REPUBLIC OF LEBANON
MINISTRY OF INDUSTRY

PSDP
Productive Sectors Development Programme
A programme by UN Lebanon

Pre-Feasibility Study
Fresh Juices Industry

January 2022

It is important to mention that data in the sub-sectors of the agri-food industry is sometimes scarce largely due to the fact that a significant number of companies and individuals operate partly or fully in the informal sector.

PREFACE

As part of the United Nations' Productive Sectors Development Program (PSDP) in Lebanon that aims in supporting gender-responsive job creation and economic opportunities in the agri-food sectors, the United Nations Industrial Development Organization (UNIDO) is committed not only to reduce the gap in market intelligence for micro, small and medium enterprises (MSMEs) in the agri-food sector, but also to provide support to the Ministry of Industry in terms of institutional capacity.

As such, UNIDO, in cooperation with the Ministry of Industry, is drafting several product-specific pre-feasibility studies, which provide MSMEs in key value chains in the agri-food sector with information and insights, in order to help them improve their production process, make it more efficient and raise awareness on international standards that are required to export their products abroad. Through these reports, UNIDO also provides institutional support to the Ministry of Industry in finding and gathering data, and transforming it into actionable insights, so it can promote efficiently Lebanese agri-food products."

This report includes research insights and growth opportunities in the Juices industry within the Lebanese market, as well as focusing on its potential to become more competitive and prominent. Several consultations have been conducted with industry experts and major players in order to provide tangible product knowledge for Lebanese producers.

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ACKNOWLEDGMENTS

The development of the pre-feasibility study report is a collaborative work between the United Nations Industrial Development Organization (UNIDO) and the Ministry of Industry (MoI) as part of its Productive Sectors Development Programme (PSDP). The PSDP is a UN joint programme, funded by the government Canada and implemented by six UN agencies (UNIDO, UNDP, ILO, UNICEF, FAO & UN Women) and coordinated by the Resident Coordinator's Office (RCO). The report was drafted by Ms. Nour Mrad (Project Assistant, UNIDO), Mr. Elie El Khoury (Economist, UNIDO), Mr. Julian Barhoun (Senior Project Assistant, UNIDO), Ms. Lina Assi (Agri-Food Engineer, Head of Standards and Quality Inspection Department, MoI), Ms. Christel Hanna (Economist, MoI), Ms. Manal Yassine (Economist, MoI), Ms. Mariam Khamis (Economist, MoI), Ms. Marilyse Chehab (Economist, MoI), Ms. Sirana Fakhri (Economist, MoI) and Mr. Bassam Jouny (Economist, MoI). Oversight and coordination was done by Mr. Kjell Sundin (UNIDO Project Manager) and Ms. Nivine Chahni (Project Coordinator).

As the fresh juices is still a niche market in Lebanon and given the lack of data in the local market, this report covers the macro trends of the whole Juices Industry while focusing on the means of production and technical requirements for the "Fresh Juices" sub-industry.

DEFINITION

According to the CODEX General Standard for Fruit Juices and Nectars, fruit juices have the essential physical, chemical, organoleptical, and nutritional characteristics of the fruit(s) from which it comes (CODEX STAN 247-2005). Properly extracted juices are very similar to the fruit; they contain most substances, which are found in the original ripe and sound fruit from which the juice is made. A fruit juice is made from the whole fruit (edible parts) and does not contain more sugar than the corresponding fruit. Ruxton et al. (2006). Fruit juice is nutritionally similar to the whole fruit. Fruit juices and 100% fruit juice-puree mixtures known as "smoothies" (with 100% fruit content) are more convenient to consume, and have basically a longer shelf-life than fresh fruit. In most cases, fruit juices need no additives, but in other cases, such as cloudy apple juice or white grape juice, the addition of ascorbic acid (vitamin C) is used for the prevention of browning. Citric acid may be used occasionally to acidify fruit juices made from fruits with a low natural acid content. In most countries of the world, like the EU, the use of chemical preservatives is not allowed.
Due to climatic conditions and packaging demands, some countries have permitted the use of chemical preservatives, which have to be mentioned in the label. Fruit juice contains essentially all substances, which are found in the original fruit, which must be ripe and healthy. The only exception is the dietary fibers, which are predominantly lost during pressing, whereas fruit purees contain essentially the same amount of dietary fibers as the original fruit. Fruit purees can be used to make juice-containing products such as nectars and smoothies.
In Lebanon, two types of juices can be distinguished:

- **Juice form Concentrated Fruits**
  Made from imported concentrated fruits in different percentages, these juices are all processed and labeled as non-fresh,
- **Juice from Fresh fruit**
  Made uniquely from fresh fruits with no additives or preservatives what so ever, and in some cases pasteurized in different method to extend their shelf life.

In this report fresh juices which are witnessing, nowadays, a growing demand in the market and are considered to be one of the most nutritious drinks to have, will be targeted.
It is crucial for every individual who wants to enter the world of juices to distinct between Juice, puree and pulp. By definition, juice is the fluid expressed from plant material by crushing, comminuting and pressing. It can be clear, cloudy or pulpy. Juice is classified as puree: if the resulting consistency is fluid that pours very slowly, or pulp: if it pours even more slowly. Whilst approximately all fruits can give juices, in some cases the cost of obtaining the juice is very high. Therefore, companies **turn to purees or pulp that can serve the commercial needs in a more economical way.**

There are about nine categories of fruit/vegetable types:

1. Pome fruits – Apple, pear and quince, are the classic examples.
2. Citrus – A range of well and lesser-known species make up this category. Orange, grapefruit, tangerine, lemon and lime are in wide use, but other citrus such as pummelo, tangerine and ugli-fruit, have unique characteristics worth exploring.
3. Stone fruits – These have a well-distinguished pit and include peach, plum, apricot, cherry and mango.
4. Soft Fruits – Although morphology varies greatly, these fruits have flesh that has a firm structure, but can be easily deformed. Grape, strawberry, pineapple, banana, berry fruits, kiwi, papaya and lychee, are some examples.
5. Amorphous fruits – Fruits with little firm flesh structure under the skin such as passion fruit, naranjilla, guava and sour sop, fit this category.
6. Fruit vegetables – Watermelon, cantaloupe and various melons are fruits by use. Tomatoes and solanaceous vegetables are also in this category.
7. Leafy, flower and stem vegetables – Only rhubarb has fruit-like character and is utilized among the many vegetables of this type.
8. Tree nuts – Although the seed is the desired crop, cashew fruit has value and there are undoubtedly other fruits in this category where the outer flesh has juice potential. The ripe coffee berry is a remote example.
9. Tropical and subtropical - Generally treated as a separate category, although the previous categories cover most species.

MACRO TRENDS

I. Market Size – Global, Regional and Local

- The global fruit juice market was valued at around 46.8 billion liters in 2020, and is predicted to grow at a CAGR of 2.1% in the 2022-2027 period to hit a volume of 53 billion liters.[1] The expected expansion is mainly due to the increased awareness about the benefits of juices and healthy products, as well as improving quality of life, product innovation, and changing lifestyles. Global exports of juices grew by a CAGR of 1% between 2009 and 2020 to about $14bn.[2]

- Starting from altering consumer preferences and shifts toward healthy drinks and foods, to the emerged beverage categories; the juices industry is in the middle of a shift towards dynamic trends and changes. Accordingly, juices companies are adjusting their production to provide low-sugar products in order to reap their market shares that were lost due to a growing demand for affordable and healthy drinks.

- Globally, consumers have been slightly reducing their consumption of juices, mostly in North America, Western Europe and Australia, they are switching to lower-cost and healthier products, mainly due to rising concerns about sugar levels in beverages. However, manufacturers are trying to bring back consumption through the launch of low-sugar lines and focusing their marketing on the vitamins, and mineral juices.[3] Yet, following the global trends towards healthier choices, Lebanese businesses have introduced new lines of organic or/and healthy options.

- As per the latest report on the fruit juices published by BLOMInvest in 2018, the market size of Lebanon's juices industry was valued between USD 130 million and USD 150 million, with 108 up to 125 million liters of production. In terms of cost, the report also mentioned that 1 liter of juice is valued at USD 1.2.

- The industry is marked by a fair competition, constant production and price-sensitivity. The differentiation between companies is based on the brand image and not on the end product as they all cater for the same target of consumers. However, a niche market of fresh juices companies is using a different type of production such as "Balkis" and others. This production process named as "Pasteurization" is gleaned from local fruits, preserved for up to one month, afterwards, the product will be expired.

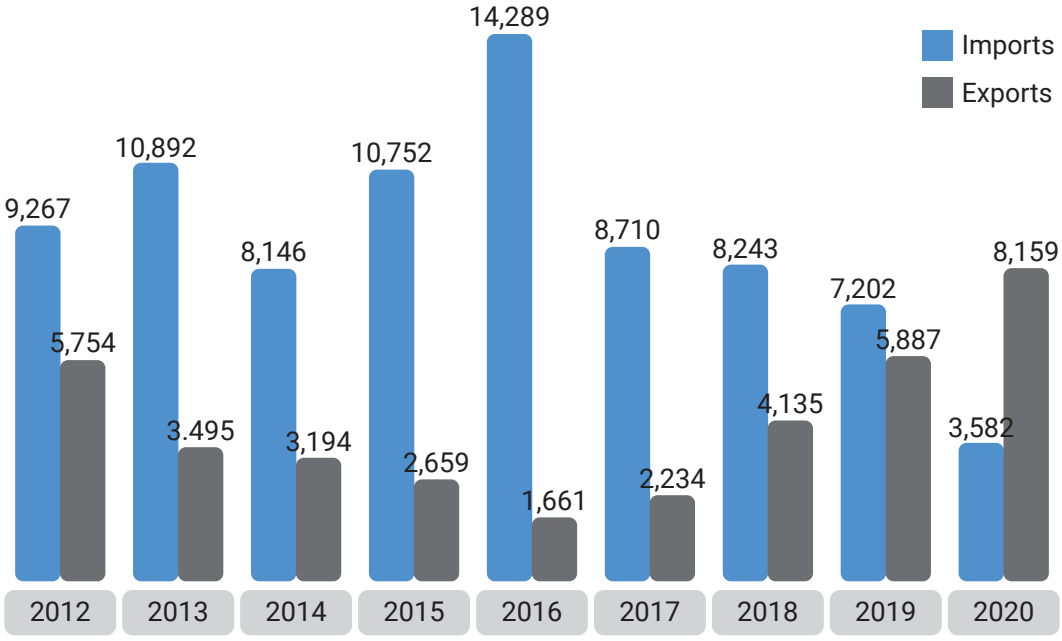
[1]Expert Market Research
[2]ITC Trade Map
[3]Global Juice 2019 –Key Insights and Drivers behind the Juice Market Performance, ReportLinker

II. Trade Performance

- Despite the fact that Lebanon's juice exports have reached higher values over the past 20 years, they have been increasing annually over the past five years (2015-2020), at a CAGR of 25%, compared to a global CAGR of -1%. It is worth noting that the sector has reached its highest level of exports since 2011, valued at $8.2 million and an annual growth of 39% in 2020.[4] The current levels of Lebanese juices exports have revealed an untapped potential given that they reached a value of USD 13.8 million in 2010.[5]

- In parallel, imports of juices in Lebanon have declined significantly over the past five years (2015-2020), at a CAGR of -19.7%, to reach $3.6 million in 2020.

Figure 1: Lebanese Imports and Exports of Juices (USD Thousand) (2012-2020)



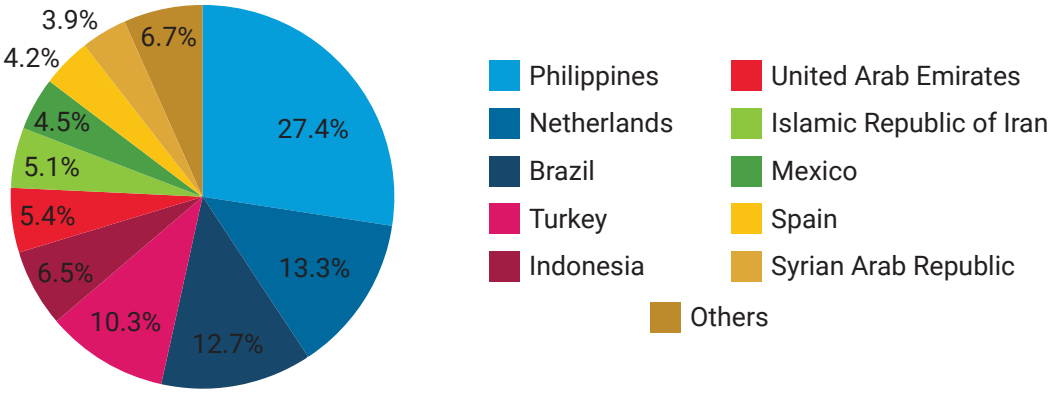
Source: Lebanese Customs

- As exports of juices have been growing significantly over the past years and imports have been declining gradually over the same period of time, the trade balance has shifted from a deficit $8.1 million in 2015 to a surplus of $4.6 million in 2020, meaning that Lebanon has become a net exporter of juices.[6] However, as per the ITC trade map, the Lebanese juice market has an untapped potential of USD 1.9 million[7].

- Lebanon mainly imported juices from the Philippines (27.4%), the Netherlands (13.3%) and Brazil (12.7%). These markets accounted for more than 50% of total Lebanese imports of juices (figure 2).

[4]ITC Trade Map
[5]ITC Trade Map
[6]ITC Trade Map
[7]ITC Export Potential Map, 2022

Figure 2: Lebanon's Main Import Countries (%) (2020)

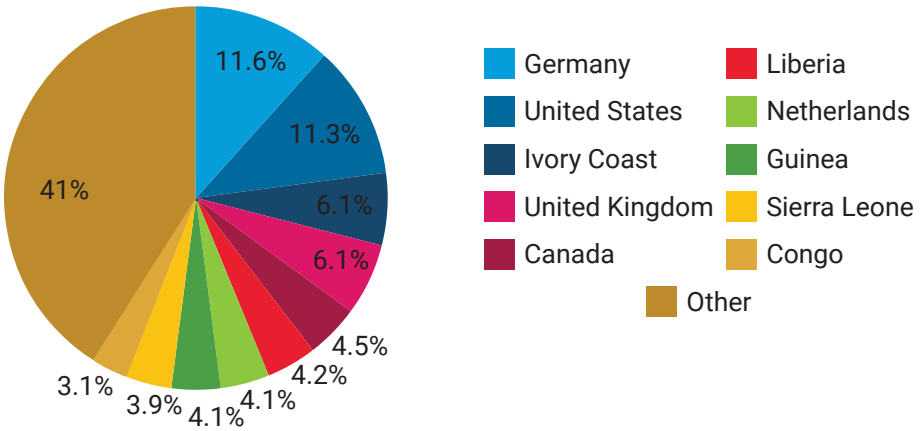


Source: Lebanese Customs

Lebanon's most important export destinations comprise: Germany (11.6%), USA (11.3%), Ivory Coast (6.1%) and the United Kingdom (6.1%) (Figure 3). As for Lebanon's untapped potential, the list includes the Netherlands (USD 596.6K), followed by the UAE (USD 234.6K), Egypt (USD 225.6K), Yemen (USD 111.9k) and France (USD 68.1k)[8].

For the fresh juices, products that have a shelf life of around 30 days are being exported to GCC countries. Nonetheless, industries that are not employing any pasteurization or adding any other ingredients to elongate the product's expiry date are focusing on the local market.

Figure 3: Lebanon's Main Export Destinations of Juices (%) (2020)



Source: Lebanese Customs

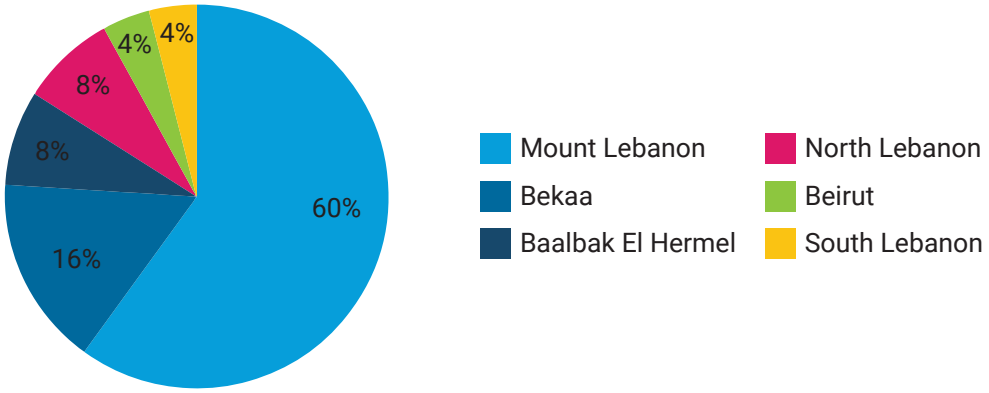
[8]ITC map, 2022

III. Supply of Juices in Lebanon and the Region

The top 3 players in the local market in terms of volume of sales are "Liban Jus", SMLC (agent of PepsiCo in Lebanon), and "Interbrand SAL" while the remaining market shares are spread between "Kassatly Chtaura", "Cedar's juices", "Liban Lait" fruit juices, "Super Jus Chtaura", "Rawabi", and "Paradise", among others[9]. As for the fresh juices market, "Balkis" is serving part of the local fresh and lemon juice market needs, which targets the "Fresh Juice" consumers rather than the "Fruit Concentrate" purchasers.

In total, 25 juice companies are operating in Lebanon with the majority located in Mount Lebanon (60%), followed by the Bekaa (16%), Baalback El Hermel (8%), North Lebanon (8%), Beirut (4%) and South Lebanon (4%) (figure 4).

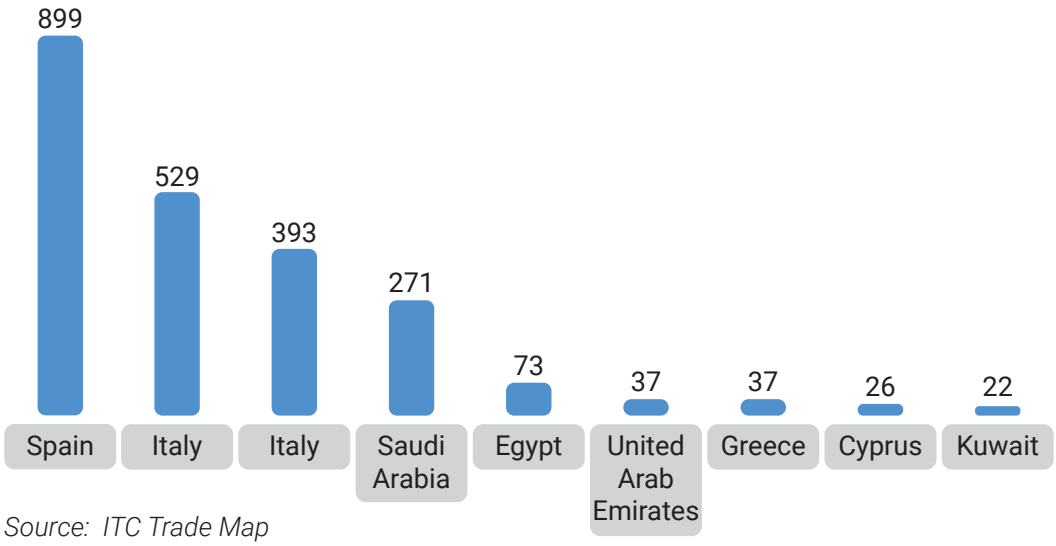
Figure 4: Distribution of Lebanese Juices Companies per Governorate (2020)



Source: Ministry of Industry

Neighboring Countries with Large Exports of Juices:

Figure 5: Top 10 exporters of juices in the MENA and Mediterranean regions USD Million (2020)



Source: ITC Trade Map

[9]"Can Fruit Juices Keep the Doctor Away? Dissecting the Lebanese Juice Market", BlomInvest, 2018

- 20% of Spain's exports of juices consist of orange juice. Grape juice followed with a share of 18%, mixtures of fruit juices (18%), and single citrus fruit juice (9%), among others. Spain's main export destinations are France, the UK, Germany, Italy, South Korea, Saudi Arabia, Portugal and the Netherlands.

- 20% of Italy's exports of juices consist of single citrus fruit. Juices of fruits and vegetables (excluding the ones containing spirit, mixtures, and juice of citrus, pineapple, tomatoes, grapes, apples and cranberries) followed with a share of 14%, grape juice (13%), apple juice (10%), and frozen orange juice (9%), among others. Italy's main export markets are Germany, France, Austria, the U.S., Japan, the Netherlands, the UK, Belgium and Switzerland.

- 47% of Turkey's exports of juices consist of apple juice. Juices of fruits and vegetables (excluding the ones containing spirit, mixtures, and juice of citrus, pineapple, tomatoes, grapes, apples and cranberries) followed with a share of 39%, and mixtures of fruit juices (6%), among others.

- 44% of Saudi Arabia's exports of juices consist of mixtures of fruit juices. Juices of fruits and vegetables (excluding the ones containing spirit, mixtures and juice of citrus, pineapple, tomatoes, grapes, apples and cranberries) followed with a share of 42%, and orange juice (6%), among others. Saudi Arabia's main export destinations of juices are Yemen, the UAE, Oman, Kuwait, Bahrain, Libya, Egypt, Jordan and Iraq.

- 67% of Egypt's fruit exports consist of mixtures of fruit juices. Juices of fruits and vegetables (excluding the ones containing spirit, mixtures and juice of citrus, pineapple, tomatoes, grapes, apples and cranberries) followed with a share of 12%, frozen orange juice (7%), and single citrus fruit juice (unfermented, Brix value below 20 at 20°C) (4%), among others. The main markets for exports of juices from Egypt are Yemen, Libya, the U.S., Palestine, Italy, Somalia, Mauritania, Saudi Arabia, and the Netherlands, among others.

- 64% of exports of juices from the UAE consist of juices of fruits and vegetables (excluding the ones containing spirit, mixtures and juice of citrus, pineapple, tomatoes, grapes, apples and cranberries). Mixtures of fruit juices followed with a share of 12.5%, single citrus juice (unfermented, Brix value above 20 at 20°C) (10%), pineapple juice (unfermented Brix value above 20 at 20°C) (4.5). The main market for exported juice products from the UAE are Oman, Iraq, Iran, Somalia, Senegal, Saudi Arabia, the U.S., Jordan, Libya, Sudan and India.

- 25% of exports of juices from Greece consist of orange juice, unfermented , whether or not containing added sugar or other sweetening agent , followed by another type of orange juice (Brix value of equal or below 20 at 20°C) with a share of 22%, mixtures of fruit juices (14%), juices of fruits and vegetables (excluding the ones containing spirit, mixtures and juice of citrus, pineapple, tomatoes, grapes, apples and cranberries) (8%), and single citrus juice (Brix above 20 at 20°C) (8%), among others. The main markets for juice exports from Greece are Romania, Cyprus, China, France, Germany, the United Kingdom, the Netherlands, Bulgaria, Algeria, and Poland, among others.[10]

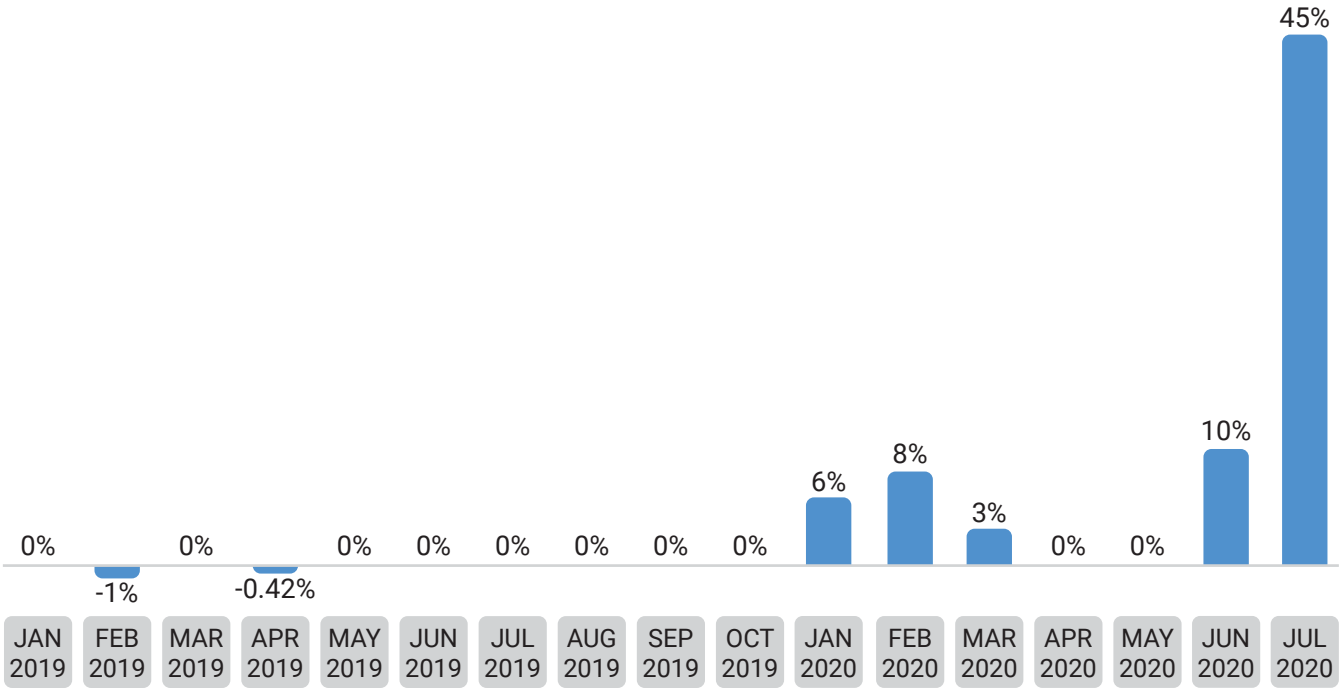
IV. Prices and Preferences

The Juices market is definitely a price-sensitive industry, with a range of consumers selecting their products based on their taste of juice and healthy choices while others pick the cheapest product to meet their needs.
In terms of sales, the number one juice sold in Lebanon is the Pineapple juice, as the fruit is not excessively available in the country. Nonetheless, other fruits that are available in large quantities like oranges are less demanded in terms of juice. Accordingly, local companies should be producing specific juices depending on the export market they are targeting, because consumers around the world will pick the juice of a fruit that isn't available in their countries. However, during an interview with a major "Fresh Juice" company, they stated that "the orange juice is their star item", and they usually compete with juices and cocktails shops in the local market, thus offering fresh juices in cheaper prices especially during summer season.

As most of the production is based on imports of fruits' concentrates, the market is highly sensitive to the depreciation of the Lebanese currency. During 2019, the prices were steady with minimal variations, while as starting in 2020 until the present day, they have been highly affected by the fluctuating exchange rate. One of the interviewed companies of fresh juices stated that their sales have dropped down by more than 60%, due to the impact of the local currency depreciation.

[10]ITC Trade Map

Figure 6: Prices Variation on Monthly Basis (%) (2019-2020)



Source: Ministry of Economy & Trade

MEANS OF PRODUCTION

I. Mchinery Needed

There are 3 types of juicers:

a. Centrifugal juicers
b. Masticating juicers
c. Triturating Juices

a. Centrifugal Juicers

In a centrifugal juicer, a cutting blade with sharp teeth shreds the materials into pulp. At the same time, the machine spins at a very high speed to separate the juice and the pulp in a mesh chamber. This technique works best with hard, thick fruits and vegetables, such as apples and carrots. Some centrifuges can also process thick leafy greens as well as soft watery fruits.
Although the most affordable of the three centrifugal juicers are the fastest in producing juice, they typically have a large feeding chute, allowing the procession of bigger items, such as a whole apple or carrot, without pre-cutting. This helps reducing the prepping time significantly.
With high rotation speeds, the centrifuge does the job faster than any other type of juicers. It usually doesn't take more than 2 minutes to make a glass of fresh juice. They are also relatively easy to assemble and clean up.

On the other hand, the high rotation speed causes the machine to generate more heat than the other types. It is known that heat from cooking can cause a loss of nutrients in food. However, the centrifugal juicer produces a much lower heat for a much shorter time compared to cooking, as such, the loss of nutrients is less significant. In addition, the heat by itself is enough to create bubbles and make the juice less appealing. And so, the juice tends to separate much quicker than when prepared by a slow juicer.

b. Masticating Juicer

The masticating juicer, also called a slow juicer, has an auger that crushes the fruits and vegetables after they pass through the chute, then squeezes them to separate the juice from the pulp. The juice runs through a mesh, while the pulp is pushed into a separate container.

True to its name, the masticator takes much longer time than a centrifugal juicer in order to make the juice. That is due to the auger crushing the food instead of shredding it, as it can only deal with one small piece of food at a time. To prevent overfeeding and clogging, the masticator usually comes with a narrow feeding chute. As a result, you have to pre-cut everything into specific sizes. Despite their slow speed, these juicers perform very well on both hard materials and softer ones, such as leafy greens or grapes, and there is no risk of heat destroying the enzymes and antioxidants. Masticators are able to make a higher-quality juice than most centrifuges can. The juice is thicker, fresher, much less foamy, and separates at a much lower rate. Most devoted juicers prefer these machines over centrifuges for the tasty, refreshing cold-pressed juice they make.

c. Triturating Juicer

The triturating juicer, or twin-gear juicer, has two gears that are assembled extraordinarily close to each other (within a tenth of a millimeter). These gears rotate to crush and grind food into tiny particles and extract the juice, pushing out the dry pulp.

A twin gear machine rarely discriminates between the material it is fed with — it works just as good on leafy greens and hard roots as it does on common fruits. The machine is exceptionally good at separating the liquid from hard fiber. However, it is probably not the best candidate for mushy fruits like bananas or avocados. Like the masticating juicer, the triturating juicer is a slow one. It takes its time to do the work and makes the most stable and nutrient-dense juice, which can stay fresh for a long period of time without degrading.

Table 1: Examples of different types of pickles

	Centrifugal Juicer	Masticating Juicer	Triturating Juicer
Function	Extracts Juice, removes & reduces fibers	Extracts juice, removes & Reduces fibers, chop fruits & vegetables	Extracts juice, removes & Reduces fibers, chop fruits & vegetables
Produce	Hard & mushy Fruits, dense Roots, vegetables	Hard & soft fruits, dense Roots, vegetables, leafy Greens	Hard & soft fruits, dense Roots, vegetables, leafy Greens
Speed	3000 - 10000 RPM	40 - 100 RPM	80 - 100 RPM

Oxidation Rate	Moderate	Low	Low
Degradation	Few hours after Juicing	36 to 72 Hours	36 to 72 Hours
Juice Quality	Moderate, high foam, separate quickly	High, low foam, separate slowly	Very High, low foam, separate slowly
Juice Yield	High, pulp is wetter with time	Very high, pulp is dry	Very High, pulp is very dry
Noise Level	Moderate to high	Low	Low
Suitable For	Beginners	Intermediate to professional	Intermediate to professional
Easy To Clean	Yes	Yes	Yes
Price	Low	Moderate	High

Furthermore, the selection of an appropriate juice extraction method relies on producing high-quality juice with health-promoting properties for manufacturers of fresh juices.

Table 2: Juice production according to different factors

Factor	Effect
Fruit immature	Resistance to juicing, low yield
Fruit inadequately crushed	Resistance to juicing, low yield
Excessive pressure	Undesirables extracted, poor quality
Fruit over comminuted	Undesirables extracted, poor quality
Excessive pressure	Undesirables extracted, dark juice
Excessive time in press	Dark, over extracted juice
Short press cycle	Low yield, lighter character
Long press cycle	Low throughput, over extraction
Cold press	Lower yield, lighter character
Hot press	Higher yield, stronger, darker character
Enzyme Treatment	Higher yield, stronger character
Pressing aid added	Higher yield
Press cake redistributed	Increased yield
Delayed or extended pressing	Dark juice, incipient spoilage

II. Labor Force

Qualified Labor Force: As per the Ministry of Industry decision No. 8676/2020, all agri-food companies and slaughterhouses are required to have a food safety specialist, who will handle the direct and permanent supervision of the production process inside the factory, including production methods and quality of products, starting with the entry of raw materials into the factory and ending with the final product. This could be leveraged by the employment of a food safety team including a production manager, quality assurance, quality control officers and food safety specialist.

Others: including workers for sorting, washing, and cutting the vegetables/fruits and filling, labelling and packaging the final product. The majority of these employees could be potentially replaced by machines, thus the range of labor force involved in the processing phase will vary depending on the level of automation in the industry.

III. Average Cost Breakdown

As per the interviews conducted by the MoI with several fresh Juices companies, the highest production cost is in the energy cost, including diesel for generators, electricity and fuel for cars, especially after the depreciation of the Lebanese currency, followed by raw materials and packaging.

IV. Fruit Juices Composition

Fruit and vegetable juices show a very complex composition with several hundred substances. Beside water (80-90%) and the common metabolites of fruits and vegetables (carbohydrates, organic acids, amino acids, peptides, minerals and trace elements, vitamins and aromatic compounds), fruit and vegetable juices are characterized by a large number of secondary plant metabolites (also known as “phytochemicals”). The two most prominent groups are the polyphenols, including the colorful anthocyanin, and the carotenoids.

The table below highlights the usual compositions found in juices:

Factor	Range (%)	Comments
Water	97 - 70	Influenced by cultivation and post-harvest conditions
Carbohydrates	25 - 3	Sugars and polymers - pectin, hemicelluloses cellulose
Protein	5 - trace	More in oily fruit and seeds
Lipids	25 - trace	Traces in cell membrane, in seeds, high in avocado
Acid	3 - trace	Citric, tartaric, malic, lactic, acetic, ascorbic 4 minor
Phenolics	0.5 - trace	Tannins and complex phenols
Vitamins	0.2 - trace	Water soluble > fat soluble
Minerals	0.2 - trace	Soil and species dependent
Dietary fiber	<1 to >15	Peel and core dependent
Pigments	0.1 - trace	Carotenoids, anthocyanins, chlorophyll

a. Health Benefits of Fruit Juices

The health benefits of fruits and fruit juices have been proved by numerous studies. It lies mainly in the phytochemicals that are present in different quantities depending on the fruits, these phytochemicals are:

- Antioxidant Vitamins
- Carotenoids
- Dietary Fibers
- Flavonoids
- Phenol and Phenolic acids
- Sulphur
- Phytoalexins
- Limonoids

b. Juice Safety

It is well known and understood that Juices are a very fragile products and can be altered very easily with water, sugar and inferior juices, which in some cases can lead to lapses that impact directly the health of the consumers.

The most common contaminations that can affect the juices are bacteria growth and molds, that are produced mainly from the fruits and vegetables; both contaminators can tolerate low PH levels (>4) which reign usually in all types of fruits. These contaminators can originate from residues of contaminated soil or water, presented on the fruits or vegetables. Other environmental factors, such as temperature and humidity, and equipment can also be another source of contaminators.

In order to avoid such problems that can occur anywhere, from harvesting, to transportation, storage, manufacture and processing, Good Agriculture Practices (GAP) and Good Manufacturing Practices (GMP) with Hazard Analysis and Critical Control Point (HACCP), procedures should be applied throughout the product chain.

V. Technical Requirements

a. Good Agricultural Practices (GAP)

By FAO definition GAP are a "collection of principles to apply for, on-farm production and postproduction processes, resulting in safe and healthy food and non-food agricultural products, while at the same time taking into account, economic, social and environmental sustainability."
When procuring inputs, fruit juice producers should ideally aim to minimize the risks of obtaining damaged or contaminated goods, for that reason they should look for a GAP certificated farmers who will obey the following nine basic elements, and will work in accordance with the Lebanese standard NL 811 about Good agricultural practices for vegetables and fruits,

I. Site History and Management

Production sites should be identified by a name or code and recorded on a site map. The land where the fruits and vegetables are growing should be assessed by soil and water testing, in order to ensure that no biological or chemical hazards exist, or else, mitigation plans must be established in case they do.

II. Planting Material

A booklet should always be present on the farm, stating the following:

a. Origin and date of purchase of seeds or seedling.
b. Detailed schedule with date and time of applying pesticides and fertilizers.
c. Symptoms of diseases should not be present.

III. Genetically modified organisms (GMO)

All GMOs that are cultivated must be legislated by the government, they must be separated from the non-GMOs and the products should be labeled in order not to confuse the customer

IV. Fertilizers and soil additives (Plant nutrient management and fertilizer use)
Fertilizers should be administrated depending on the result of a soil testing, amounts and dates shall be kept in a book along with recommendations for use by a qualified person with any hazards reports linked to fertilizer use. It is inhibited to use untreated organic matter or sewage water as fertilizers.

V. Water (Irrigation/Fertigation)

Water used for irrigation must be tested annually to minimize the risk of chemical or biological contamination

VI. Chemicals (Plant protection products or other agro and non-agrochemicals)

Includes, pesticides, seed treatment material, plant growth regulators and. All used brands must be authorized by the government, quantities must be carefully chosen and registered in a book for not having any excessive residues on the product.

This information should be available upon request.

Harvesting and handling produce

The producer should ensure that products cannot be contaminated in any way by the following:

a. All equipment used for harvesting should be kept in a safe place, maintained and cleaned frequently.
b. Buildings and structures used for growing, packing, handling and storage of produce shall be constructed and preserved to minimize the risk of contaminating produce.
c. Equipment, tools, containers and materials that may be sources of contamination of produce should be identified and regularly cleaned and sanitized by appropriate substances.
d. Good Hygiene Practices (GHP) must be implemented to reduce the risk of contamination.
e. Water used in post-harvest treatment is equivalent to drinkable water.
f. Not only products should be transported, but also stored separately from goods that are potential sources of chemical, biological and physical contamination, in addition it should be stored in a cool area that maintains the product requirements.

VII. Traceability and recall

Also, Packed produce should be clearly marked with name, identification date of delivery and destination, in order to enable traceability of the produce to the farm or site where the produce is grown.

VIII. Documents and records

All documentation and records should be kept on site to see upon request.

Furthermore, when acquiring raw materials and inputs every juice manufacturer should take into consideration the following:

Picking the right time to harvest the fruits and vegetables and packing them correctly, are two crucial factors to ensure high quality input that will guarantee a high-end product. The table below highlights the influence of fruits harvesting and handling on juice quality.

Procedure	Error (%)	Result
Harvest timing	Too early	Inadequate flavour & coulour development, low yield
Harvest timing	Too late	Incipient spoilage, low quality
Rough Harvest	Fruit damaged, soiled	Incipient spoilage, contamination
Improper packing	Unsanitary container	Fruit contamination
Transportation	Delayed/hot fruit	Fruit deterioration
Rough Trasportation	Unprotected fruit	Damaged fruit
Temperature abuse	Too high or low	Rapid quality deterioration
Lenghthy holding	Fruit unprotected	Rapid quality deterioration
Rough unloading/conveying	Fruit damaged	Rapid quality deterioration

Last, prior to any purchase of goods or even to have a GAP certificated farmer, every juice manufacturer has to take into consideration several factors and pay attention to certain criteria that could have a direct effect on the quality of juice. The table below pinpoints these factors and criteria.

Factor	Criteria	Rationale
Maturity	Ripeness	Optimum quality
Solids	Adequate level	Affecrs yield, flavour
Acidity	Appropriate pH level	Flavour, sugar/acid ratio
Colour	Fully developed	Juice Apperance
Defects	Appropriated level	a few can be tolerated
Size/shape	Uniform	Ease of handling/juicing
Specific Chemicals	Past analyses	Reflect handling/quality
Pesticinde residues	Regulatory control	Legality of product
Foreign matter	Appropriate level	Reasonable limits
Microbial count	Low total, no or few pathogens	Safety/stability of juice
Aflatoxin level	Below proscribed limits	Juice safety

After acquiring the fruits and vegetables from GAP certificated farmers and ensuring a high-end quality of the product, every juice manufacturer should follow the GMP and HACCP guidelines mentioned below.

b. Good Manufacturing Practices (GMP)

The fresh juice should be manufactured according to requirements set out in the mandatory standard 656:2002 (General Principles of Food Hygiene) and its related mandatory Guideline, as well as the Decision of Minister of Industry 1/1 dated on 5/1/2015 (General requirements in food processing establishments). To ensure safety of the production process, Good Manufacturing Practices (GMPs) have been defined. These are referred to, as practices and procedures performed by a food processor, which can affect the product food safety . GMPs refer to the people, equipment, process and the environment in the production process. GMPs are a set of procedures during which, if adopted and fully implemented, they will lead to production of safe and wholesome foods.

Hygiene of staff

Hygiene of all the personnel carrying out activities in the food processing/manufacturing plant has an impact on the food safety. Organizations need to ensure that those who come directly or indirectly into contact with food do not contaminate the food product that is being manufactured in the plant. Food handlers need to maintain a high degree of personal cleanliness and, where appropriate, wear suitable protective clothing, head covering, and footwear. Cuts and wounds, where personnel are permitted to continue working, should be covered by suitable waterproof dressings. Personnel must always wash and disinfect their hands, when uncleanliness may affect food safety. It is mandatory that annual medical check-up of workers is carried out and its reports must be recorded. People known or suspected to be suffering from, or to be a carrier of a disease or illness likely to be transmitted through food, should not be allowed to enter any food handling area, thus preventing any food contamination. Vaccination of food handlers against typhoid is recommended as a good practice for food handlers. People engaged in food handling activities must be refrained from any behavior that could result in the contamination of food. For example, smoking, spitting, chewing or eating, and sneezing or coughing over unprotected food.

Training of Staff

All staff that is in direct contact with the product has to undertake a specific training on the necessary skill for the plant operations. To ensure that this aspect of GMPs is in place, the management must identify the training needs of personnel whose activities have an impact on food safety and quality. In addition, a monitoring system and an assessment tool should be put in place to ensure that methods learnt during training are being implemented effectively. It is necessary that the personnel are aware of the relevance and importance of their individual activities in contributing to GMP system.

It is the job of the management to ensure that the training program is routinely reviewed and updated where necessary. Records of all training and related actions should be documented. Programs types and levels should be put in place and updated following the below factors:

- The nature of the product, particularly its ability to sustain growth of pathogenic or spoilage or micro-organisms.
- The manner in which the food is handled and packed, including the probability of contamination.
- The extent and nature of processing or further preparation before final consumption.
- The conditions under which the food will be stored.
- The expected length of time before consumption.

Note
Laxity of monitoring in the factory can lead to low abidance of GMP guidelines, which may cause some product contamination and other hazards.

Documentation requirement for GMP

Every factory adopting the **GMP** should have a detailed document on the various processes, production system and operation of the unit. Any change occurring to this document should be completed by the GMP expert of the facility.
Records should always be kept on all GMP practices adopted by the facility; these records should contain detailed information on the following:

- Description of the activity.
- Responsibility of the activity.
- Monitoring tools.

Note
It is crucial to have GMP documentation for the procedures in the facility, for these documents work as a preventive tool, they also help in pinpointing where things went wrong and fixing such incidents.

Good Manufacturing practices when implemented will ensure that:

- No micro-organisms or toxins are present on the equipment that could cause any kind of contamination.
- Temperature and other conditions necessary to food safety and suitability could be rapidly achieved and maintained.
- Containers for waste, by-products and inedible or hazardous substances, must be specifically identifiable, suitably constructed and made of impervious material, if appropriate.

- An adequate supply of potable water with appropriate facilities for its storage, distribution and temperature control, should be available whenever necessary to ensure the safety and suitability of food.
- Adequate drainage and waste disposal systems and facilities must be provided.
- Adequate means of natural or mechanical ventilation should be provided.
- Adequate natural or artificial lighting must be provided to enable the undertaking of operations in a hygienic manner.
- Adequate and appropriate maintenance and cleaning of the equipment and the facility are in place.

Good hygiene practices **(GHP)** should be implemented to avoid infestations of pests or contamination of the product.

Product Information and Consumer Awareness

Every juice manufacturer has to determine requirements and standards for all the inputs that need to be purchased, that being said, all incoming material should be inspected and sorted before processing.

Raw material should be stored at temperatures that maintain product conditions. The packaging design and materials must provide adequate protection for products to minimize contamination, prevent damage and accommodate appropriate labelling.

Control of operations:

The control of operations ensures the production of healthy products as per the requirements set by the producer. It includes monitoring the usage of every machinery as well as examining the end product whilst providing the ideal atmosphere for its production.

Transport

Products should be adequately protected during transport. There should be maintenance of effective temperature, humidity and other conditions necessary to protect food from harmful or undesirable micro-organism and deterioration, likely to render it unsuitable for consumption.

Traceability

The Juice manufacturer shall ensure that effective traceability procedures are in place from raw material to finished products and to the consumer as appropriate, in this manner the producer will be able to control and trace back any hazards any defect in the product to its source and manage it accordingly.

c. Hazard Analysis and Critical Control Point (HACCP)

HACCP is important because it prioritizes and controls potential hazards in food production. By controlling major food risks, such as microbiological, chemical and physical contaminants, the industry can better assure consumers that its products are as safe as good science and technology allow.
HACCP is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product.
It is recommended for applying **HACCP** to hire a specialist team.
HACCP can be defined by 7 principals as listed below:

1. **Conduct a Hazard Analysis**
The application of this principle involves listing the steps in the process and identifying where significant hazards are likely to occur. A justification for including or excluding the hazard is reported and possible control measures are identified.

2. **Identify the critical Control Points**
A critical control point (CCP) is a point, or step at which control can be applied and a food safety hazard can be prevented, eliminated or reduced to acceptable levels. The HACCP team will use a CCP decision tree to help identify the critical control points in the process. The number of CCP's needed depends on the processing steps and the control acquired to ensure food safety.

3. **Establish critical limits**
A critical limit (CL) is the maximum and/or minimum value to which a biological, chemical, or physical parameter must be controlled at a CCP in order to prevent, eliminate, or reduce to an acceptable level the occurrence of a food safety hazard. The critical limit is usually a measure such as time, temperature, water activity (Aw), pH, weight, or some other measure that is based on scientific literature and/or regulatory standards.

4. **Monitor CCP**
The HACCP team has to describe monitoring procedures for the measurement of the critical limit at each critical control point. Monitoring procedures should be described on how the measurement is taken. When the measurement is taken, who is responsible for the measurement and how frequently the measurement is taken during production.

5. **Establish Corrective Action**
Corrective actions are the procedures that are followed when a deviation in a critical limit occurs. The HACCP team will identify the steps that must be taken to prevent potentially hazardous food from entering the food chain and the steps that are needed to correct the process. This usually includes identification of the problems and the steps chosen to ensure that the problem will not occur again.

6. Verification

Those activities, other than monitoring, determine the validity of the HACCP plan and that the system is operating according to the plan. The HACCP team may identify activities such as auditing of the CCP's, records' review, , instrument calibration and product testing as part of the verification activities.

7. Recordkeeping

A key component of the HACCP plan is recording information that can be used to prove that juices were produced safely. The records also have to include information about the HACCP plan. Records should hold information on the HACCP Team, product description, flow diagrams, the hazard analysis, the CCP's identified, Critical Limits, Monitoring System, Corrective Actions, Recordkeeping Procedures, and Verification Procedures.

Note

The application of HACCP does not stand alone in a juices processing facility. The plan must be built on other food safety programs. Good Manufacturing Practices (GMP) that are practiced by the processing facility will support HACCP plan and will address food safety and food quality issues that are critical for the reduction of food safety hazards.

The journey that fruits and vegetables undertake to be transformed into juices can be summarized by the following steps:

Preparation

Juice preparation can differ from one fruit to another. That is why it is very important to specify and group the fruits into categories depending on their family and types in order to choose the best modality to extract juices. The table below specifies different procedures for different types of fruits.

Type	Procedure	Example
Soft, all edible	Comminute, grind, press	Berry
Soft, seed inedible	Crush, press	Grape
Firm, seed inedible	Grind coarse, press	Apple
Firm, inedible skin ± seeds	Ream, press flesh	Citrus
Soft inedible skin ± seeds	Pre-peel, gently pulp flesh	Mango
Brittle inedible skin + seeds	Slice, gently press flesh	Passion fruit, lychee
Tough adhering skin, ± seeds	Hand or contour peeling	Guanabana, pineapple
Soft, inedible skin	Roller/squeeze peel	Banana

VI. Packaging and Labeling

All Packaging and labeling of juices have to include the following information:

- The name and address of the manufacturer with its logo, if available
- Juices' name
- Ingredient
- Nutritionnel information (Vitamines, fat, calories, proteins, sugar, etc.)
- Raw warning (in case it is not pasteurized)
- Allergen disclaimer
- Dates of production and expiration
- Batch number, otherwise production date
- Storage instructions
- Country of origin

The specific labeling guidelines for the Lebanese markets can be found at **LIBNOR,** under the mandatory standard **NL 206:2017** and its amendments (General Standard for the Labelling of Prepackaged Foods)

Packaging may vary and could be completed using several components such as:

- Glass

  It has been and remains to be considered as a premium material for fruit juices packaging, boasting specific strengths related to hygiene, freshness and transparency. It is also used because of its environmental sustainability, since glass is completely recyclable.

  However, glass requires greater expenses, both when purchasing the raw material and for the transport, since this material is heavier and more voluminous than others. In addition, glass packaging is very fragile and easily breakable.

- Polyethylene Terephthalate (PET)

  Polyethylene Terephthalate is a known food graded plastic that does not react with food chemically It is the most used material in making bottles. However, there are some drawbacks that are slowing down their global use: PET is a deformable material and provides the product a low protection from the UV rays.

- Aseptic Cartons

  Aseptic cartons have many advantages. The carton packaging is unbreakable, easy to palletize during the transportation and convenient to be placed on shelves. It's a strong material that offers the highest protection and an excellent long-term shelf-life at room temperature. In addition, it is light and economically convenient compared to other materials, such as glass. From a marketing perspective, carton packaging has an external part, which is wider than in other types of packaging.

This surface can be devoted to the brand and to the information related to the product. The advantages are also related to sustainability since carton (which constitutes the 80% of the packaging) is eco-friendly and it implies limited footprint since it is easily foldable.
the non-transparency of the material and the absence of a diversification among the packaging shapes, mainly affect the use of this type of packaging.

VII. Storage

Two things about juice that are interesting:

1. Oxygen degrades the nutrients they provide.
2. The choice of the container is critical in preventing contaminations.

That is why storing the juice in an airtight glass container is always best. Neither oxygen can get in and degrade the nutrients, nor can any acids harm the glass. (Plus, you won't get polyethylene or any other plastics in your juice.)
Knowing that oxygen degrades the nutrient value of your juice, it is recommended to fill the container as much as possible. In that way, it's the exposure to oxygen is minimized. Unfortunately, fresh-squeezed vegetable and fruit juices lose their nutritional value quite quickly. That is why it should be stored immediately after squeezing, in order not to lose as much of the nutritional content. To benefit from all its vitamins and nutrients, it is recommended that the juice must be consumed within 24 to 48 hours or, at most, 72 hours after bottling, and that only in case the juice was free from any additives or preservatives.

a. Preservation Methods for Fruit Juices

Traditionally, the shelf-life stability of juices has been achieved by thermal processing. Low temperature long time (LTLT) and high temperature short time (HTST) treatments are the most commonly used techniques for juice pasteurization. However, thermal pasteurization tends to reduce the product quality and freshness. Therefore, some non-thermal methods have been proposed during the last couple of decades, including high hydrostatic pressure (HHP), high pressure homogenization (HPH), pulsed electric field (PEF), and ultrasound (US).
In Lebanon, only heat treatments (LTLT and HTST) are being used by the companies, however in the below section we will mention all available treatments that could be introduced.

b. Traditional Thermal Pasteurization

Thermal processing is the most widely used technology for pasteurization of fruit juices and beverages. Juice pasteurization is based on a 5-log reduction of the most resistant microorganisms of public health significance (USFDA 2001). The process could be accomplished by different time-temperature combinations.

Low temperature long time (LTLT)
Fruit juice has been traditionally pasteurized by batch heating at 63-65°C for relatively long time. This method has been replaced by high temperature short time treatment due to the undesirable quality changes during this process.
High temperature short time (HTST)
HTST treatment could minimize those undesirable quality changes made by batch heating due to the much less duration of heat treatment. Currently, HTST pasteurization is the most commonly used method for heat treatment of fruit juice. For example, orange juice is processed by HTST at 90 to 95°C for 15 to 30 seconds; apple juice is treated by HTST at 77 to 88°C for 25 to 30 seconds.

c. Non-traditional Method
Thermal processing has been proven to be effective for preservation of fruit juice and beverages. However, thermal treatment tends to reduce the product quality and freshness. Nowadays, the consumer's demand for natural, healthy and convenient food products is fast growing, which leads to the innovation of novel food preservation technologies. Based on the literature, these novel technologies can be generally divided into physical methods (mostly non-thermal methods) and chemical approaches.
Physical methods (non-thermal pasteurization)
Some non-thermal methods have been proposed such as:

a. High Hydrostatic Pressure (HHP).
b. Pulsed Electric Field (PEF).
c. Ultrasound (US).
d. Ultra-Violet Light (UV light)
e. High Pressure Homogenization (HPH)
f. Membrane filtration Ultrafiltration (UF) and microfiltration (MF)

These emerging techniques seem to have the potential to provide "fresh-like" and safe fruit juices with prolonged shelf life.

d. High Hydrostatic Pressure (HHP)
High hydrostatic pressure (HHP) processing uses pressures up to 1000 MPa, with or without heat, to inactivate harmful microorganisms in food products.
Compared with thermal processing, HHP has many advantages. It can provide safe product with reduced processing time. It can maintain maximum fresh-like flavor and taste in the product due to the lower processing temperatures. Moreover, it is environmentally friendly since it requires only electrical energy and no waste by-products generated. The table below highlights the most common types of juices and their respective HHP to use:

Type	Recommended HHP (Mpa)	Treatment parameters
Orange Juice	100 – 800	30 – 50 °C / 3 - 5 min
Apple Juice	151 – 620	30 – 50 °C / 1 min
Peach Juice	600	30 – 50 °C / 3 - 5 min
Blueberry Juice	400 - 600	30 – 50 °C / 15 min
Blood Orange Juice	400 - 600	30 – 50 °C / 15 min
Carrot Juice	600	30 – 50 °C / 3 - 5 min

e. Pulsed Electric Field (PEF)

Pulsed electric field (PEF) processing, applies short bursts of high voltage electricity for microbial inactivation and causes minimum effect on food quality attributes. Briefly, the foods being treated by PEF are placed between two electrodes, usually at room temperature. The applied high voltage results in an electric field that causes microbial inactivation. It is usually in the order of 20-80 kV for microseconds. Compared with thermal processing, PEF processing has many advantages. It can preserve the original sensory and nutritional characteristics of foods due to the very short processing time and low processing temperatures. Energy savings for PEF processing are also important compared with conventional thermal processing. Moreover, it is environmentally friendly with no waste generated.

Type of fruits	Recommended PEF (Kv/Cm)	Treatment Parameters
Apple Juice	30 34 36	172µs, <35°C 7.68µs, 55°C 800 pulses per minute
Cranberry Juice	40	150µs, <25°C
Orange Juice	30 35 90	2.5 - 5 µs 12µs, 54°C 100µs, 55°C
Grape Juice	34	7.68µs, 55°C
Cherry Juice	34	34kV/cm
Peach Juice	34	163µs, 21°C
Strawberry Juice	18.6 18.6 18.6	150µs, 45°C 150µs, 50°C 150µs, 55°C

f. Ultrasound (US)

Power ultrasound (US) uses a lower frequency range of 20 to 100 kHz and a higher sound intensity of 10 to 1000 W/cm2. The principle of ultrasonic processing could be explained as follows: First, the ultrasonic transducers convert electrical energy to sound energy. Second, when the ultrasonic waves propagate in liquid, small bubbles will be formed as they collapse thousands of times per second. This rapid collapse of the bubbles (cavitation) results high localized temperatures and pressure, causing the death of microorganisms.

Except HHP, PEF and power US, non-thermal techniques including high pressure homogenization (HPH), membrane filtration and UV-light, among others, are also being investigated.

g. Ultraviolet Light (UV-light)

Ultraviolet light utilizes radiation with the electro-magnetic spectrum in the range of 100 to 400 nanometers, between visible light and x-rays. UV-C is known to have biocide effects and destroys microorganisms. Therefore, UV-C could be used for the inactivation of microorganisms such as bacteria, yeasts, and molds, among others. For fruit juice and beverage processing, the wavelength of **254 nm** is widely used. As a non-thermal preservation method, it is best to use UV-C treatment in order to avoid the formation of toxic or significant non-toxic by-products, as well as the minimal usage of energy compared to thermal pasteurization processes, and to maintain maximum aroma and color of the treated fruits. The minimum treatment condition for clear apple juice was under UV dosage of 230 Joules/lumen J L−1, whereas higher UV dosage levels would be needed for cloudy juices such as orange juice and tropical juice.

h. High Pressure Homogenization (HPH)

High pressure homogenization (HPH) is considered to be one of the most promising non-thermal technologies proposed for preservation of fruit juice and beverages. The primary mechanisms of HPH have been identified as a combination of spatial pressure and velocity gradients, turbulence, impingement, cavitation and viscous shear, which leads to the microbial cell disruption and food constituent modification during the HPH process. HPH has shown its ability to increase the safety and shelf-life of fruit juices including orange juice, apple juice and apricot juice. The effectiveness of the treatment depends on many parameters including processing factors such as pressure, temperature, number of passes and medium factors such as type of juice and microorganisms. For example, up to 350 MPa processing pressure is required to achieve an equivalent 5-log inactivation **of Listeria. Innocua;** however, less pressure is required for E. coli (> 250 Mpa) in carrot juices.

i. Membrane Filtration Ultrafiltration (UF) and Microfiltration (MF)

The most commonly used membrane filtration techniques for fruit juice processing are ultrafiltration and microfiltration. They have been used commercially for the clarification of fruit juices. Through this processing, a "" product could be produced with flavors better than thermally treated products. The effectiveness of the treatment depends on many parameters including processing factors such as:

- Types of membrane
- Pore size
- Transmembrane pressure

And medium factors such as:

- Type of juice
- Type of microorganism

For example, an ultrafiltration (UF) unit, with polysulphone membranes of 1**0 kDa** and **50 kDa** pore sizes and trans-membrane pressures of up to **155 kPa**, were used to treat apple juices. Another application example was to use an ultrafiltration membrane of **15 kDa** pore size to filter carrot and citrus juices. Then the clarified juices could be further processed by reverse osmosis and osmotic distillation.

CONCLUSION

The growth of the global market is catalyzed by the altering lifestyle and dietary patterns, which have induced an upsurge of the healthy food and beverages consumption such as fruit juices. Following the global trends, market opportunities are directed towards healthier choices of juices purchasers. Overall, the Lebanese juices companies have an untapped potential in specific countries, while implementing export strategies based on consumer needs and preferences as well as price sensitivity.

As for meeting the local demand, and taking into consideration the deterioration of the Lebanese currency and the financial meltdown, the industry should focus on meeting local demand with affordable prices and innovative products. Local producers need to entice consumers with new flavors and less sweet juices in order to generate growing demand for their products. Consequently, juices brands are expected to diversify their range of products and dive into the innovation era.

In Lebanon, the market for fresh juices is booming lately as one of the healthiest drinks, in some cases fresh juices were able to make their way to MEA airlines where it was served as freshener for passengers. Whilst only pasteurization by heat treatment is the only technique used, new technologies can be introduced and could have different effect on extending the shelf life of the end product, which will prove key to enabling exports to different distant countries.

According to the ITC Export Potential Map, Lebanon has an untapped export potential of about $1.9m in the juices market. The most promising markets for Lebanese exports of juices are the Netherlands, the U.S. and Saudi Arabia. In addition, the UAE and Egypt provide Lebanon with significant markets for exports of juices. Pineapple juice, as well as orange juice and mixtures of fruits and vegetables tend to have the largest untapped export potential, among the most common exported juices from Lebanon.

SWOT ANALYSIS

Strengths

- Lebanon's climate diversity leads to producing variety of fruits
- Availability of many types of fresh fruits in Lebanon
- Fresh Juice is a part of Lebanon's heritage
- High National branding in Lebanese foods and beverages
- Availability of wide range of options meeting different preferences for making fresh juice
- Do not require large investments

Weaknesses

- Some fresh fruits (pineapple-mango and others) are imported from oversees which increases the cost of production
- Imports of fruit concentrates also increase the cost of production
- Some producers unable to commercialize their output, due to their small size and weak organization
- Technical and quality requirements for production are not easily accessed by small producers due to the lack of financing and expertize
- Lack of innovation in product diversification and creativity in packaging/labeling
- Short shelf life of fresh juices

Opportunities

- Increasing local market share by Substituting imported juices
- Potential to increase Lebanon's exports especially to untapped potential markets
- Benefitting from the growth in the global demand for fresh juice due to health benefits
- Introducing new innovative products to the market and packaging
- Advantage of the current price competitiveness (decrease of LBP exchange rate to dollar) compared to other producing countries which in turn will increase Lebanon's exports

Threats

- Challenging production conditions due to economic and financial crisis
- Lose access to international markets due to noncompliance with international regulations, standards and technical requirements or due to other obstacles such as economic sanctions
- Lose market share against competitors in the Mediterranean due to the repercussions of normalization between multiple countries in the region
- Price sensitivity in the local market especially after the depreciation of the Lebanese currency

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