the aim of this study. Of course, a combination of the former technique and grounded theory development (theoretic coding) might be plausible as new categories (theory formation) might arise during the interpretation of the data. The key stakeholders form the purposive sample (Flick, 2009) (Patton, 2002) for this qualitative study and have been chosen specifically as instrumental agents in assessing, within the temporal and local context of ethical practices in Lebanon, the validity of a proposed quality framework and identification of the main characteristics that make such a framework effective.

Nonetheless, it is within the aim of this study to include a large number of different food industries. This is indeed plausible, given the priority of the topic within the agenda of policy makers and given both the anticipated reactions of the food industries. Such a topic should sit well with the prospective subjects of the study. It would be too ambitious and indeed unnecessary to cover all industries related to food in total; however, it is expected that a substantial number of them, providing a representative sample of the sector, will agree to collaborate, within our professional capacity we have already become acquainted with the following industries: Junet, BM Machaalany, etc.

Application on Junet and Machaalany: Analysis and Results

It was shown from the interviews that were conducted with the two managers of Junet and Machaalany that technology has played somehow a big role in creating and building sustainability in the Lebanese food industry.

Results and Discussion

The analysis presented in the previous sections lead us to emphasize on the role of government in working towards a fair, healthy and environmentally sustainable food system. Government needs to show leadership by providing a clear, long-term, and joined up food policy and by facilitating the development of an action plan for implementing that policy. It needs to ensure that all areas of policy contribute towards the goal of a sustainable food system, or that policy to not militate against the achievement of this goal. Government also needs to learn and implement the lessons from the experience of voluntary partnership initiatives

with business. Moreover, the government should consider the benefits of introducing taxes on unsustainable food. For instance, government can use this tax incentive to encourage employers and businesses in general to provide healthy and sustainable meals to their workforce and to the marketplaces. It is also crucial to endorse all green food projects focusing on sustainable consumption. On the other hand, civil society responsibilities require an attention.

Energy is a key aspect of sustainable development. Energy system is mainly based on fossil fuels. This trend is unsustainable for a number of reasons: threats of man-made climate change by greenhouse gas emissions, the rapid depletion of fossil fuels, rising energy prices due to increasing demand, geopolitical uncertainty, and threat of instability in oil-rich countries. Solutions will be found in massive energy efficiency; development of renewable energy based on sun, wind, biomass, and tides; and improvements in energy storage technologies, such as batteries and flywheels. Carbon capture and storage is not yet proven feasible but could help to mitigate increasing CO₂ emissions (Stephens, J. C. and Zwaan, B. V. D., 2005). Hydrogen is an option, but only if it can be efficiently generated by use of renewable energy. Agriculture in a sustainable society will provide plentiful food supplies at prices local populations can afford, at a level of quality that promotes health, and without damage to the environment or reduction of biodiversity. To achieve this goal will require a prudent combination of new technologies and ecological sensitivity. Thus, after extensive discussions and controls, some GMO crops would be admitted, but others would not be allowed (Vergragt, P.J. and Brown, H.S., 2006). Ecological agriculture would be accepted and practiced as standard throughout the world, taking different forms in different places depending on tradition, local circumstances, and specific opportunities. As citizens, the responsibilities carry over into our food purchasing decisions, and into how we cook, who we eat with, what we throw away and so on. Additionally, citizens can also have a significant impact on the sustainability of our food system. Moreover, schools and universities have a major impact on sustainable society development. By engaging students in discussions on contemporary questions related to world development and technological advances, not only their motivation and interest is stimulated, but also a type of education closer to life is introduced to them, so that young people are familiarized with the ideas and actions related to sustainable development in a natural and spontaneous way.

Conclusion

Nowadays, the interest in conserving and protecting the environment which is taken as a societal issue is increasing noticeably in the public and private sector. Embracing environmental issues without changing current processes provides the company with a sense of social legitimacy which usually leads to narrow, incremental solutions (Corbett, C.J. and Wassenhove, V., 1993) (Wood, 1991).

In this project, we began by reviewing the extant literature across a number of disciplines, technology, sustainability, sustainable society, sustainable development etc, and then we ended up with the main issue, to find out whether technology

existed in the Lebanese companies helping to achieve sustainable society. To approach this investigation, we selected two companies; one in the juice sector and one in the pickled and oil sector. Our main selection of these two companies was due to the fact that they considered among the largest companies in Lebanon in terms of size, number of employees and worldwide distribution. To assure comparability of data, interviews and research methods were carefully designed and implemented in the two industries. Then we presented our results and discussed their implications for theory and practice.

While the results of the study are interesting and usually support the need and importance of working towards achieving a sustainable society through the technology, limitations of the study should be considered when interpreting the findings. While we took great care in developing the measures, some scales have more marginal measurement properties than others. Higher levels of measurement error tend to reduce the statistical power needed to detect real differences. However, with the challenges facing most Lebanese industries and businesses our findings are relatively strong. Also Lebanon did not sign yet the Kyoto protocol which will make it hard to measure and compare the results and the impact of the greenhouse gas emissions. Although sampling two companies within the food industry, additional research in other industries should be done to increase confidence in our conclusion. Future research might also examine differences when buyers, suppliers and employees are from different cultures. In conclusion, this research provides additional insight into how technology influences and helps in building a sustainable society. This study offers guidance about how strategies and plans may need to be developed as they are implemented across different business companies.

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