Green Agricultural Value Chains for Improved Livelihood

in the Arab Region

ESCWA

United Nations Economic and Social Commission for Western Asia

Acknowledgements

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The report seeks to inform and engage public and private sector decision-makers with regard to value chain development. Special emphasis is put on using resources more efficiently and adopting appropriate standards throughout agricultural value chains as part of a quality and safety improvement programme and promoting the development of a green economy in the region. It is hoped that this initiative will lead to a related project to promote the development of efficient agricultural value chains that could contribute towards improving food security in the region in addition to enhancing food quality and safety, and supporting livelihoods.

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ABBREVIATIONS AND ACRONYMS

ESCWA	Economic and Social Commission for Western Asia
FAO	Food and Agriculture Organization of the United Nations
GAP	Good agricultural practices
GCC	Gulf Cooperation Council
GMP	Good manufacturing practices
GIZ	German Agency for International Cooperation
HACCP	Hazard Analysis and Critical Control Points
ISO	International Organization for Standardization
MRL	Maximum residue limit
SME	Small and medium enterprise
SWOT	Strengths, weaknesses, opportunities and threats

Executive summary

This report aims to inform and support the development of a competitive national and regional agriculture and food sectors. It reviews and analyses agricultural value chains in the region to explore options for their development, particularly through greening. The report argues that economic development in the region has not focused significantly on the agriculture sector as its contribution to overall economic output is negligible. However, since the 2008 food price crisis and the resulting disruptions in food supply a number of countries have had to reconsider their overall food and agricultural strategies to ensure continuous and competitive access to sufficient and healthy food without depleting their limited natural resource base.

This report highlights that about 20 per cent of the population of the Arab region relies on agriculture for its livelihood and increasing affluence has increased demand for more food of higher quality. The share of the region in world agriculture trade is only 7 per cent though a number of Arab countries are among the largest net cereal importers in the world. Agricultural yields could be improved even within current constraints on land and water resources. As exemplified by Lebanon and Tunisia, the agriculture sector is dominated by small operators who generally have no or little access to an adequate agricultural production support system. Agricultural markets are subject to market forces, but the presence of many market intermediaries introduce uncertainty over commodity prices and quantities. Thus, most probably, the region will be unable to produce all the food it needs. To enhance food security and reduce vulnerability to short-term shocks, the Arab region must development efficient agricultural value chains.

Value chains are composed of all the inputs required to produce and bring to market agricultural commodities either fresh or processed. The value chain framework can be used to assess the flow of goods and revenues and the process of value addition. Value chains contribute to alleviating poverty by linking smallholders to markets. Through the value chain framework, geographically dispersed activities can be traced and linked, the roles of stakeholders and firms can be identified and analysed, and various other economic, social, technological, environmental and institutional issues can be studied. Regional agricultural value chains are lack adequate economies of scale which are essential to achieve significant improvement in productivity, competitiveness and bargaining power. However, a few regional firms are starting to gather momentum alongside major global actors, but regional firms are still small and fragile.

The issue of "greening" refers to the process by which value chain participants reduce their negative economic, social and environment impact while building on successful processes, including rationalizing energy and water use, using clean and renewable energy resources, emitting less pollution and waste, adopting appropriate practices and quality and safety standards and/or ensuring fair-trade. To this end, the adoption of good practices is important for the development of green agricultural value chains. Greening should be understood as a strategic and transparent integration of material, information, and capital flows to achieve specific social, environmental and economic objectives. It can be applied or used in many circumstances as long as the aim is to improve efficiency and competitiveness.

This report proposes seven implementation actions that provide a framework to support the development of sustainable agricultural value chains. The implementation actions are neither static and nor comprehensive. They could be reduced, increased or split depending on prevailing conditions and the aim of each country. The proposed implementation actions are as follows: (1) prioritize sectors for value chain interventions; (2) assessment, benchmarking and design of strategies; (3) upgrading value chains; (4) promoting vertical and horizontal linkages; (5) increasing value, quality and competitiveness through standards and certifications; (6) providing support services and improving the operating environment; and (7) monitoring and evaluating achievements.

To improve the functioning of regional agricultural value chains, a few prerequisites must be met at the national and regional levels. Priorities and policies must be refined, markets and institutions must be strengthened, and agricultural productivity and the access of farmers to the market must be improved. Ensuring macroeconomic stability and improving economic policy coordination are also priorities, building

on national, subregional and regional strategies, such as the Riyadh Declaration to Enhance Arab Cooperation to face World Food Crises, and making use of existing regional institutions such the Arab Organization for Agricultural Development. Policies and strategies could include rationalizing regulations to support investments and value chain linkages, simplifying and harmonizing regulations, improving national and regional infrastructure, standardizing regulations and practices, promoting greater regional integration, supporting regional institutions and developing specific agricultural clusters for strategic commodities.

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Introduction

During the past few decades, the agricultural sector was not a major focus for most economies of the Arab region[1] as its contribution to overall economic output was relatively negligible. However, since the food price crisis of 2008 and the ensuing disruptions in food supply, a number of countries have had to reconsider the agricultural sector and its place in development strategies. In the high-income countries of the region, agriculture is not viewed as a development tool but as a way to support the livelihoods of native populations while for mid- to low-income countries, agriculture is an important development tool as the sector is still the main source of income for a large portion of their population. In the latter countries, the agricultural sector could contribute even more to the national economy if more efficient and effective agricultural value chains could be promoted that could lead to and support the development of a competitive agricultural system.

A value chain is made up of inputs and services that are brought together in order to produce a commodity and then deliver it to the final consumer. In a value chain, the value of a commodity increases at each step of the process.[2] Value chains link producers, particularly smallholders and small and medium enterprises (SMEs) to markets, thus, they can contribute to alleviating poverty. Well-optimized value chains can improve revenue, productivity, competitiveness and entrepreneurship and foster the development of smallholders systems and SMEs.

Arab countries are facing the challenge of ensuring continuous access to sufficient food without depleting their already limited natural resources. Unlike the usual models of competitive advantage which look at prices and costs as the only determinants of the competitive edge of a country, the value chain framework also considers existing value chain interrelationships in the assessment of competitiveness. Thus, a country could improve its competitive advantage by enhancing efficiency through better management of its value chain**.**

Countries can use agricultural value chains both to improve competitive advantage and to assess the impact of trade on food costs and other factors to enhance overall food security. Improving food security through value chain development may also involve investing in improving logistics (namely, trading, handling, wholesaling or improving transport infrastructure) rather than solely investing in extensive and/or expensive production systems to minimize costs or increase supply.[3]

In the region, a few high performing agricultural systems, including their related value chains, have been successfully developed (namely, vegetables for export from Morocco) but the majority lack efficiency and effectiveness. Without further improvement to current practices, competitiveness and the overall business environment, many of the actors and agribusinesses within the value chains will remain low-skilled and low-value thereby missing out not only on global agricultural markets but also, and increasingly, on local and domestic ones as well, as the globalization process continues to permeate national economic structures. By contrast, improving the efficiency of agricultural value chains may prove to be a way to achieve greater food safety and food security, growth in income, sustainable development and improved livelihoods.

The global integration of agricultural markets has led to larger and more efficient flows of goods and resources, and allows new opportunities for countries to achieve food security and economic development

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[1] In this report, 'region' refers to ESCWA member countries: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, the Sudan, the Syrian Arab Republic, Tunisia, the United Arab Emirates and Yemen. Algeria, although not a member country of ESCWA, is included to ensure continuity over North Africa. Data for the Sudan include South Sudan.

[2] Weber and Labaste, 2010.

[3] Porter, 1998.

without depleting scarce resources. Countries now have the opportunity to enhance growth that is not based on natural resources, and thus to reduce poverty in a more sustainable way by enhancing productivity, efficiency and effectiveness in accessing new markets and expanding the range of products they could access or offer in national and global markets. However, globalization also brings other challenges, such as the need to improve quality and standards, introduce regulatory reforms and adopt cost-effective measures to remain competitive in much freer markets.[4]

The early use of the value chain framework focused largely on competitiveness and economic issues. However, more recent uses have brought in social and environmental issues including employment, labour relations, workforce development, gender, the lifecycle of goods from production to disposal, greening processes, sustainability and so on. Thus, a wide range of stakeholders from around the world are using the value chain framework to better understand specific commodity lines and/or industries or to guide programmes and policy formulation and implementation for agricultural, social and economic development.

By taking advantage of agricultural value chains, farmers and agricultural SMEs in the region will improve their competitive edge in local, national, regional and international markets. Globalization allows regional producers to access wider markets but it also heightens competition in local and regional markets. Local stakeholders will have to adapt to those conditions, specifically they must ensure quality and adhere to standards to attract new customers and rely less on government support to gain access to markets. The development of more competitive value chains will help the region anticipate these changes.[5]

"Green" and "greening" refer to processes by which suppliers, producers, processors, buyers and consumers reduce their negative social, economic and environmental impact by using less energy and water, and decreasing waste and emissions, while also treating waste, promoting fair-trade and/or adopting appropriate quality and safety and other standards of corporate social responsibility. Greening should be part of a concerted strategy for enhancing efficiency and for achieving sustainable development. In particular, greening agricultural value chains should be part of a clear strategy for agricultural development and to ensure food availability in both quantity and quality. It consists of a strategic and transparent integration of material, information and capital flows of key value chain processes to achieve social, environmental and economic objectives. To this end appropriate actions should be proposed to guide the development of green agricultural value chains.

In all probability, the region will not be able to produce all the food it requires, given the lack of water, insufficient arable land, harsh climate, and other challenges. Moreover, the increasingly affluent and urbanized population of the region is demanding more high-value products composed of a wide range of processed foods. This trend is expected to continue unabated in the near future as more segments of the population move into the middle class. The development of regionally integrated agricultural value chains could ensure that the region becomes less vulnerable to short-term shocks such as the 2007-2008 food price crisis. Moreover, despite its widely reported negative impact, the recent increase in food prices has opened market opportunities for a number of local and regional commodities, firms and brands. What is now needed is an integrated strategy to develop a more comprehensive regional plan for food production and agribusiness.

The partners collaborating in this endeavour, ESCWA and GIZ, aim to generate and disseminate knowledge on the development of a high-performing and high-value agricultural supply chain in response to concerns over deteriorating food availability. The report provides recommendations on how individual countries and the region can improve the performance of the agricultural and food sectors through well-functioning and better-performing value chains. Countries must design focused policies and programmes to

[4] Christian and others, 2011.

[5] Altenburg, 2007.

improve the productivity and performance of the agricultural sector while also ensuring that consumers have access to sufficient food both in quantity and quality.

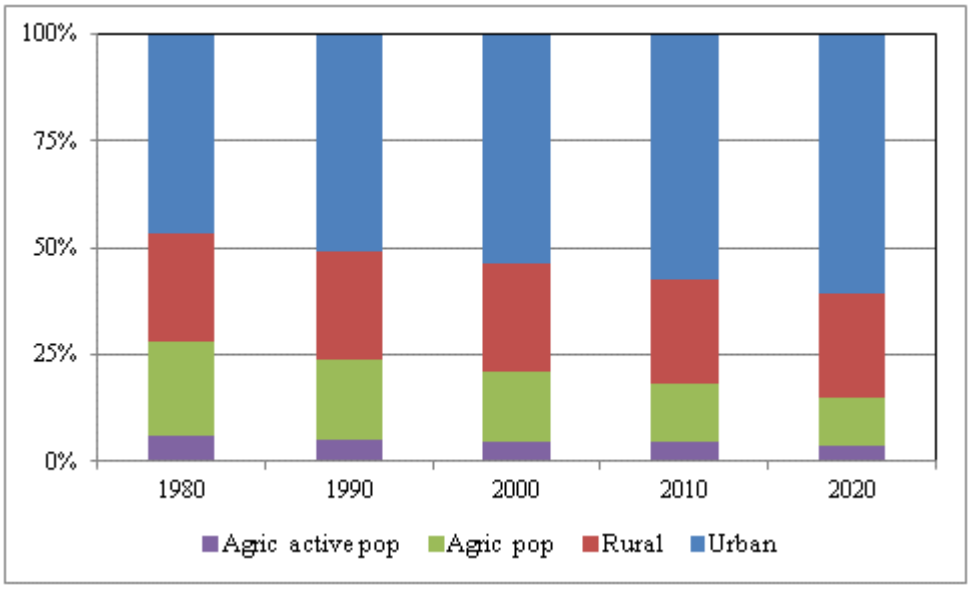
The report provides an overview of the agricultural sector of the region with emphasis on trade and productivity, the potential market size, economies of scale and competitiveness. It then reviews the value chain framework with emphasis on agriculture and highlights cases from the region that illustrate constraints and opportunities particularly as related to the fruit and vegetable markets. The report discusses resource-use efficiency and issues related to developing green agricultural value chains, and introduces a number of implementation actions that support value chain development programmes. Finally, the report reviews lessons learned and recommendations for the development of agricultural value chains in the region.

I. AGRICULTURE TRADE IN THE REGION

A. OVERVIEW

The population of the Arab region is gradually urbanizing (figure 1). Well over 50 per cent of the population is currently living in urban areas, and less than 20 per cent of the population depends on agricultural livelihoods. The population that is economically active in agriculture or that participates in the agricultural labour force is less than 10 per cent. Population growth combined with higher income and urbanization are affecting food demand in the region. Projections show the population of the region jumping from about 340 million today to 445 million by 2025 and approaching 600 million by 2050[6] while the urban population is expected to increase to 60 per cent by 2025 and 70 per cent by 2050.[7] Income growth is expected to grow at about 3.4 per cent a year over the next few decades.[8] With the growth and urbanization of the population, a major shift in food demand is expected, which will increase the vulnerability of the region to changes in food supply. Currently, the vulnerability of the region to food shocks is already high owing to the limited supply of arable land and water.

Figure 1. Population distribution in the region



Source: Computed from FAOSTAT.

Note: FAOSTAT defines agricultural population as "all persons depending for their livelihood on agriculture, hunting, fishing and forestry. It comprises all persons economically active in agriculture as well as their non-working dependents". Similarly, it defines the economically active population in agriculture, also known as agricultural labour force, "as that part of the economically active population engaged in or seeking work in agriculture, hunting, fishing or forestry".

The share of the Arab region in world agriculture trade is relatively low.[9] The share of the Arab region in global agricultural imports is about 7 per cent, while its share of global agricultural exports is close to 2 per cent (figure 2). Although those shares have remained relatively constant over the years (figure 3), food import is expected to increase as argued above due to the combined effect of high population growth, greater urbanization, higher income and lower domestic production.

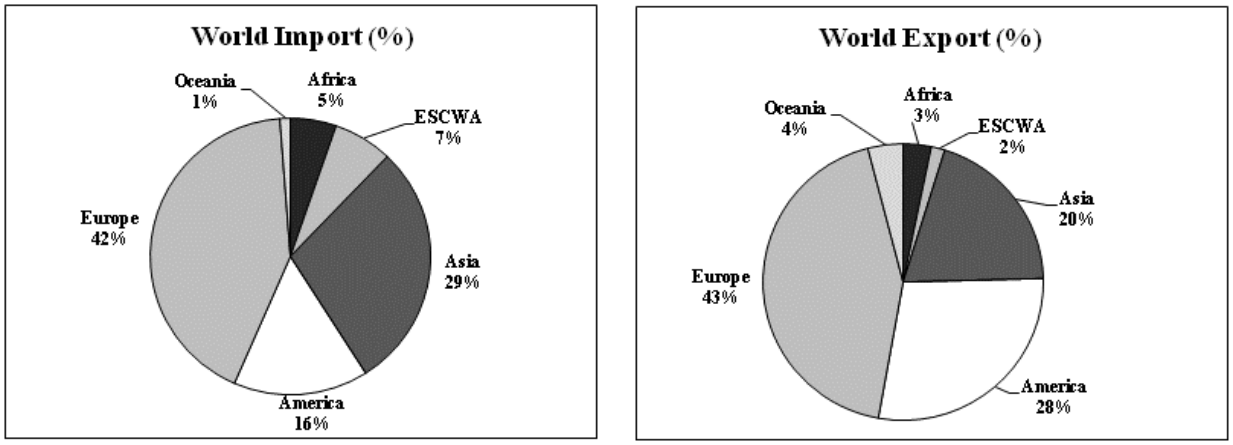
[6] United Nations, 2011.

[7] United Nations, 2009.

[8] World Bank, 2009.

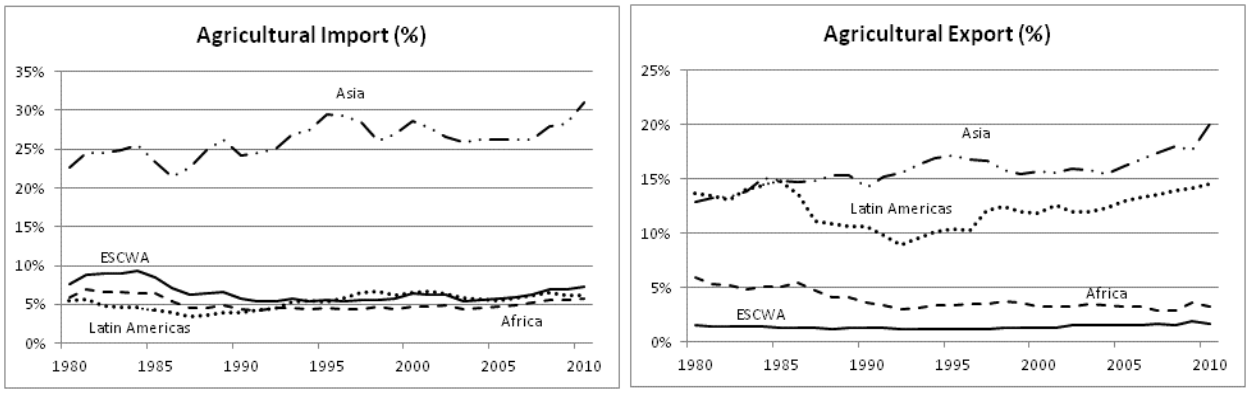
[9] FAOSTAT defines agricultural trade as "imports and exports of food and agriculture products (raw and processed), excluding fishery and forestry products".

Figure 2. Regional shares of world agricultural trade, 2010



Source: Computed from FAOSTAT.

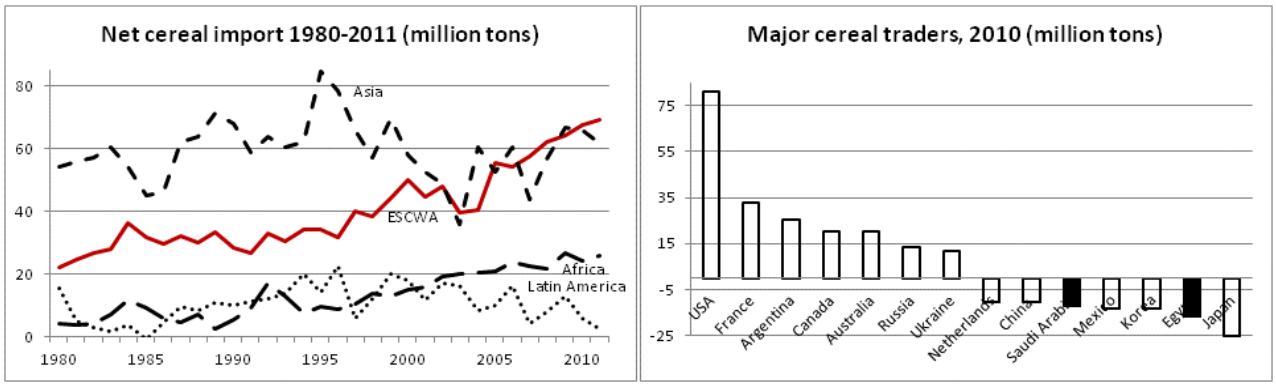
Figure 3. Agricultural trade of selected world regions, 1980-2010



Source: Computed from FAOSTAT.

Cereal import has increased over the years and currently the net deficit hovers at around 70 million tons per year (figure 4). In addition, a number of countries from the region, notably Egypt and Saudi Arabia, are among the highest net cereal importers in the world. The deficit stands at about 16 million tons per year in Egypt and at about 12 million tons per year in Saudi Arabia.

Figure 4. Cereal trade data



Source: Computed from FAOSTAT.

The dependency of the region on imported food and notably on imported cereals is clear, though its implication for individual countries will be different depending on their fiscal standing. Gulf Cooperation Council (GCC) countries that benefit from high oil revenues will be less impacted than most other countries.[10]

Arab intraregional agriculture trade is substantial compared to total global agricultural trade. However, this applies mostly to GCC countries and the Arab Mashreq region as the countries of the Maghreb region are more oriented towards European market and other parts of the world (table 1).

TABLE 1. AGRICULTURAL TRADE IN THE ARAB REGION

Countries	Exports to the region	Imports from the region	Exports to all destinations	Imports from all destinations
	Percentage		*Millions of United States dollars*	
Algeria	19	2	107	6 598
Bahrain	90	26	54	989
Egypt	55	4	4 568	7 738
Iraq	33	48	5 429	120
Jordan	81	29	515	2 410
Kuwait	91	19	44	1 470
Lebanon	66	17	436	2 429
Libya	30	39	119	14
Morocco	9	6	1 840	3 985
Oman	66	61	103	20
Palestine	73	37	189	1 978
Qatar	74	34	14	1 720
Saudi Arabia	88	17	774	10 600
Sudan	71	42	540	1 271
Syrian Arab Republic	95	14	2 400	3 516
Tunisia	30	5	1 227	1 647
United Arab Emirates	60	10	176	11 045
Yemen	74	15	112	2 572

Source: Computed from FAOSTAT.

The value of exports to destinations in the region represents the minimum revenue that could be expected if regional agricultural trade was to be further enhanced and/or supported. It is estimated that revenues could double at a minimum with enhanced value added and better working agricultural value chains.[11] Thus, countries could and should take advantage of this opportunity.

B. AGRICULTURAL TRADE IN SELECTED COUNTRIES: LEBANON AND TUNISIA

Limited mapping of agricultural value chains was conducted for this report in Lebanon and Tunisia. This section presents a review of agricultural trade in both countries.

1. *Lebanon*

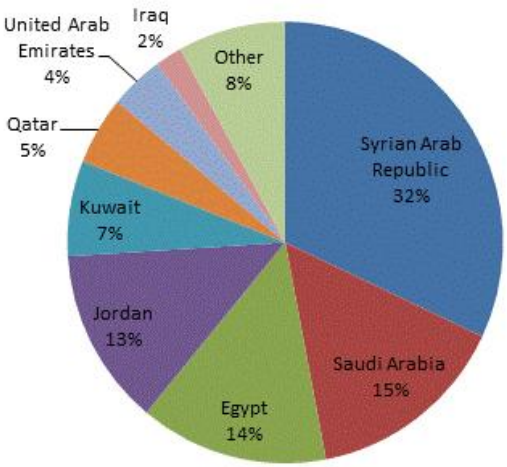
In Lebanon, agricultural trade is mostly concerned with products sold fresh. Most markets operate without a sales contract between producers and buyers. Prices are, generally speaking, set through supply and demand as there are no quotas or other restrictions to limit trade, even in the case of those commodities destined for export. The largest trading partners of Lebanon for fruits are the Syrian Arab Republic, Saudi Arabia, Egypt and Jordan (up to 74 per cent of the fruit export value in 2011) while for vegetables, major trading partners include Qatar, the United Arabic Emirates, Saudi Arabia, Kuwait, Jordan, the Syrian Arab Republic and Oman (up to 87 per cent of the vegetable export value in 2011). Most of the trade in fruits and vegetables thus happens within the region (figure 5).

[10] World Bank, 2009.

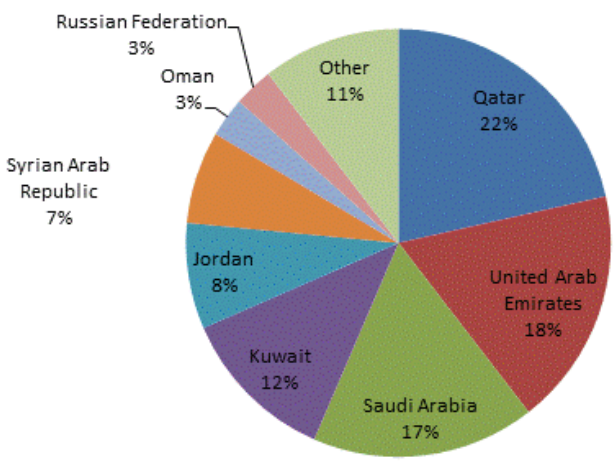
[11] Kaplinksy and Morris, 2007.

Figure 5. Trading partners of Lebanon

(a) Fruits and related products



(b) Vegetables and certain roots and tubers



Source: ITC Database, Trade Map, 2013.

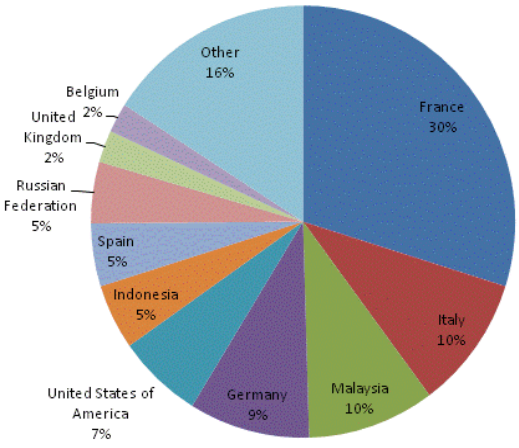
2. *Tunisia*

A number of agricultural products are classified as "key" or "strategic". Key products are those that are destined for export as they bring revenue into the country, and include oranges and dates. Strategic products are those which help to ensure the food security of the country, and include tomatoes. For key and strategic products prices and export quotas are set by a semi-public organization. For all other agricultural products, the market is liberalized in accordance with the General Agreement on Tariffs and Trade except for two subproducts: tomato double concentrate and milk. For a few other products, including potatoes, a price capping mechanisms can be initiated if the price rises too much. However, markets rarely follow those price cap mechanisms.

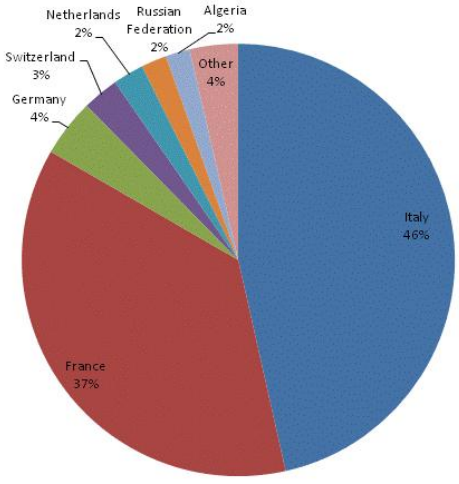
Figure 6 depicts the major trading partners of Tunisia, with France taking the bulk of its fruits export (30 per cent) followed by Italy (10 per cent) and Germany (9 per cent). Other partners include Malaysia, the United States, Indonesia, Spain and the Russian Federation each with 5 per cent or more of trade share. For vegetables including roots and tubers the two major trading partners are Italy (46 per cent) and France (37 per cent).

Figure 6. Trading partners of Tunisia

(a) Fruits and related products



(b) Vegetables and certain roots and tubers



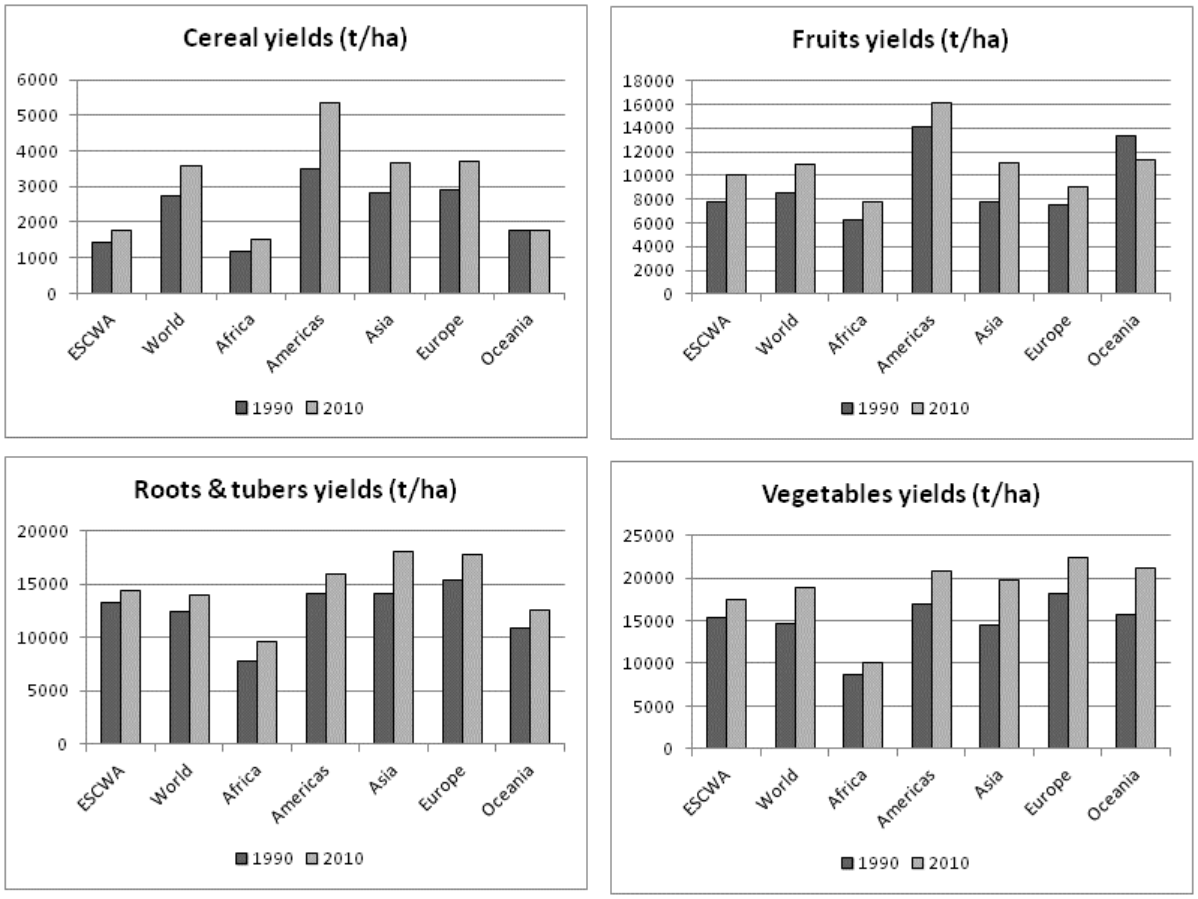
Source: ITC Database, Trade Map, 2013.

While agricultural trade in Lebanon is turned towards other Arab countries, Tunisia trades mainly with the European Union and the rest of the world. These differences may be the result of the geographic location of both countries and the lack of adequate infrastructure (transport, cold storage, and so on), which makes it more convenient to trade with neighbouring countries.

C. AGRICULTURAL PRODUCTIVITIES

In the Arab region, the agricultural productivity of roots and tubers, and fruits and vegetables are close to the world average (figure 7) while the agricultural productivity of cereals are well below world averages. More could be done to improve agricultural yields in the region. There are serious constraints on the availability of natural resources, particularly arable land and water and in some areas, the use of manufactured agricultural inputs is already high. For example, at more than 300kg/hectare, Egypt is one of the largest consumers of manufactured fertilizers in the world.

Figure 7. Agricultural productivity for major food groups by region, 1990-2010



Source: Computed from FAOSTAT.

The countries of the region are not at a comparable level when it comes to agriculture development and performance. GCC countries have relatively small but homogeneously productive agricultural systems while the agricultural performance of other Arab countries is uneven, especially the large agricultural producers such as Egypt, Iraq, Morocco, the Sudan, the Syrian Arab Republic and Yemen. In those countries, certain agricultural systems or selected geographical areas may be highly productive while others suffer from underdevelopment and poor performance.

However, arable land and water resources are in short supply in the region. With increasing economic development, those scarce resources will be increasingly reallocated to meet demands in other sectors of the economy where they could be more profitably used, notably in the domestic and industrial sectors. This will further constrain agriculture production and any hope for increased domestic production will have to build on higher productivity, specifically more crops per unit of input (land or water). Thus, greater efficiency will be sought either through the production of higher value crops such as fruits and vegetables, or through the import of products that require a high volume of water to produce. In addition, agricultural value chains must be enhanced at national and regional levels to allow for a smoother flow of products and revenues. The aim would be to improve efficiency by increasing productivity, reducing costs and the consumption of resources, improving technology, optimizing operations and so on.

In most developing countries, value chains are underdeveloped. As a result, farm productivity becomes the main indicator of success and determines national and regional food and agricultural strategies. As the markets of the region mature, well thought-out strategies for more efficient value chains aimed at both domestic and regional markets will be required to revitalize the agriculture sector and improve livelihoods and food security.[12]

[12] Webber and Labaste, 2010.

II. AGRICULTURAL VALUE CHAINS IN THE REGION

A. OVERVIEW

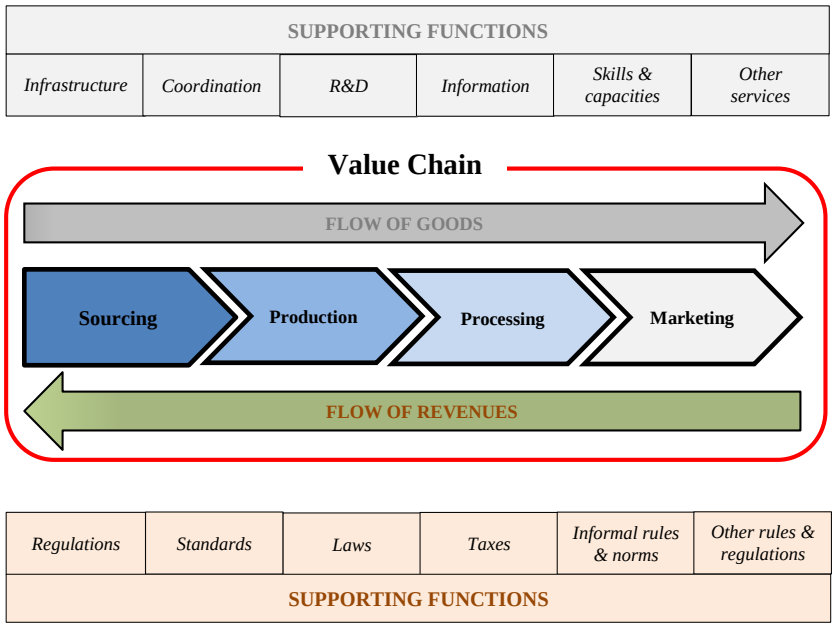
A value chain consists of all the value-generating activities that are required to bring a good or service from production to consumption and sometimes all the way to final disposition after use. A value chain framework allows for the assessment of interlinkages between all activities involved in bringing a commodity from production up to final consumption or disposal, even if some of those activities belong to different sectors of the economy or to different geographic areas. With the complex interconnections that may exist between products, the value chain framework follows a commodity through every stage of production and identifies the actors and geographic areas that contributed to it and takes note of their role in the successive chain of activities.

Value chain analyses allow for the examination of various issues including the following:

- Economic: performance, capital, information, customers, competition, products, markets, costs, revenues and benefits;
- Social: livelihoods, employment, labour relations, skills and capacity-building;
- Technological: adoption, processes, material and equipment need;
- Environmental: resource use, product disposal, locations, standards, quality;
- Institutional: relationships or interactions between actors, regulations, policies.[13]

Analysing a value chain allows a holistic view of a product at each step of the process of adding value. In the case of an agricultural commodity, this includes a mapping of production beginning at the farm level, through the various intermediary steps (processing, handling, storage and distribution), and culminating with final consumption and/or disposal.

Figure 8. A value chain flow of goods and revenues and supporting functions



Source: Adapted from Webber and Labaste, 2010; and Herr and Muzira, 2009.

[13] Gereffi and Fernandez-Stark, 2011; Kaplinsky and Morris, 2000.

Value chain analysis also allows for the examination of the following issues:

- Market structure: mapping all activities from input acquisition to final consumption and disposal for a determined commodity;
- Governance: identifying the type of interactions between firms along the value chain;
- Institutional context: identifying the conditions and policies (economic, social, environmental, technological, and so on) that determine the way the value chain performs or functions;
- Performance: assessing outcomes along the value chain to evaluate how its components or actors evolve over time.

The analysis of value chains can be performed using both primary and secondary data and information that originate from concerned governments agencies, statistics offices, industry associations, interviews with stakeholders and other actors (including market assessments and observations). The data and information are then assessed and analysed using different tools to identify or describe the value chain structure, governance, institutional context and performance. Some analyses or evaluations, such as those on value creation, could be disaggregated by or within differing levels or segments of the value chain to study a selected portion of the value chain. In fact, analyses that are often found in the literature tend to focus on selected aspects rather than the entire value chain. Thus, they often lack complete information to inform the decision-making process on the course of action that could lead to the greatest impact.

Table 2 summarizes the importance of value chain analyses, key issues they address and limitations.

TABLE 2. IMPORTANCE AND LIMITATION OF VALUE CHAIN ANALYSES

Importance	Issues addressed
• Allows the conduct of a structure-conduct-performance analysis; • Emphasizes on value addition rather than revenues or physical output; • Investigates cost build-up, value accumulation and distribution of burdens and benefits; • Recognizes the variation of linkages as product and market changes; • Recognizes the need for constant adjustment in response to dynamic markets; • Allows the assessment of changing governance based on leverage, information or power; • Assesses physical flows as well as financial and information flows; or • Seeks to better understand constraints and opportunities of the overall operating context.	• Identifies markets, competition and products; • Draws a map from source to end-market; • Assesses comparative advantage; • Estimates financial and economic costs; • Identifies actors and their behaviors; • Assesses extent of trust and cooperation; • Estimates shares of volume and value; • Identifies bottleneck or choke point areas; • Assesses overall size of the value chain; • Identifies connections and synergies; • Identifies governance structure; • Identifies main power holder(s); • Identifies regulations and self-regulations; • Discusses the institutional framework; • Identifies enabling environments; • Identifies growth areas and evolution; • Assesses potential improvement or upgrading.
Limitations	
• Value chains change in composition, relationships and/or market as result of strategic choices; • Value chains are not static as they adapt to changing markets and competitiveness conditions; • Quality and service are as important as quantity; • Value chain environment (namely, regulations, standards, policies or market forces) is important; • A cost-benefit analysis is not sufficient as it does not provide a global view; and • Need to focus on the whole value chain instead of its components/levels only.	

Sources: Adapted from Webber and Labaste, 2010; Henriksen and others, 2010; Herr and Muzira, 2009; Hellin and Meijer, 2006.

Value chain analyses are important as they allow an investigation of the structure of the sector, the interrelation of various elements and overall performance notably in the distribution of benefits. They provide a global mapping and assessment of a sector through the multitude of variables examined to better guide policymaking and development planning. A number of issues must be taken into consideration to ensure that value cains meaningfully contribute to local and regional development and, in the case of agricultural value chains in the Arab region, that they improve the food security situation. Thus, value chain interventions should not attempt quick fixes, but they should aim to address core and specific issues based on prevailing forces and related benchmarks and indicators.

B. AGRICULTURAL VALUE CHAINS IN THE REGION

To better illustrate constraints and opportunities in the agricultural sector of the region, case-studies were conducted in Lebanon and Tunisia. These consisted of limited mapping exercises and interviews with major stakeholders to get a global overview of the agricultural sectors of those countries with emphasis on selected crops: potatoes and apples in Lebanon; and dates, tomatoes and oranges in Tunisia.[14] The interviews targeted selected stakeholders and institutions involved in the agricultural sector and these were complemented with desk researches. The interviews and desk reviews allowed for the following assessment and mapping of the agricultural sectors and on specific crops in both Lebanon and Tunisia.

1. *Structure*

The distribution of farms is relatively homogeneous in Lebanon. The main agricultural areas are the North (Akkar and North Lebanon) with 33 per cent of farms, the Bekaa valley (Baalbek-Hermel and the Bekaa) with 20 per cent and Mount Lebanon with 18 per cent. Nabatiyeh accounts for 16 per cent and the South accounts for 13 per cent of total farms. The majority of farmers are in a relatively precarious situation, as some 75 per cent have no access to social security, and approximately 91 per cent of farms are smaller than 4 hectares.[15] The favourable climate of Lebanon allows for the production of a large range of fruits and vegetables. Potato is an essential crop in Lebanon both for food security and export capacity and is grown on about 20 thousand hectares mainly in Akkar and the Bekaa valley. Apples are grown mainly in mountain areas, primarily for export.

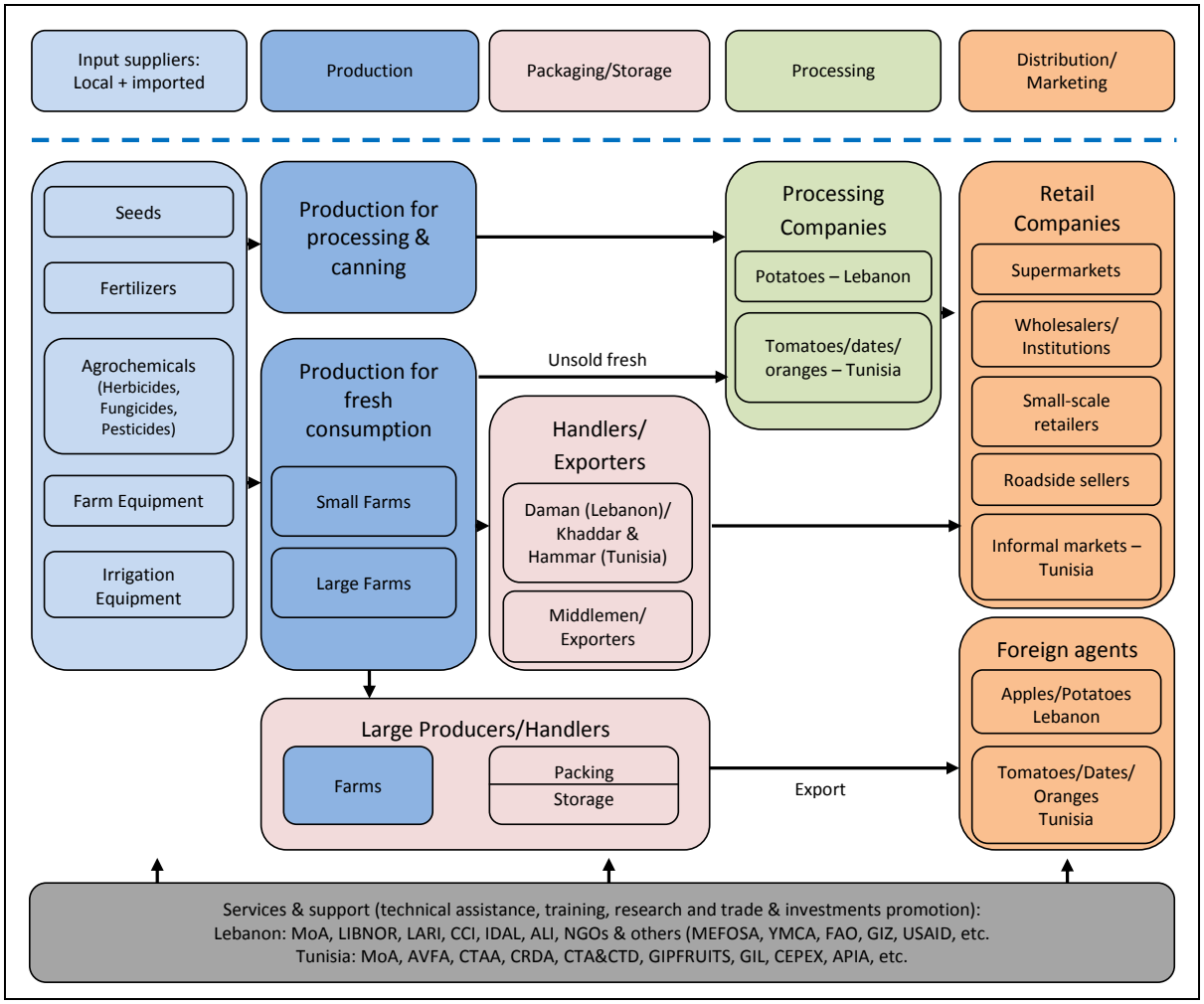
In Tunisia, agricultural activities are located mainly in the North and on the coast where there is good rainfall. The agricultural sector in Tunisia is largely composed of small operators. In 2005, 43 per cent of families depending on farming for their livelihoods had farms of less than 5 hectares while only 8 per cent had farms of 50 hectares or more. Tunisian farmers have access to social services (social security and pension fund) although very few farmers actually participate in these schemes. There is no established support system such as a compensation or subsidy scheme in case of a disaster for example. The area allotted to tomato production is about 25 thousand hectares, which is exploited throughout the year either in open fields or in cold and heated greenhouses. Oranges are mostly produced in Cape Bon along the Mediterranean Sea and are, for the most part, exported to France. Dates are produced in the oases of Southern Tunisia and about 60 per cent of the production is also exported.

A structural map of the value chains of potatoes and apples in Lebanon and tomatoes, dates and oranges in Tunisia is provided in figure 9. The major levels or segments of the value chain are highlighted along with input suppliers, producers, processors, various intermediaries (traders, wholesalers and exporters including the *daman* in Lebanon and the *khaddar* and *hammar* in Tunisia) and retailers.

[14] Interviews in Tunisia concerned Deglet Nour dates and Maltese oranges, referred to in the text simply as dates and oranges.

[15] Lebanon, Ministry of Agriculture and others, 2012.

Figure 9. Value chains of selected fresh products in Lebanon and Tunisia



Source: ESCWA adapted from Fernandez-Stark and others, 2011.

Note: More detailed value chain mapping of selected commodities in Lebanon and Tunisia are provided in the annex.

Table 3 outlines the interrelationships between major stakeholders at each level of the selected fruit and vegetable value chains in Lebanon and Tunisia. These were obtained from background research and interviews with major stakeholders including ministries of agriculture and export-promoting agencies.

TABLE 3. MAJOR ACTORS OF AGRICULTURAL VALUE CHAINS IN LEBANON AND TUNISIA AND PREVAILING RELATIONSHIPS

	Lebanon
Input suppliers	• Seeds and seedlings for both potatoes and apples are imported as attempts to establish local production units failed due to inadequate land and water, risk of contamination and cost for developing new varieties. Seeds and seedlings are major costs to farmers. • Manufactured inputs: Producers are forbidden to import their own inputs. Records show that there are 43 companies importing fertilizer and 142 importing pesticides. The need to register has greatly reduced smuggling activities. • Machinery: Machines such as tractors are imported while smaller ones are sometimes produced locally. Large farms usually acquire their own machinery while smaller ones either do not use machinery or rent it from local renting companies. • Packaging: There are a few local manufacturers of packaging items such as plastics and cardboard boxes.

TABLE 3 (*continued*)

	Lebanon
Producers	• Most producers of tomatoes and apples are small. • Producers are not organized in cooperatives or other kinds of groups or associations and thus are unable to make their voice heard. • Potato producers are about 10 thousand, of which 2 per cent have farms of 20 hectares or more and produce about 32 per cent of the output. Large producers are also merchants and exporters who also buy the output of small producers in competition with the "*daman*" (intermediary) and exporting companies. • Small producers of apples also sell to the *daman* or to larger producers who takes care of the marketing. • Apples for export are generally of better quality, and are either bought by an exporter having his own storing facilities or by a storing facility who will then sell it to an exporter.
Processors	• Specific potato varieties are grown for agro-industry purposes. • Production is usually through contracts between processing companies and producers with processing companies supplying all inputs and related advices (namely, dosage or timing) while producers sell their entire production to the processors. This relationship is sometimes abusive and often lead to disagreements and/or conflicts between farmers and processors. • Apple processing is not well developed and there are no exclusive varieties for processing. Apples of lesser quality are the ones sent for processing.
Daman	• The *daman* usually buys the entire crop well before harvest thereby assuming all the risk while guaranteeing farmers' revenues but at a much lower price than those prevailing on the market. The *daman* operates in both potatoes and apples and most other marketable crops.
Traders (including wholesale, export/import and retail)	• Export companies contract producers on an informal basis rather than dealing with wholesalers or the daman. • Producers sell also to intermediaries for an 8-12% commission. • Commissioners ensure the re-selling. Relationships are based on confidence as producers are not present during final negotiations and are paid once the product has been sold. • Production for the local market is sold on the wholesale market by box rather than by weight or quality. • Prices on the wholesale market are usually higher in the morning than in the afternoon. Most Beirut wholesalers buy their products in the afternoon. • Most value addition take place at the level of intermediaries due to a lack of infrastructures (namely, storage rooms or refrigerators). • The small fruits and vegetable shops have a significant share of the retail market and are supplied by the wholesale market. • Roadside sellers have a minimal share of the market. • In some cases, farmers or their family members get involved in retail activities as a way of diversification. • Unsold or bad quality products are sold at lower prices at the end of the day usually for processing.

	Tunisia
Input suppliers	• Seeds and seedlings: Tomatoes are hybrid varieties, which are imported. Dates shoots are produced locally in small numbers and the remaining are smuggled even though they are unsafe. Also, the necessary pollen is imported as male plants are uprooted since they do not bear fruits. Orange seedlings are locally produced while seeds are imported. • Manufactured inputs: About 30 per cent is produced locally, mostly all the phosphate and ammonium fertilizers. All other inputs are imported including the gas for post-harvest fumigation. • Machinery: Small equipment is partly locally produced while bigger ones are imported, as well as irrigation hardware. Machineries can be rented but small producers still face difficulty to access it. • Packaging products for export goods are imported due to stringent EU requirements and are usually exempt of taxes. Those for local markets are produced locally and have low quality.

TABLE 3 (*continued*)

	Tunisia
Producers	• Producers are small and scattered. • Cooperatives are very rare and as a matter of fact there is only one exporting "cooperative" remaining for citrus. • Tomatoes production modes include geothermal, unheated greenhouse, early season greenhouse, late season open field and seasonal open field. Geothermal production is for fresh produce export while the seasonal open field production is for processing. Most other production systems are destined to local consumption as fresh produce. The unsold fresh tomato is sold to processing companies or given for free as animal feed. • Citrus: big producers represent around 20 per cent of producers and sell to exporting companies or packing units whereas. Smaller producers sell to collectors or service cooperatives or to the "*khaddar*" (similar to the "*daman*" in Lebanon).
Processors	• Tomato processors contract producers and provide them inputs including the irrigation system and in return gets their entire crop from which the input cost is deducted. • Processing companies near cities mandate collectors who are now inevitable intermediaries, taking commissions on both sides. • Processing companies have decreased by half, as smaller units face financial difficulties due to the on-going crisis. • Dates and oranges are usually not processed. • The cooling storage of oranges is limited and the low grade fruits discarded are sold to be processed into juices.
Khaddar and *Hammar*	• The *khaddar* is the equivalent of the *daman*. The *khaddar* estimates the volume and pays the producer before harvest. The *khaddar* re-sells to retailers, packers/exporters, wholesalers, *hammar* or even directly to the final customer. The *hammar* usually links 2 intermediaries and can mix various qualities.
Traders (including wholesale, export/import and retail)	• The formal wholesale market is managed by a semi-public company which sets prices (both wholesale and retail) and profit margins. Control is made through receipts and a tax is collected. • Formal wholesale market sales represent 15-20% of total sales with the remaining happening in informal markets though some transactions are between intermediaries. • Informal sales are onsite (field), a little shop or on the roadside. • Exporters buy through the *khaddar* or a packaging centre for quality. They re-sell to foreign agents or foreign retailers. • Usually, there is no contract between exporters and collectors or producers. Relations are based on confidence. • Sellers do not use the same channel from one season to the other as they sell to the highest bidder. • Packing centres can also sell on wholesale market though it is less frequent. • Collectors supply wholesale markets, packing/exporting units and informal markets. Their number varies per year. • The farmer cooperative sells only on the wholesale market. • The date sector is changing due to the development of cool storage at producer level, which allows them to sell when prices are higher.

Sources: Lebanon, Ministry of Agriculture and others, 2010 and FAO and Cooperazione Italiana, 2007.

2. *Governance*

Value chain governance is concerned with existing interactions between actors and levels. When sufficient information on value chain governance is available, it becomes possible to better understand how the chain is controlled and coordinated, which proves useful when it comes to implementing chain-related activities (such as quality standards, quantities and varieties) or improvements (including management, accountability, resource-use efficiency). The analysis of governance also allows a better understanding of the

flow of resources including financial resources. The two commonly found governance types are "producer-driven" chains, in which producers have a major say, and "buyer-driven" chains, in which buyers (mostly intermediate buyers such as retailers or export agents for example) play a major role in the functioning of the value chain. In most cases, however, value chain governance tends to be complex and it changes depending on the crop concerned particularly in developing countries where information is seldom widely available.

Generally speaking, the presence of many small and scattered operators adds to the complexity of agricultural value chain governance in the region. The various intermediaries (*daman* in Lebanon and *khaddar* and *hammar* in Tunisia) play a major role in determining how the market will function and thus how the value chains works. These intermediaries are difficult to avoid as most farmers are small and scattered and lack access to adequate financial resources and information, and are thus faced individually with the propositions suggested by these intermediaries. The large buyers, on the other hand, do not have sufficient capacity to deal with a great number of farmers and thus prefer to deal with a limited number of intermediaries. Moreover, the system works on mutual confidence or agreement, usually without formal contracts between participants. Thus, a farmer, processor or retailer might not know the real prices that at the previous or next level, which hinders their ability to negotiate more favourable prices. Given this lack of information flow, some of the intermediaries even go to the point of providing producers with their production plans and inputs.

Producers in both Lebanon and Tunisia are getting older as younger people are more interested in other professions or attracted to urban life. A survey conducted in 2005 in Tunisia, shows for example that the share of producers aged more than 60 years was 21 per cent in the early sixties, 37 per cent in the mid-nineties and reached 43 per cent in 2005. These 43 per cent of producers own 46 per cent of the cultivated area though their lands are usually subdivided among those inheriting upon the death of the owner. Farms decrease in size over the years and at some point the producers with small plots of land become reluctant to devote substantial resources in improving their farming activities as their farms are not productive enough.

Several difficulties faced by the agricultural sector are linked to the organization of the supply chain. Among these are the large numbers of intermediaries, which usually limit the capability of the various value chain participants to react to competition both because there is no information available on competition and the benefits going to the producer is greatly reduced. In some cases, an input supplier company or its intermediaries provides the entire range of input to the producer and related advice on dosages for pesticides and fertilizers. This relationship usually leads to situations where the producer is indebted to a company and thus further dependent on its whims especially that the advice for the input use is adapted to the aims of the company which are not always aligned with those of the farmers.

In general, there is no synergy between the different actors in the supply chain. Each operator works independently with no common marketing strategy for accessing or opening new markets. As the supply chain is too long and not efficient, information about market conditions and demands hardly reaches producers not taking into account that most intermediaries lack either interest or incentives to collaborate with producers because their current position gives them more control and a larger share of the proceeds.

There is also no common organization for group purchases or offering to give producer a stronger negotiating position over sales or acquisition price. Even if several institutions exist, there is a lack of representation of producers. Sometimes groupings are created because governments, non-governmental organizations or an industrialist are promoting or giving benefit to grouped producers. But these groupings are usually slow to adapt, not well managed or benefit the concerned few while also not building unity with others. The lack of collaboration also holds back producers from adopting better production practices as they fear that their neighbours might spoil or profit from their innovations without taking similar risks. Below is a summary of some of the major constraints facing actors in the supply chain, which makes it less efficient particularly for certain value chain actors (table 4).

TABLE 4. PROBLEMS ALONG THE FRUIT AND VEGETABLES SUPPLY CHAIN IN LEBANON AND TUNISIA

Value chain level	Major issues encountered
Organization of the supply chain	• Too many intermediaries. • The length of the supply chain reduces the benefits going to the producer. • The producer is not in control of the marketing of his production. • No legal framework. • There is no guaranty that the payment will be done. • There are no sales contracts. • No minimum price defined or framework according to grade. • When selling to the wholesale market the price could substantially change between the time of shipment and the time of arrival. • Supply chains count a lot of small market participants, except the exporting companies which are larger.
Input supply	• Little to no production of seeds while their costs can reach up to 25-30 per cent of production costs. • The development of higher performing varieties is limited.
Production	• Unorganized sector with most producers having small farms. • The sector is made of thousands of small producers who are not organized. • Due to the small size and the strong division of farms, it is difficult for farmers to access agricultural extension services, which explains the slowness in the implementation of changes. • There is a lack of mechanization (production and post-harvest) to lower costs and increase quality. • There is no identification of the needs of customers (namely, industry, and so on) so producers do not adapt their production to meet a determined demand or need from the market. • Agreements among producers on quality and standards in the fruits and vegetables sector is very difficult and cannot be sure of the advises given by collectors and processors as they are financially involved and thus set rules, which are to their advantage. • Most cooperatives have no clear strategy of development; one single cooperative might produce different products. In some cases, they are also used for political purpose thereby deviating from their development objectives. • There is no common organization for the group purchases of inputs or to allow them stronger negotiating power over sales price. • There is a very strong division of land plots, most producers own very small cultivable areas.
Intermediaries (*Daman* in Lebanon, *Khaddar* and *Hammar* in Tunisia)	• Reduces the benefit going to producers. • Hinders the implementation of traceability so the promotion quality becomes impossible. • Hinders empowerment of producers as they take over harvesting and marketing activities (sometimes even production). • Contracts between them and producers are based on quantity and not on quality. • Provide low prices. • Remove sense of responsibility from the producer.
Other traders (Exporters/ importers, wholesalers and retailers)	• Losses are caused by exporter as they select the most beautiful fruits only while the remaining is sent to processing or sold locally at cheaper prices. • The exporter is sending the product without a fixed price of the product before shipment. This creates insecurity in payment (insecurity on whether or not payment will be received and on price to be expected). • The commissioner pays the producer based on the sale price negotiated on the wholesale market. Everything is based on confidence. • Grading is not done and products are sold per boxes rather than according to weight. • "Vente garage" (= informal market). • Sales on the national wholesale market represent 15 to 20 per cent of the total sales only.

Source: ESCWA based on Lebanon, Ministry of Agriculture and others 2012; and FAO and Cooperazione Italiana, 2007.

3. *Institutional*

Institutional analysis allows the assessment of the impact of policies on the performance of the value chain as a component of a structured environment that contributes to local, national and regional development. Value chains are affected by various economic factors (costs, capital, infrastructure, credit, prices, incentives), social factors (skills, gender, health, education), environmental factors (natural resources, climate, degradation, pollution) and institutional factors (taxes, regulations, standards, policies), from both the public and private sectors. These factors have to be evaluated as part of the overall environment in which value chains are embedded. The institutional environment can be a positive or negative catalyst to agricultural value chains notably with regard to resource-use efficiency, product quality or safety.[16]

In general, support provided to actors in agricultural value chains is insufficient, and it may be limited to the same field of activities while other areas may be overlooked. For example, entities listed in table 5 tend to be active in technical capacity-building, but the managerial side does not receive the focus it requires. On top of the different development institutions that support the agricultural sector, several administrative and private sector entities are also working towards the development of sustainable supply chain networks through training, technical assistance, research, and so on.

TABLE 5. INSTITUTIONAL SUPPORT TO THE AGRICULTURAL SECTOR

Type of support	Target group	
	Producer	Industry
Technical assistance, training, research	LARI (Lebanese Agriculture Research Institute) in Lebanon: Research in agricultural.	MEFOSA (MENA Food Safety Associates) in Lebanon: Building capacity on quality/standards through consulting, auditing and training.
	AVFA (Agence de Vulgarisation et de Formation Agricole) in Tunisia: Providing free training to producers.	CTAA (Centre Technique Agro Alimentaire) in Tunisia: Providing technical assistance for the implementation of quality standards.
	CRDA (Regional Commissary for Agricultural Development) in Tunisia: Following the progress of the crop year.	
	Ministry of Agriculture in both Lebanon and Tunisia: Delivering training, marketing exports, inspecting production, ensuring food safety, use of pesticides, Integrated Pest Management "Plan Vert" in Lebanon: Developing roads, terraces, infrastructure to facilitate agriculture development, and so on. Promoting also the creation of cooperatives.	
	LIBNOR (Lebanese Standards Institution) in Lebanon: Delivering training on marketing, reading and implementing norms, implementing classification and labelling, and so on. Trainings are free and aimed at producers, coops, exporters, manufacturers, and so on.	
	Various non-governmental organizations, donor and technical assistance organizations in Lebanon: Delivering services to producers and food processing companies, namely: - YMCA (Young Men's Christian Association): Processing of food, implementing food safety and standards like the HACCP, calculating sales price, and ensuring traceability, quality standards and logistics; - USAID (United States Agency for International Development): Development of greenhouse cultivation and agricultural value chains; - GIZ: SME development; - ADP (Area Development Program): GlobalGAP implementation; - CHF (Cooperative Housing Foundation): Training on post-harvest handling; - George Frem Foundation: technical support for apple producers, better cultural practices and renewal of varieties in orchards.	

[16] Kaplinsky and Morris, 2000.

TABLE 5 (*continued*)

Type of support	Target group	
	Producer	Industry
Technical assistance, training, research (*continued*)	CTA and CTD (Centre Technique des Agrumes and Centre Technique des Dates) in Tunisia: Provide assistance to operators of the supply chain and research and training	
	GIFRUITS (Groupement Interprofessionnel des Fruits) in Tunisia: Building capacity in the fruit supply chain	
	GIL (Groupement Interprofessionnel des Légumes) in Tunisia: Building capacity in the vegetable supply chain	
Trade/investment promotion	NGOs , donor and technical assistance organizations as listed above	
	Chamber of Commerce and Industry in Lebanon: Developing a "food quality centre," testing products to be exported, delivering sanitary certificates, building capacity on agricultural practices and management, and representing in international fairs to increase visibility. The chamber is also working on developing alternatives to road transportation.	
		IDAL (Investment Development Authority of Lebanon) in Lebanon: Promoting exports, enhancing quality, improving packing and promoting marketing, providing financial incentives, taking part in trade fairs, modernizing packing and storage houses, providing training on quality certification, and conducting market studies
	GIFRUITS (Groupement Interprofessionnel des Fruits) in Tunisia: Promoting the fruit supply chain	
	GIL (Groupement Interprofessionnel des Légumes) in Tunisia: Promoting the vegetable supply chain	
	APIA (Agence de Promotion des Investissements Agricoles) in Tunisia: Promote private investment	
		CEPEX (Centre de Promotion des Exportations) in Tunisia: Promotion of Tunisian exports

Source: ESCWA.

Institutional development related to food standards in Lebanon picked up strongly about three years ago. Most of the adopted standards were based on the Codex Alimentarius,[17] which apply for domestic as well as for imported and exported products. Most Lebanese standards are voluntary, though the Government has the authority to enforce or require adherence to these standards for public health reasons, public safety or national interest. In order to ensure the quality and safety of imported and exported agricultural products, regulations are now being imposed by the Ministry of Agriculture based on international guidelines and recommendations such as from the Food and Agriculture Organization of the United Nations (FAO), International Plant Protection Convention, Codex Alimentarius, the European Union, and so on. A ministerial decision regulates the inspection of exported and imported fresh fruits and vegetables products based on specific technical and quality criteria that differ depending on the product concerned. The ministerial decision and its annexes also set a number of packing and labelling requirements.[18] For apples, the testing of pesticide maximum residue limit (MRL) is being implemented by the Ministry of Agriculture for export product and based on the limits fixed by the Codex Alimentarius. In doing so, representatives of the Ministry go to the field to get samples which are analysed free of charge for producers. Since the beginning of its implementation, products cannot leave Lebanon without a proper "phytosanitary" certificate. For potatoes, a certificate stating that the product is "free from brown rot" must be presented before export is

[17] The *Codex Alimentarius* is a collection of internationally recognized standards, codes of practice, guidelines and other recommendations relating to foods, food production and food safety.

[18] FAO and Cooperazione Italiana, 2007.

allowed. The test is done for an affordable fee of US$1/ton by the Lebanese Agricultural Research Institute. For processed products for export, certification is mandatory and is delivered by the Ministry of Industry after verification that all hygienic conditions were met. The Investment Development Authority of Lebanon also has a programme to help industrialists implement quality standards.

The Lebanese Standards Institution (LIBNOR) is the only authority that prepares national standards and gives the right to use the Lebanese Conformity Mark, "NL" (Normes Libanaises), which is based on the management standard ISO 22000 of the Interantional Organization for Standardization, and Hazard Analysis and Critical Control Points (HACCP). For fruits and vegetables, this mark was introduced in 2013, and it tests a sample product for compliance with the stated quality criteria and the quality management system in place. However, most of these efforts are geared towards products for export while there is no product quality and safety management in place yet for products sold on domestic markets. Each market participant presents his products the way he/she sees fit. The Ministry of Agriculture has a project for the reorganization of the wholesale market but it remains a draft as it is difficult to determine the responsibilities of each of the parties involved. The Ministry of Agriculture should be involved because it concerns agricultural producers, other relevant ministries might also be interested (trade, industry, for example) along with the municipalities, as they host markets. For all others, participation would have to be debated because in Lebanon there are not yet independent central controlling bodies such as a food and drug administration, which could take responsibility. Control is organized by individual ministries, each overseeing its area of competence.

In Tunisia, there are a number of producer syndicates, which assist and defend the interests of their members (farmers and fishermen). They are also involved in training and the provision of agricultural extension services. In some cases, these syndicates also play a role similar to that of cooperatives: they collect raw products from their members and sell them in national wholesale markets. These syndicates are active in national markets only, as they are not sufficiently financially secure to engage in export where it is more difficult to follow stringent norms and standards. This system helps avoid intermediaries and offers higher prices to participants but they have to wait longer to get paid and, as a result, only about 10 per cent of its members use its services for selling their products. In addition, following the recent sociopolitical changes, several of these institutions have not operated as expected and now farmers are unsure of their effectiveness. Most of these institutions are still trying to regain the confidence of producers particularly in their roles as impartial market regulators and export promoters.

Tunisia is a member of the Codex Alimentarius and abides by the World Trade Organization agreement on sanitary and phytosanitary measures. A department within the Ministry of Agriculture conducts the sanitary control of products and inputs. A list of authorized products was established and imports are controlled. Most imports are from Europe and the United States where rules over quarantine pests are similar to those in Tunisia. A phytosanitary certificate is required in order to export food products. MRL is randomly controlled through qualified laboratories, though the number and capacity of accredited laboratories is very limited. The Chamber of Commerce and Industry of Tunisia delivers certificates of origin for exports. This certificate does not give any guarantee of quality but it is necessary for exports to countries which are not members of the European Union. Most industrialists have acquired quality certification such as ISO 9001 or ISO 22000. There is also a programme of the professional association of industrialists, which assist its members in the implementation of quality standards but most are for products destined to external markets. For domestic markets, the semi-public entity which regulates wholesale markets has technicians and laboratories checking on quality through random control and analysis to verify the respect of HACCP rules. However, these controls remain limited as informality dominates local markets and sales. The Ministry of Industry is also involved in normalization and intellectual and industrial protection.

Regarding the harmonization of norms in the Arab region, the League of Arab States has a committee for standardization, which meets every two years in Morocco to work on harmonizing standards in Arab countries (namely, to set a common standard for pesticide residues) but these are not yet viable alternatives. Despite some strong achievements, the overall institutional context is still weak and a lot remains to be done to promote voluntary sustainability standards for domestic markets. Greater harmonization of rules,

regulations and institutional framework within the region will also be needed if increased regional trade is to become a reality.

4. *Performance*

It is human nature to seek advancement especially once success has been achieved in a certain area. For value chains, it is no different. Any successful firm in an agricultural value chain will seek ways to enter new markets or production systems to increase production, efficiency or profitability or to enhance specialization or diversification. Thus, producers will attempt to acquire land, buy out other producers, or to take on new roles such as wholesaling, handling, retailing or processing to improve their margins. Similarly, processors might seek to consolidate horizontally or vertically. To encourage this kind of advancement, governments must support a diverse mix of policies, improve the overall investment environment and allow for and support the acquisition of appropriate technologies. This is also referred to as upgrading, which could be of four types: (i) process change, which involves adopting more efficient systems (technology); (ii) product change, which suggests moving into new product lines (innovation); (iii) function change, which aims at adding new functions (scales); or (iv) chain change, which implies moving into new business lines (diversification). The characteristics of upgrading will be dictated by the type of industry, the geographic location, the structure of the value chain, the prevailing context and also the ability of the entrepreneur to take risks.[19]

As mentioned earlier, agricultural value chains in the region are largely made up of many participants that are too small and scattered to build economies of scale that are needed for improved competitiveness or bargaining power. Various actors each make their own decisions independently without following a common, agreed upon strategy. Moreover, market information is often unavailable which leads to unsustainable systems with substantial misuse of resources and other inefficiencies. This has a major impact on overall performance, as most value chain participants become rent-seekers or seek short-term solutions instead of developing a long-term vision or investing for meaningful development.

Most agricultural value chains in the region are slow, inefficient and lack transparency. For example, farmers are unable to reap the fruits of their efforts both because of unscrupulous intermediaries who take advantage of their access to price and market information. Also, the needs of end consumers are rarely known because of a lack of transparency, a lack of proper monitoring of the functioning of markets and a lack of other alternatives to choose from. Thus, issues of quality and safety are an afterthought unless a lucrative niche is readily identified or activist consumers attract attention products they prefer (such as organic produce). Otherwise, powerful actors in the value chain typically have power over farmers, and have few incentives to improve the functioning of the system, especially if they would risk losing their clout and profit.

There are a few agribusinesses in the region that aim to become major regional players, which could give a major boost to national and regional agricultural value chains. These include the Agthia group, a food and beverage company from the United Arab Emirates; the Mawashi group, a meat products company from Qatar; the Savola group, a dairy and related foods company from Saudi Arabia; the Americana group, a restaurants and frozen vegetables company from Kuwait; the Almarai group, a dairy company from Saudi Arabia; and few others.[20] Also, a number of national and regional retailers are slowly emerging including for example The Sultan Center (TSC) group from Kuwait or the Bou Khalil group in Lebanon, which are increasingly working alongside and competing with foreign groups, such as Carrefour, Spinneys, Monoprix and others. These positive achievements could provide the stepping stone to develop successful agricultural value chains, though the challenges are still daunting. Among these challenges are that countries in the region continue to pursue piecemeal approaches and prefer to go it alone rather than to pursue integrated and coordinated efforts aimed at the entire region and beyond. The fragmentation of agricultural markets prevents Arab countries from taking advantage of regional economies of scale.

[19] Kaplinsky and Morris, 2000.

[20] Keulertz, 2013.

Regional agribusinesses are faced with great competition from well-established international firms and brands with significant experience, large budgets, marketing prowess, well-known product lines, strict standards, streamlined management and so on. Thoese global players usually set the "rules of the game" in global commodity markets and include France-based firms Danone (brands Activia, Actimel or Bledina); the Lactalis group (brands President, Bridel or Bridelight); and Sodiaal (brands Candia and Grandlait) that cannot be avoided in the dairy sector. In addition, the market includes America-based General Mills (brands Pillsbury, Green Giant, Old El Paso or Haagen Dazs); Canada-based McCain frozen products; and the Switzerland-based Nestlé (brands Nescafe, Coffee-mate Carnation and others). Those firms are simply too large, and regional producers who operate on a smaller scale cannot compete with without a clear and well-articulated development strategy.

In addition, the world trade of agricultural commodities, notably the grain market, is dominated by a few global players including Archer-Daniel-Midland, Bunge, Cargill and Louis Dreyfus, which hail from developed countries, along with a few emerging firms from the Asia-Pacific region, which include the Noble Group, Olam, Wilmar or Sinamas.[21] These firms set the terms of product acquisition or pricing. Although Arab countries are among the largest importers of cereals, their voices are not heard when prices and standards are set. Local and regional firms must begin to forge strategic alliances among themselves and with leading firms to ensure that they are included in major value-adding processes.

There is a continuous shift of power and value addition away from small agricultural actors to larger ones. As global firms seek to increase their size and presence, farmers and SMEs from the region could benefit from their knowledge and experience to gain access to more affordable farm inputs, better output pricing, advanced technical know-how and management, and easier access to standardization and certification bodies.[22] Through patterning with global firms, local farmers and SMEs may be able to improve their compliance with rules and regulations and thus enhance quality and safety. Improved compliance with rules regulations may also enable local producers to export goods instead of being restricted to local markets. Competition in local markets has grown considerably given that the above-mentioned global firms are also seeking to expand and open new markets. Box 1 presents the experience of Morocco in developing and improving the competitiveness of its vegetable market both for export and local sale.

Box 1. Successful consolidation in the vegetable market of Morocco

The vegetable export sector in Morocco has become increasingly consolidated and more competitive following the liberalization programmes of the 1980s. Consolidation occurred, to a certain extent, to respond to the increasingly tight European regulations and the introduction of new sanitary and phyto-sanitary measures and standards to improve quality while ensuring traceability.

A few exporters have dominated the vegetable supply chain of Morocco since the 1990s. These firms control the network of packing facilities while also sometimes managing their own farms or relying on a few large farms for their supplies. As a result, by 2007, seven exporters accounted for 70 per cent of fresh fruit and vegetable exports from Morocco. The top five are Rosaflore, Armona, Marissa, Avryl, and GED, which are vertically integrated (involved in production, handling, shipping, marketing and exporting). However, due in part to the existing restrictions on foreign ownership of land, locally owned firms are important players particularly in the production segment of the value chain.

By 2008, Morocco exported for about US$1.06 billion in fresh fruit and vegetables with its leading export markets being France and the Russian Federation. Tomatoes were the largest single export item at nearly a quarter of total earnings, while a variety of citrus fruits accounted for about 40 per cent of earnings. Processed exports amounted to US$151 million, with frozen strawberries accounting for over half of this total. Other important horticultural exports include melons, peppers and potatoes.

Source: Femandez-Stark and others, 2011.

[21] Ibid.

[22] Altenburg, 2007.

The development of efficient regional agricultural value chains could provide opportunities for upgrading and diversification. It would allow firms from the region to compete in global markets not only to export products but also, and more importantly, to acquire basic products such as cereals on much better terms. The implication would be improved national and regional food security through better and more integrated production, acquisition, transport, storage and marketing. The development of efficient regional agricultural value chains would also be in line with some major regional declarations, including the 2008 Riyadh Declaration to Enhance Arab Cooperation to Face World Food Crises, which urge countries to support greater Arab agricultural integration.

III. RESOURCE-USE EFFICIENCY IN AGRICULTURAL VALUE CHAINS

Resource-use efficiency is primarily concerned with sustainable use of resources through appropriate processes. The aim of resource-use efficiency is to reduce the amount of resources consumed while also reducing waste generated by production and consumption. Resource-use efficiency can be understood as increasing productivity while reducing the environmental impact. Ideally, a resource-efficient system meets the economic, social and environmental needs of a population or country while remaining profitable, competitive and sustainable. Resource-use efficiency paves the way towards a green economy, which advocates for clean methods of addressing poverty and enhancing livelihoods. As part of the green economy, participants in green value chains meet certain social, economic and environmental objectives while acquiring inputs, producing and processing outputs, handling, storing and transporting goods, marketing and retailing the end product, and also in recycling and disposing of used goods.

Green value chains are a promising way to address economic issues such as profitability, cost reduction and revenue generation, but they also impact a wider range of social and environmental development issues including creating jobs, enhancing livelihoods and conserving the environment. Companies that have taken the lead in greening their supply chains are finding significant savings by reducing packaging, using energy more efficiently, removing harmful chemicals from production processes and improving logistics. By becoming more efficient in those ways, firms that have greened their supply chain have also become more competitive and more resilient to crises. Although this new business model was developed in large part in response to environmental regulations and consumer demands, it also helps companies to reduce costs while increasing competitiveness in a crowded global marketplace.

A. TRANSITIONING TO GREEN

1. *Overview*

Green value chains are increasingly having global ramifications and those who are unable to adapt risk losing to their competitors. Leading companies are making social, economic and environmental performance part of their growth strategies and are allocating more and more resources to reduce costs and to become more socially responsible and environmentally friendly. As a result, they are requesting all stakeholders in their value chains, suppliers and buyers alike, to meet certain standards and to use resources more efficiently. Table 6 summarizes some of the economic, social and environmental impacts that result from green value chains.

TABLE 6. EXAMPLES OF IMPACT OF GREEN VALUE CHAIN ADOPTION

Strategy	Economic impact	Social impact	Environmental impact
Optimize material use	Less waste (cost)	Less health hazards	Reduced solid waste and pollution
Reduce inventory	Less space and energy consumption	No relocation and social disruptions	Reduced pollution, build up areas and emissions
Reduce overproduction	Fewer resources used for production	Less over-consumption	Energy savings
Reduce transport	Less fuel consumption	Less health risks	Reduced emissions

Source: ESCWA Adapted from Ma and others, 2010.

The main drivers of the development of green value chains include the following:

- Market demand: Although still limited, consumers demand is increasing for products that are attractive, safe, socially responsible and environmentally friendly. Value chain firms, mainly global firms, have made ever greater attempts to reduce their negative impact by manufacturing and selling products that are branded as green;
- Regulatory pressure: Governments around the world are prohibiting certain products due to their negative health, social, economic or environmental impacts and value chains firms must comply with those policies to avoid penalties;

- Economic competitiveness: Costs to businesses can significantly increase as a result of various social, economic and environmental factors (namely, strikes, resource depletion, pollution clean-up, and so on) and value chains are adapting by anticipating the impact of those risks.

However, greening is not an easy task especially for small stakeholders (farmers, SMEs, middlemen/traders, and so on) largely as a result of their inability to meet the necessary investment required to comply with green standards. Some of these challenges include the following:

- Long payback periods for green investments are a strain to many small operators;
- Lack of long-term commitments, and few financial incentives from green value chain buyers;
- Green investments are costly and may bring in additional operating costs;
- Limited access to adequate finance or a lack of capital for green investments;
- Competition from non-complying operators may force firms to cut costs for greening in order to stay in business.

The current paradigm shift from a supply- or quantity-driven food chain toward one that is driven by demand or the market is attracting more attention to issues such as quality standards or environmental concerns. Those developments go hand in hand with changes in dietary patterns due to rapid urbanization and increased purchasing power. That shift is leading to changes in the agriculture and food sector at the local, regional and global levels and this in return is affecting the food chain not only in terms of sustainable intensification but also in terms of safety and quality, and social and environmental impact.

The agricultural sector is essential to the development of a green economy in the Arab region as the population is expected to reach half a billion during the 2030s, thus, agricultural supplies will have to increase substantially while minimising economic, social and environmental impact. At the same time, efforts will be made to enhance the livelihoods of those along agricultural and food value chains starting from farmers, which tend to be the weakest link. Greening agricultural and food value chains should be understood as a strategic integration of resources, information and capital to achieve economic, social and environmental objectives through a systemic coordination of key processes. The greening process will include using fewer inputs and more efficient processes, reducing energy consumption, ensuring site cleanup, treating and reusing water, abating air emissions, adopting cleaner production techniques, recovering resources, and refurbishing and recycling.

2. *Greening agricultural value chains*

Inefficiencies in agricultural value chains have received much attention in recent years. Relevant issues include globalization, food recalls, technological innovations and the changing preferences and diminishing trust of consumers in the market. From agriculture production through processing to retail, agriculture value chains consume resources and emit pollution and waste as described in table 7.

TABLE 7. MAJOR RESOURCES USED, AND EMISSIONS AND WASTE GENERATED IN AGRICULTURAL VALUE CHAINS

Resource	Usage
Water	Used for farming (irrigation, watering) and processing (cooling towers, condensers, washing, pre-cooking)
Soil	Used for crop production and livestock grazing
Energy	Used on-farm (fertilizers, machineries, pumps), during handling, processing, storage and transportation (refrigeration, heating, conveyers, equipment, forklifts, trucks)
Greenhouse Gas	Mainly carbon dioxide emissions associated with livestock production and fertilizer, pesticide, processing and packaging activities, burning of agricultural wastes
Waste	Mineral (waterlogging, salinity), organic (sewage, manure, crops, food, animal-derived), and other solid waste (plastic bags, corrugated cardboards, glass)

Source: ESCWA adapted from www.food-chain.com.au.

The increased attention on how food is produced and delivered has led many agricultural value chains participants to implement a range of green management practices (table 8), such as efficient use of input resources, pollution prevention, waste minimization and recycling. Efforts are being made to provide better eco-designed products and to enhance resource-use efficiency, to rationalize or enhance the efficiency of inputs including water, minerals, land, plants, trees and fossil fuels, and to deal with waste and pollution by drawing on methods of pollution control including cleaner production, eco-efficiency and industrial ecology.[23]

TABLE 8. EXAMPLE OF GREEN MANAGEMENT PRACTICES IN THE FOOD PACKAGING INDUSTRY

Green Management Practices
Creating generic, less expensive and lighter packaging
Using biodegradable packaging made from recycled material
Sorting recyclable materials as specifically as possible
Working with experts to reduce/eliminate packaging whenever feasible
Recycling material to reduce waste and environmental impact

Source: Kushwaha, 2010.

However, moving towards green value chains will require that agricultural sectors achieve greater sustainability and resource-use efficiency while increasing productivity and incomes, enhancing the resilience of livelihoods and ecosystems and reducing greenhouse gas emissions. This implies that every segment of agricultural systems must become more efficient and resilient by using less land, water, energy and inputs while still producing and delivering the food sustainably and to become more resilient to changes and shocks. Farming and manufacturing operations are viewed as the root causes of inefficiencies, in the form of waste generation, ecosystem disruption and natural resources depletion.

Greening food value chains has numerous benefits ranging from cost reduction to the integration of suppliers in a participative decision-making process that promotes environmental innovation. Most Arab countries are working towards developing green value chains even though most companies are still coming to terms with how to begin and achieve results. Some of the challenges are to minimize carbon emissions, decrease water use, lessen waste, adopt greener or cleaner production processes and fill the information gap notably on the impact of green value chains.

Greening is starting to become more common, particularly to showcase good business conduct and improve the environmental friendliness of companies, products, processes, systems or technologies. Currently, almost all green solutions that have been adopted in the Arab region are based on traditional approaches whereby firms identify harmful environmental impacts of their operations, and then try to eliminate or reduce the impact.[24] A more sustainable solution would be to improve resource-use efficiency along the entire agricultural value chain.

B. RESOURCE-USE IN AGRICULTURE AND FOOD VALUE CHAINS

The agriculture and food sectors rely on a finite supply of land, water and energy to meet food demand; hence, misusing and degrading these supplies can lead to a serious economic crisis not only for the agricultural sector but also for the entire economy. This section reviews how resources are used throughout agricultural value chains and examines underlying governance and institutional assistance in using these resources.

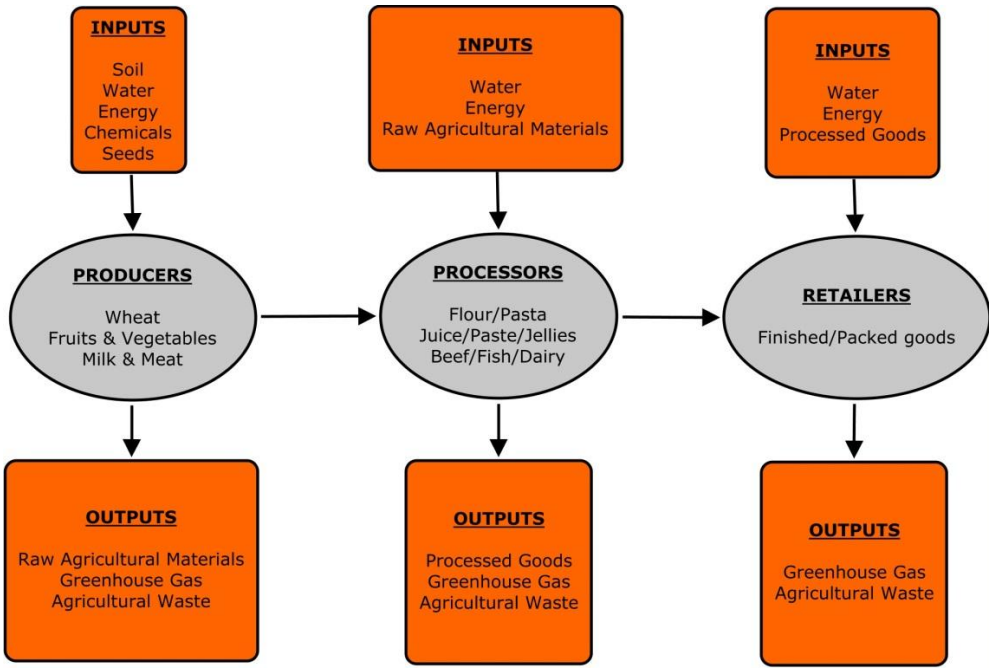
[23] FAO, 2012.

[24] Rull, 2010.

1. *Structure: mapping of consumptive activities*

Figure 10 illustrates inputs consumed and outputs produced including waste and pollution in agricultural and food value chains.

Figure 10. Schematic representation of inputs and outputs in agricultural value chains



Source: ESCWA.

Agricultural value chains encompass farmers, processors, retailers and a number of intermediaries who all work to add value, improve quality or increase efficiency and develop and market differentiated products. To better understand the characteristics of agricultural value chains, analyses usually start with a mapping of the structure of its different segments. Below is a review and short description of some of the major actors and their resources, emissions or wastes that they generate along agricultural value chains. Emphasis is put either on the resources, emissions or wastes or on the segments or levels or actors generating them (see also annex table 1 for more details).

(a) *Selected segments/levels or actors of agricultural value chains*

(i) *Farmers*

The main activities of farmers consist of land preparation, ploughing, planting, irrigating, growing, fertilizing and harvesting. They may also be involved in limited storage, cooling or heating farms and processing. Major resources used include soil, water, energy, feeds and seeds. These activities will result in raw agricultural and animal source materials and will generate waste including greenhouse gas, and farming and chemical by-products. In the region, a majority of producers are small-scale with little capital to invest thereby relying on traditional techniques, family labour and lacking access to major markets.

(ii) *Processors and intermediate handlers*

Food processing goes from simple production, namely, washing and packing raw produces, to more high-tech processing, namely, cook-chill processing, ultra-high temperature processing, and so on. Processors rely on raw agricultural inputs and animal source materials provided to them by farmers. Their

work encompasses activities such as drying, grinding, slaughtering, packaging, storing, cooling, heating, cooking, canning, freezing, deboning, cutting up, homogenizing, sterilizing, fermenting, and so on. In addition to the inputs and source materials from farmers, they consume energy and water, and other manufactured inputs such as chemicals, oils and sugars. Processed food could be highly profitable and lead to job creation, development of vibrant SMEs, and so on. Quality, safety and standards are big issues which determine success and survival. In the region, the majority of actors are small family processing units that rely on determined clients, both suppliers and buyers. A few large operations associated with international brands are emerging though the availability of sufficient raw resources is a major issue.

(iii) *Retailers*

Success in the agrifood business is determined by the marketing and distribution of intermediate and final goods in local and global markets.[25] These represent the retail segment of the value chain. Their role consists of connecting and coordinating farmers, processors and final consumers. Retailers' activities are limited to storing, heating, cooling, packaging, distributing, transporting, shipping and marketing. Their main inputs are energy and water, and they generate considerable waste. In the region, agrifood retailers comprise different types of entities ranging from small corner and roadside markets to family stores and specialty stores, convenience stores, supermarkets, hypermarkets and large-scale warehouses. Supermarkets are rapidly globalizing (Carrefour, Monoprix, Spinneys to name a few) and crowding out local and regional firms.

(b) *Selected resource used and waste or emissions generated in agricultural value chains*

(i) *Cereals*

Cereals are the main raw agricultural resource and are a benchmark of the agricultural sector. A number of Arab countries are among the largest net cereal importers in the world. Cereals are used for the production of various foods including breads, pastas and a whole lot of other preparations including animal feeds.

(ii) *Water*

Water is used for raw agriculture production, agro-industry and retail. Unreliable water supplies have a significant impact on productivity in agrifood systems where waste and losses are also high. Farming uses most of the water attributable to the agrifood chain though agro-processors also use a significant amount of water for cooling or to dissipate and transport waste materials.

(iii) *Soil*

The soil is considered an input resource in the agrifood chain and particularly in the production of raw materials as it is fundamental to crop and livestock production. However, many contemporary soil and crop management systems are unsustainable and a great amount of manufactured inputs are used as a result of the intensive but unsustainable use of soils.

(iv) *Energy*

Energy is used at most levels of the agriculture value chain from the production of crops, fishing, livestock rearing, post-harvest handling, storage, processing, transport and distribution, and food preparation. The agrifood chain is energy-intensive and thus the availability of energy is important for improving both food security and agriculture development even though the current use pattern is unsustainable.

[25] Fairbrain, 2003.

(v) *Solid losses and waste*

The agrifood chain generates substantial amount of waste and other losses from initial agricultural production up to final household consumption (see below also in Performance section). Agricultural waste in developed countries occur at retail and consumer levels while most losses happen at the post-harvest and processing stages in developing countries as a result of the combined effect of the warm and humid climates and the lack of modern transport and storage infrastructure.[26] In the United States, the amount of animal manure produced annually is estimated at about 1,240 million metric tons. Other agricultural wastes from processing operations are about 1.5 billion metric tons per year. According to various sources, in North Africa and West Asia, food waste and loss from production to retailing is about 180 kg/year per capita. Table 9 shows the percentage of food waste/loss for several commodities throughout the major segments of the agricultural value chain in the West Asia and North Africa region.

TABLE 9. FOOD WASTE AND LOSSES ALONG AGRICULTURAL VALUE CHAINS IN NORTH AFRICA AND WEST ASIA
(*Percentage*)

	Agricultural production	Post-harvest handling and storage	Processing and packaging	Distribution	Consumption
Cereals	6	8	7	4	12
Roots and tubers	6	10	12	4	6
Oilseeds and pulses	15	6	8	2	2
Fruits and vegetables	17	10	20	15	12
Meat	7	0.2	5	5	8
Fish and seafood	7	5	9	10	4
Milk	4	6	2	8	2

Source: Gustavsson and others, 2011.

2. *Governance: Patterns of resource use or waste generation*

This section will review a few management practices related to major resources used in agriculture. The major goal in agricultural value chains is to produce higher yields without further endangering the environment either on- or off-site. Sustainable agricultural value chain development is a systemic approach integrating a framework for resource-use analysis and efficiency improvement. Agricultural sustainability is evaluated from different perspectives including economic viability, environmental sustainability and social acceptability. Economic viability consists in maintaining necessary inputs such as land, labour and manufactured capitals of the economic process to keep producing enough food. Environmental sustainability is attained when taking into account the ecological limits of the ecosystem and its services. Social acceptability is achieved through the acceptance, fair distribution and access to food for all, by the improved quality of life and the stability of lifestyles.

(a) *Pattern of water use*

Currently, the agriculture sector uses over 70 per cent of available natural freshwater resources in the region; however efficiency barely reaches 50 per cent, and sometimes is as low as 30 per cent in a number of Arab countries. In addition, the over-pumping and the lack of control against unlawful drilling, poor irrigation practices, and the absence of water tariffs lead to an excessive consumption of water in agricultural value chains. Excessive water use and pollution adds financial and ecological burdens to the industry, to the environment and to the population. Various subsidies provided by most Arab countries encourage over-consumption of water resources thereby worsening ecological losses and water scarcity.

[26] George Morris Centre and Value Chain Management, 2012.

The agriculture sector is by far the largest consumers of water. They consume one thousand times more than the quantity of drinking water and one hundred times more than is the quantity used to meet basic personal needs. Better irrigation-water management and water-saving technologies can significantly reduce the waste of water. This would have to be combined with reuse, recycling, water harvesting or "virtual water import" meaning the import of high water-content products.

Box 2. Reducing water use in the food industry

A food processing company in Australia reduced its water consumption from 3.10 kilolitre/ton of product to 1.49 kilolitre/ton of product through a series of changes to water use practices in the factory, including the following:

- Replacing all inefficient taps for a saving of 296 kilolitre/year;
- Reducing the defrosting cycle of freezers, saving 5,500 kilolitre/ year;
- Turning off sprays when the conveyors were not running, saving 13 kilolitre/year;
- Replacing interlocking belts with flat belts saving cleaning time and 788 kilolitre/year;
- Retraining staff to operate hoses more effectively and to preferably dry clean or use buckets to wash spills on floors during manufacturing.

Source: www.ecoefficiency.com.au.

(b) *Pattern of land use*

To maximize land productivity, farmers may operate in ways that aggravate land degradation, including activities such as increased cultivation, shortening crop cycles and reducing fallow periods, inadequate crop rotation and monoculture, intensive overgrazing, deforestation and so on. A few countries of the region, namely Bahrain, Egypt and Qatar, use a higher level of fertilizers per hectare than any other country in the World. The challenge is to abandon such unsustainable practices to move towards better land management that can provide a sound foundation for sustainable intensification of crop production. In the region, land degradation and erosion is a major problem while widespread urbanization is slowly scavenging prime lands around cities.

As food demand is continuously increasing and agriculture is the primary livelihood of many in the region, sustainable land conservation should be urgently adopted. To this end, Governments should take appropriate measures to promote natural resource management, including enacting policies, designing plans, developing strategies, implementing reforms, encouraging investments and conducting appropriate monitoring to promote the sustainable management of land, water and biodiversity. This will involve working with numerous stakeholders, including public and private entities, farmers, industry, urban administration, local communities, environment groups, researchers and the broader community.

(c) *Pattern of energy use*

Farmers, agro-processors and supermarkets rely heavily on fossil fuel. Energy is used inefficiently in production systems including transport, storage, cooling or heating, waste collection and treatment, and chemical applications. Air quality is deteriorating in several major urban centres of the region, namely, Cairo, Damascus and Sana'a, as a result of the burning of fossil fuels and air pollution levels in some cities are well above the standards set by the World Health Organization. In addition, rising energy prices are negatively affecting the competitiveness of existing food processing.

Thus, the continued development of the food and agriculture systems of the region will have to be based on cleaner technology that reduces the consumption of fossil fuels. Increasing energy efficiency and

integrating renewable energies can do much to improve the sustainability and economic competitiveness of food processing industries. The region has a lot of potential for both solar and wind energy.[27] Renewable energies, including solar, wind, hydro, bioenergy or geothermal must be used substantially whenever feasible and affordable for the various farm or processing and handling operations.

(d) *Pattern of solid waste/loss*

Like any other value chain, wastes and losses occur through all segments of agrifood value chains. Fresh fruits and vegetables are wasted because there infrastructure is inadequate for proper transportation, storage, cooling and marketing. Major causes of losses in the Arab region include inappropriate handling and exposure to undesirable environmental conditions, lack of sufficient cold storage facilities, or handling of crops to name a few. Current waste management practices in Arab countries are not economically sustainable. Solid waste generated by the agrifood industry is badly managed, creating numerous environmental problems and health complications.

3. *Institutions: Supporting improved efficiency*

A problem that underlies agricultural value chains in the region is inefficient pre- and post-production infrastructure and practices. Food production, processing and marketing systems are complex, and in developing countries they are highly fragmented and dependent on a large number of small operators. As the food passes through numerous handlers and middlemen, there are more chances for it to be exposed to unhygienic conditions. Moreover, agricultural value chains rely on limited infrastructure, which in most cases, are deficient and do not fulfil all quality and safety requirements, especially in rural areas. For example, available transport facilities for most farmers are very restricted and deficient and packing stations are becoming more common but are used almost exclusively for exports.[28] In addition, the food processing industry, which ranges from sophisticated facilities to small under-equipped operations, suffers from several comprehensive and widespread problems on different levels, including the lack of or insufficient raw materials and technical know-how, deficient quality control measures, management problems, insufficient research, inadequate products for processing and obsolete equipment.[29] Retail and market infrastructure in the region, especially in the wholesale market, is poor and needs improvement. Roadside markets are very common, usually in the suburbs of major cities and in rural areas. In nearly all types of markets, the produce is exposed to adverse conditions, namely direct sun with elevated temperatures.

Food safety practices in the region, notably hygiene and sanitation, are inadequate. In most Arab countries, well-defined standards for food quality are absent or neglected and institutions to follow up on enforcement of the already limited standard are weak.[30] In recent years, the region has gone to great length to ensure risk management and strengthening food safety. Thus, efficient food control systems were developed in the United Arab Emirates and Jordan for both domestic and imported food while new food legislation was issued in Lebanon, Oman and the Syrian Arab Republic. Monitoring agencies were set up in Saudi Arabia and Jordan and were provided with adequate inspection technology (namely, hand-held computers, customized software and improved surveillance systems). Additional efforts were also made in Bahrain, Kuwait and Qatar to carry out the accreditation of qualified analysts.[31]

Good agricultural practices (GAP) and good manufacturing practices (GMP) are widely used in agricultural value chains covering activities related to maintenance, food safety and quality, environmental impact, as well as animal health or agricultural workers rights. The use of GAP and GMP in agriculture

[27] Tolba and Saab, 2008.

[28] Yahia, 2005.

[29] FAO and WHO, 2010.

[30] Yahia, 2005.

[31] Tajkarimi and others, 2013.

involve the adoption of determined guidelines or standards, the monitoring of these standards, and wide awareness-raising campaigns. GAP and GMP for plant and livestock production are designed to minimize food hazards, eliminate damaging practices, protect worker health, educate customers and promote safety. Redesigning and improving food and agriculture-related production and manufacturing processes and upgrading equipment will yield large efficiency improvements though this may require significant resources and investments and proper support so value chain actors could be able to identify their needs and receive appropriate incentive.

Three international standards, ISO, HACCP and Codex Alimentarius, are the most relied upon in the world covering wide-ranging areas from resource-use efficiency to waste reduction. ISO standards are concerned with safety, reliability and quality and are strategic tools for businesses to reduce costs, minimize waste and errors and increase productivity. These standards are important in agricultural value chains, as they promote resource-use efficiency and risk management improvement. ISO standards are built through consensus-based global process and target a number of areas (box 3).

Box 3. Popular ISO standards

ISO 9000: Quality management
ISO 14000: Environmental management
ISO 22000: Food safety management
ISO 26000: Social responsibility
ISO 31000: Risk management
ISO 50001: Energy management

Source: www.iso.org.

HACCP provides a systematic approach to food safety through the reduction of allergenic, chemical and biological hazards in production processes. They set measurements to reduce risks to safe levels and are also referred to as standards for the prevention of hazards. HACCP can be used at all stages of the food value chain, from production to processing including packaging and distribution. In most cases, HACCP are very effective in ensuring food safety and protecting public health even though its use is still voluntary except for specific food items such as juice, meat and seafood.

CAC coordinates food standards at the international level and has proved successful in pushing for the international harmonization of food quality and safety requirements. It formulates standards for a wide range of food products on issues such as pesticide residues, food additives, veterinary drug residues, hygiene, food contaminants, labelling, and so on. It has been instrumental in raising worldwide awareness on food safety, quality and consumer protection issues, which it achieved through consensus-building.

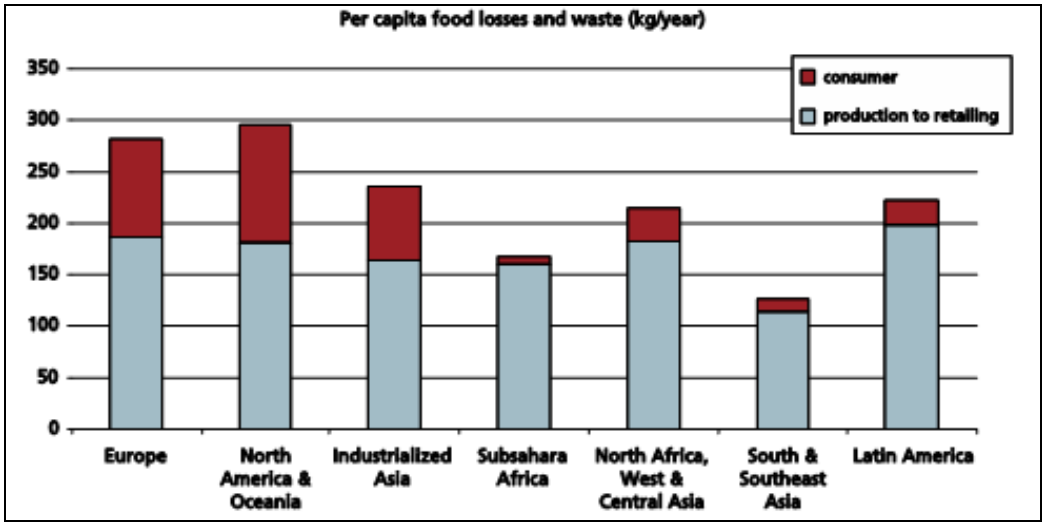
Improving the safety and quality of food in agricultural value chains is vital. Countries of the region should exert efforts to induce the wide adoption and use of the above standards in addition to other voluntary sustainability standards, which are private-led standards that are increasingly being adopted by leading agro-businesses, such as GlobalGAP, Fair-trade, Rainforest Alliance and Organic Standards. National institutions and legislation are being strengthened, though more must be done to harmonize the various institutions, legislation and regulations at the regional level.

4. *Performance and implication for livelihood improvement*

The dilemma of excessive resource-use in agricultural value chains is apparent in the Arab region. The region's agricultural value chains are characterized by an inefficient use of resources, which is leading or worsening the environmental challenges such as higher or increased air and water pollution and the depletion and degradation of natural resources. To the above should be added the impact of sociopolitical crises that are prevalent and that constrain Arab countries from embarking on a more sustainable path towards economic and agro-industrial development. New ways of using resources more sustainably are needed as the

current mode of production relies on substantial amount of natural resources which are limited, scarce and irreplaceable. As noted above, food producers are using excessive agro-chemicals and overusing water resources. They are misusing non-renewable resources and generating industrial effluents and sewage while traders, transporters and large retailers are polluting and overconsuming fossil fuels for transporting, heating and cooling. Moreover, food losses and waste in the region is quite substantial for various reasons, chiefly that the multitude of small food handlers are not well equipped to ensure food safety (figure 11). Efficient use and handling of agricultural resources along all segments of value chains is urgently needed as it will lead to improved livelihoods particularly in rural areas.

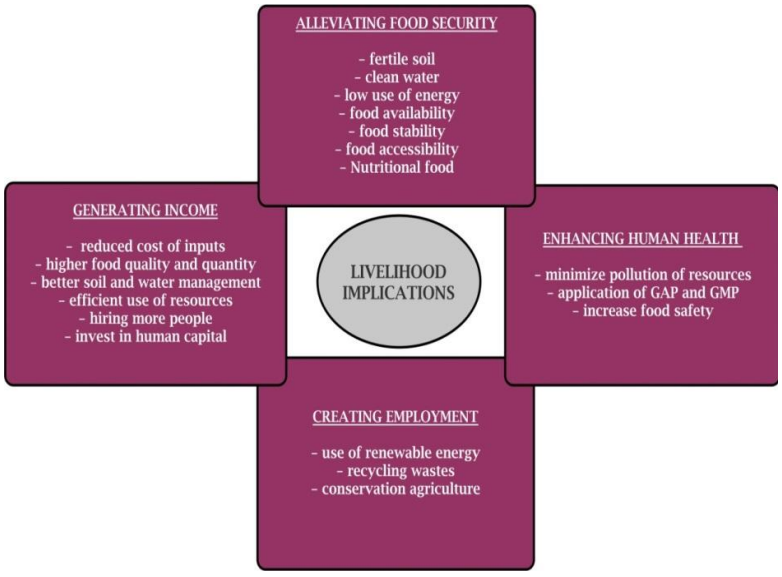
Figure 11. Food loss and waste by major world regions



Source: Gustavsson and others, 2011.

Thus, greening agricultural value chains, especially its livelihood implications, could prove highly beneficial to countries of the region if viewed in the context of enhancing food security, reducing poverty, generating income, creating employment, developing human capital or enhancing human health, all of which contribute to improving livelihood as shown in figure 12.

Figure 12. Livelihood implications of greening agricultural value chains



Source: ESCWA.

The four dimensions of food security, namely availability, accessibility, stability and quality, are closely correlated to limited access to fertile soil, clean water and use of energy. Using input and output resources efficiently can improve the food security of millions of poor people living in developing countries including in the Arab region. Increasing plant (wheat, fruits and vegetables) and livestock (sheep and goat) productivity and reducing post-harvest losses have the potential to alleviate food insecurity. Efficient use of water and energy resources by food processors and retailers will enhance food stability in the long term without further degrading the environment. In addition, the application of good manufacturing practices will directly enhance the nutritional value of the food commodity, thus increasing food security.

Greening agricultural value chains could reduce production costs at different levels of the chain resulting in the generation of more income and reduction of poverty. Greening implies that farmers use fewer chemicals to spray and fertilize crops for human or animal consumption, which increases the overall quality though it leads to less quantity. An increase in the quality of agricultural raw products is believed to generate more income and ensure a better quality of life. Higher returns are obtained by reducing the cost of agricultural inputs and labour combined with better soil and water management strategies. Similarly, the efficient use of renewable energy sources and adequate management of waste will increase the income of food manufacturers and traders. As a result, higher production and additional income will help to protect the environment and improve the health and ultimately, the livelihoods of people. Additional revenues can lead food processors to hire more people and invest in human capital by enabling a healthy and comfortable working environment.

Better resource use along all segments of agriculture value chains can lead to improved savings and enhanced investments and thus to employment creation. Green agricultural value chains have the potential to generate green jobs while also improving livelihoods particularly in rural communities. Green value chains also have the potential to minimize the pollution of natural resources such as air, water and soil. Using lower agricultural inputs (fertilizers and pesticides) for production and lower fossil fuel-based inputs for processing and marketing food products will help significantly reduce green house gases in the air and chemical levels in soil and water. This would improve the health of workers and rural population. Adhering to GAP, good hygiene practices and GMP will increase food safety by reducing the risk of food poisoning and the potential for chronic diseases.

However, greening comes at a cost. Though many sustainable processes are becoming affordable and greening is progressively being accepted in project design and implementation, the adoption of advanced or innovative practices and technologies may add (in some cases significantly) to costs. Larger firms may find it easier to meet the added cost, but it may be too expensive for smaller firms and particularly for family-owned or neighbourhood-operated units.

IV. DEVELOPING GREEN AGRICULTURAL VALUE CHAINS

This section provides policymakers and development-planners with options to organize and promote the development of agricultural value chains in the region and to also adopt green practices and processes. The development of efficient agricultural value chains could be seen as another way to overcome challenges to food security that have prevailed in a number of countries since the food crisis of 2007-2008. Numerous responses to the crisis have been enacted though the great majority led to increasing the fiscal deficit of countries in the region without significantly or sustainably improving food availability. Developing green agricultural value chain could help transform agricultural in the region by improving productivity and profitability, and thereby revenues, while at the same time ensuring the sustainability of the entire system through improved economic, social and environmental conditions.

A number of implementation actions are proposed to guide the national and regional transformation of agricultural value chains. The aim is to provide stakeholders with steps to support the development of sustainable firms that help to achieve sustainable agricultural value chains. The need for greater resource-use efficiency is embedded within those steps, which were designed to be simple, practical and creative to better support or given the prevailing challenges.

A. IMPLEMENTATION ACTIONS

The implementation actions below were assembled to guide interventions across and within value chains and their environments. The proposed implementation actions are not exhaustive, and ultimately, Arab countries must choose actions to implement based on prevailing conditions. Furthermore, these actions could be classified differently and with more or less depth depending on the objective to be achieved..[32]

1. *Prioritize sectors for value chain interventions*

The aim of this action is to identify which crop, area or sector would receive more focus because of its potential economic, social or environmental benefits. This would help businesses and investors identify profitable options while allowing development planners and policymakers to direct resources for the greatest positive impact, namely, export revenues, job creation, improved livelihoods, environmental conservation, and so on. Related actions include the following:

- Prioritizing value chains to identify the most promising or important ones or for which competitiveness and efficiency could be further improved;
- Assessing comparative advantages and existing opportunities particularly when it comes to greening processes as the embedded cost could make them uninteresting for private sector adoption;
- Choosing value chains to support based on future possibility to improve and upgrade;
- Evaluating the capacity to respond competitively to available opportunities through scenarios with multiple assumptions on profits, jobs, export, wages and others;
- Harnessing public, private and collective perspectives and interests through participatory approaches.

The assessment would build on available data on trade, production, costs, prices, market sizes, and so on. Table 10 provides an example of market size estimation for processed food and snacks in Saudi Arabia to identify patterns and preliminary efficiency or competitive advantage. The data and information could originate from national or regional entities such as departments of agriculture, statistics or commerce and

[32] These implementation actions were adapted from the following sources: Reardon and others, 2012; Miller, 2011; Henriksen and others, 2010; Weber and Labaste, 2010; Herr and Muzira, 2009; Sturgeon, 2008; APO, 2007; and Taylor, 2005.

private sector entities or from international organizations such as the United Nations, World Bank, the Organisation for Economic Co-operation and Development, FAO. If funds are available, other more detailed surveys and studies could be conducted on green implications of specific technologies or practices, for example, though these are not absolutely required.

TABLE 10. HISTORICAL AND FORECASTED MARKET SIZE DATA IN SAUDI ARABIA

Categories	2007	2008	2009	2010	2014
Snacks total	317.4	346.1	369.4	426.4	712.1
Fruit snacks	103.0	114.0	122.2	141.1	229.2
Chips and crisps	139.3	151.4	161.3	186.4	317.6
Other snacks	41.6	44.8	47.8	55.2	92.5
Nuts	33.5	35.9	38.1	43.7	72.8
Ice cream total	279.9	313.9	337.2	361.6	491.4
Processed ice cream	123.8	140.4	149.6	159.2	210.7
Home ice cream	97.4	106.6	114.0	121.3	161.9
Artisanal ice-cream	58.7	66.9	73.6	81.1	118.8
Canned and preserved food total	291.8	307.8	323.7	365.8	552.7
Meat and related products	35.3	37.5	39.8	45	67.9
Fish and seafood	157	165.2	173.8	196.9	299.6
Vegetables	22.3	23.1	24	26.7	39.3
Beans	58.7	62.9	66.3	75.2	114
Fruits	18.5	19.1	19.8	22	31.9
Frozen and processed food total	204.1	219.5	233.0	268.1	451.9
Red meat	83.2	90.4	96.5	111.3	193.4
Poultry	63.5	68.1	72.5	83.7	141.4
Fish and seafood	24.4	26.3	27.7	31.8	51.5
Vegetables	13.6	14.4	15.3	17.5	28.7
Potatoes	6.5	6.9	7.2	8.2	13.1
Baked products	3.5	3.7	3.8	4.3	6.5
Desserts	9.4	9.7	10	11.3	17.3

Source: Extracted from International Market Bureau, 2011.

Note: 2009 exchange rate.

2. *Assessment, benchmarking and design of strategies*

Appropriate analytical tools must be selected to assess and plan activities for value chain development. Care must be taken to choose strategies that could greatly improve quality and efficiency in production and not only on productivity or profitability. A number of analytical frameworks could be used to describe, analyse and evaluate value chains. These include assessing the status of value chains (profits, efficiency, waste generation, relationships and behaviours among actors or opportunities to increase productivity, profits or efficiency), along with an analysis of strengths, weaknesses, opportunities and threats (SWOT) to characterize the current state or to identify issues or options as well as opportunities and risks. The competitiveness diamond can also be used to assess the burden on resources, demand, and related and supporting industries. Table 11 provides SWOT analyses for the development of agricultural subsectors in Lebanon and Tunisia.

TABLE 11. SWOT ANALYSIS OF AGRICULTURAL SUBSECTORS IN LEBANON AND TUNISIA

(a) *Potatoes and apples in Lebanon*

Strengths	Weaknesses
Organization of the sector: • There is a syndicate of potato producers; • Apple producers own their orchards; • Development of local nurseries for tree seedlings; • Good control over pesticide import; • Control of MRL (Maximum Residue Limit) for apple export and of brown rot for potato; • Mandatory phyto-sanitary certificate for the export of processed products. Sustainable resource management and availability: • Drip irrigation in apple production, new varieties have been developed and pruning methods have improved. Marketing: • Lebanon has good climatic conditions; • Lebanese gastronomy is world renowned; • Development of potato varieties for processing. Research/Infrastructure: • Several certification bodies in the country.	Organization of the sector: • At the level of producers the sector is small and scattered; • Lack of producer empowerment; • No framework for food safety control in local markets; • No financial support to producers, namely subsidies or compensation in case of losses; • Lack of programmes addressing the supply chain as a unity; • Too many intermediaries on the supply chain. Sustainable resource management and availability: • Reluctance to change; • Difficult access to trained workforce; • Unsustainable practices (quantity rather than quality) and resource management (soil, water and waste); • Lack of impartial consultation; • High production costs and difficult access to financial means; • Lack of agricultural surfaces availability; • Energy shortage issues. Marketing: • No collaboration among the supply chain; • No common vision and understanding of market and quality; • No marketing strategy : production not always adapted to market and little optimization in marketing; • Lack of traceability and hygienic norms in packing houses; • No legal framework for sales especially with fresh products. Research/Infrastructure: • Limited logistics resources and infrastructure; • Difficulty to develop local seeds and new varieties; • Lack of research on risk management; • No use of machinery in production, harvest and post-harvest.
Opportunities	**Threats**
• The large Lebanese Diaspora is keen to consume Lebanese food and represents a large number of potential customers; • Possible development of a Lebanese brand image; • GCC countries represent a stable market with a good purchasing power; • Egypt, which is an important trade partner for Lebanon, has easy seaway access; • For potato, there is not much competition in the region. In 2012, Saudi Arabia stopped potato planting because of water shortage; • Lebanon is no longer black listed for exports of potato to the European Union.	• Political instability in the region and market insecurity; • Norms on packing, calibration and varieties are different according to markets; • GAFTA (Greater Arab Free Trade Area) Agreements are not always respected; • Lack of control and sanctioning of respect of norms in the region: no regional accreditation body; • Lack of coordination on food security consultations in the region when food is not the priority; • No sustainable commitment of countries of the region for the respect of trade rules and norms.

(b) *Tomatos, dates and oranges in Tunisia*

Strengths	Weaknesses
Organization of the sector: • National, local and regional producer representations have been established; • The import of pest free and authorized inputs are under control; • National organization of the wholesale market through the Tunisian Company for Wholesale Markets [Société Tunisienne des Marchés de Gros]; • Local nurseries for Maltese oranges. Marketing: • Most packing units are up to date with hygienic standards; • Packaging sector well developed and supported by its own institution; • Tunisia has local varieties (namely Maltese oranges, Deglet Nour dates) specific to the country. Research/Infrastructure: • Several certification bodies in the country; • Infrastructure in place for the control of food safety for export and wholesale.	Organization of the sector: • Producers within the sector are small and scattered; • Lack of producer empowerment; • Lack of synergy between supporting organizations; • Sector development programme focusing on marketing issues rather than sustainable cultural practices (namely development of packaging, elimination of diseases unaccepted for exportations, and so on.); • Lack of programmes addressing the supply chain as a unit; • No financial support to producers, namely subsidies or compensation in case of losses; • Limited sanitary control of goods on the local market; • Too many intermediaries in the supply chain. Sustainable resource management and availability: • Reluctance to change; • Increase in production costs; • Lack of trained workforce; • Difficulty to access financial services; • Strong plot division; • Weak water availability and bad quality of the water; • Unsustainable production practices (quantity instead of quality oriented) and resource management (soil, water and waste); • Lack of impartial consultation. Marketing: • No collaboration among actors of the supply chain; • No common vision and understanding of market and quality; • Lack of good marketing knowledge and strategy; • Unsuitable transportation for tomatoes; • Price purely market driven. Research/Infrastructure: • Lack of adequate research for better cultural practices; • Lack of research to develop local seed multiplication; • Difficult logistics to GCC countries; • No use of mechanization in production.
Opportunities	Threats
• Harmonization of norms for tomato double concentrate cans between Libya and Tunisia; • Possible development of a Tunisian brand image.	• Sociopolitical transition in which a lot of changes are happening; • Smuggling at borders; • Lack of collaboration in the region except with Morocco and Libya; • Norms regarding packaging, calibration and varieties are different according to the market; • Market insecurity.

Source: ESCWA.

Related actions include the following:

- Understanding the value chain through appropriate and relevant analyses such as financial, cost-benefit, SWOT, competitiveness diamond, strategic productivity, operational productivity, quality and efficiency, human resources, social and environmental impact assessments or business environment;
- Measuring and comparing value chain performance against itself, against competitors or against best practice in order to choose the best strategic choice;
- Integrating the information collected into sound development strategies for the entire value chain or along selected segments.

These assessments should provide enough information for the various stakeholders of the value chain to identify growth opportunities and priority interventions and for policymakers and development planners to outline a clear path towards the development and greening of agricultural value chains.

The major gaps that were identified for the fruits and vegetables sector in Lebanon and Tunisia are provided in table 12. Thus, this implementation action also exposes gaps in the concerned sectors and enables the selection of objective solution.

TABLE 12. GAPS IN THE FRUIT AND VEGETABLE SECTORS IN LEBANON AND TUNISIA

	Main gaps identified
Organization of the sector	No collaboration between producers
	Farmer status: only a minority of farmers have registered to the social security; also there is no insurance system, namely compensation in case the producer loses his entire production for climatic reasons.
	Lack of producer empowerment on the supply chain
	Organisation of the market in terms of sanitary conditions control is not completely mastered
Sustainable resource management and availability	Lack of resources: increase of the production costs, lack of qualified work force, difficult access to impartial consultation and difficulty to access financial means (namely bank credit)
	Small plots: due to limited surface availability or a strong division of the plots over time
	No sustainable agricultural practices
	Lack of resource: lack of energy, of quality water, and so on.
Marketing	Lack of involvement of producers in marketing
	Lack of quality standards in post-harvest (transportation, packing, and so on)
	No common marketing strategy and understanding of quality definition
	Organisation of the market current functioning cannot guarantee a sustainable income to producers
Research and infrastructure	Lack of infrastructure: roads and access especially in orchards or wells and irrigation systems (especially in oasis)
	Lack of research: for the development of new varieties, local seeds production and sustainable agricultural practices, especially in sensitive areas (namely oasis).
	Lack of mechanisation

Source: ESCWA.

3. *Upgrading value chains*

The aim of this action is to seek ways to improve efficiency, enhance quality add new operations, and to implement sound business models in order to improve value-addition, volumes and sustainability. By improving competitiveness, firms of the value chain will be able to build on their experience to enter new or more challenging markets as exemplified in box 4. Successful value chain operators would be able to improve on efficiency or green their operations, target unmet market needs, seek specialization or expand services to other actors of the value chain and replicate that success throughout the value chain to improve economies of scale. Related actions include the following:

- Attracting investments, including foreign investment, to facilitate technology transfer and identifying financial sources to enhance greening processes;
- Identifying and developing partnerships for upgrading and/or deepening knowledge of sound business services such as technical capacity, access to skills and access to finance;
- Exploring commercial opportunities for collaboration with outside entities such as universities, research and development, think tanks;
- Identifying new business models to increase efficiency and value added suitable for replication;
- Supporting and facilitating value chain stakeholders to implement pilot enterprise such as incubators; Encouraging the replication of successful approaches through promotional campaigns, business associations, technical assistance and other available means.

Box 4. Expansion of an agricultural SME

The Lebanese firm, Mechaalany, specializes in fresh fruits and vegetable processing, and has built its brand name and market share, becoming known for pickled products in the US and Europe. However, the seasonality of its product line was a challenge for the company to overcome. It operated at close to 70 per cent capacity during a short-time period, the jam season, while for the remainder of the year it would operate at 30 per cent capacity only. The firm received appropriate assistance to develop new product lines to increase operative capacity throughout the year while capitalizing on the its brand equity. Mechaalany linked with local fruit and vegetable growers to improve supplies while also enhancing business practices. The firm has analysed the potential for entering new markets, such as the ready-to-eat market, identified the need to update labels and packaging practices to meet international consumer standards and helped resolve problems in distribution to local markets. Mechaalany has continued to strengthen its core business and has incorporated organic pickles into its product line. The company has connected with local organic farmers to ensure that organic practices and certifications are upheld while also providing farmers with assurances of output buying opportunities thereby allowing them to build their own capacity to meet requirements in the growing and increasingly lucrative organic market. Following these improvements, sales have increased by 11 per cent.

Source: Extracted from ACDI/VOCA, 2010.

4. *Promoting vertical and horizontal linkages*

The aim of this action is to build economies of scale in order to improve supply, capture additional value, improve access to appropriate information, increase production volume, improve the efficiency and quality of products and the accessibility of inputs, spread the cost of adopting green processes and enhance market power while also reducing risk. Vertical integration allows firms or other actors take on more activities upstream or downstream, while horizontal linkages allow for better coordination at the same level to gain scale advantage in a specific area to improve market power and the quality of products and services provided, and increase savings. Related actions include the following:

- Identifying opportunities for expansion into adjacent up, down or same level areas;
- Improving control over quantity, quality and timing of inputs, among others;
- Reducing transaction costs;
- Identifying areas where cooperation with firms performing similar activities in the chain could increase efficiency and effectiveness (namely, marketing, procurement, management or logistics);
- Acquiring or collaborating with less efficient firms (namely, through contracts, agreements, cooperative activities, new entities, or reorienting existing ones to perform joint activities.

Box 5 provides an example of a consolidation process in the delivery of meat to McDonald's restaurants in the Middle East.

Box 5. Consolidation in the meat market

As McDonald's expand into the Middle East market, it sought to reduce costs and deal with the smallest possible number of suppliers in order to ensure efficiency through greater economies of scale. The main meat supplier of McDonald's is the OSI Group. OSI contracted with Braslo Produtos de Carnes Ltd. of Brazil as the exclusive supplier of beef and chicken to McDonalds in the Middle East. McDonald's operates restaurants in Bahrain, Lebanon and the United Arab Emirates among others.

In 2008, Braslo consolidated with OSI Group European poultry plants under Marfrig, one of the largest meat companies in Brazil, making Marfrig the largest supplier of meat to McDonald's restaurants outside the United States. In 2010, Marfrig acquired the Seara poultry business in Brazil and Keystone Foods in the United States, which was then the leading supplier of meat for McDonalds in the United States and around the world. The expansion strategy of Marfrig was meant to meet the needs of McDonald's restaurants and its other large global customers. In particular, its Malaysian subsidiary, Mac Food, sends about 3,200 tons of halal meat into the Middle East every year. Keystone supplies around 28,000 fast food restaurants in the world. ,

Source: Adapted from http://www.grain.org/article/entries/4044-big-meat-is-growing-in-the-south.

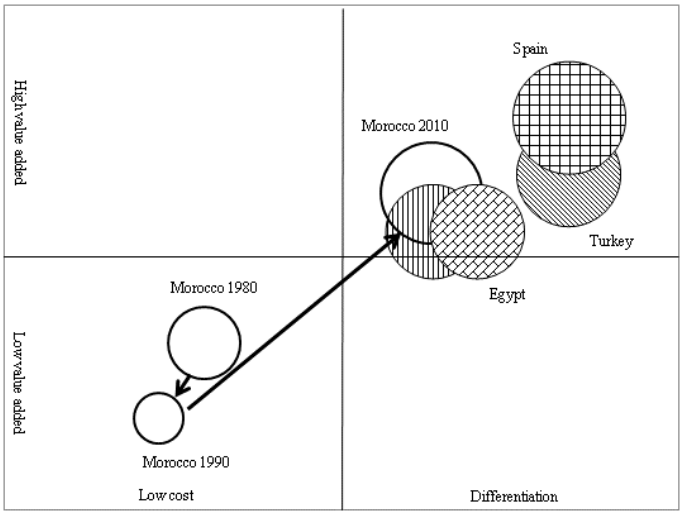
5. *Increasing value, quality and competitiveness through standards and certifications*

This implementation action aims to encourage wise business choices and models to ensure good strategic direction, improve competitiveness and enhance quality through standards. Strategic decisions can better position products, firms and the entire value chain for enhanced competitiveness. This implies moving towards higher quality or product differentiation, such as gourmet or organic products that meet certain quality and performance standards. The related actions provided below build on the assessments and benchmarking proposed in the previous implementation actions:

- Developing a strategy to enhance product differentiation and value-addition;
- Evaluating market risk and the value of market opportunities, adopting specific standards and quality certifications that could lead to product premium and access to niche markets;
- Exploring opportunities for coordination and assessing the capacity of firms and producers within value chains for quality control including quality and consistency of services provided by others;
- Investigating public sector support and services for producers and enterprises seeking certification or value-added production.

The Moroccan vegetable market evolved over the years and became highly competitive as a result of the adoption of international standards (figure 13).

Figure 13. Repositioning the Moroccan vegetable market for export



Source: ESCWA, adapted from Fernandez-Stark and others, 2011.

Among other things, Morocco aggressively adopted European standards in its vegetable market, in addition to private or voluntary standards. Initiatives of some of the major retailers and other agribusinesses led to the adoption of those standards (box 6).

Box 6. Food safety and quality standards

With the widespread globalization of agriculture value chains, the issue of food safety has become far more apparent. Though globalization has led to greater productivity and novel products, it has also brought great risks associated with the participation of a multitude of actors who may lack the capacity to guarantee quality and standards. Along global supply chains, agriculture products may be exposed to contamination as they pass through numerous processing stages. As a result, food scandals have increased in numbers and have become worldwide or international concerns, such as the Chinese milk scandal of the late 2000s or the more recent horse meat scandal in Europe. These have highlighted the fact that importing countries are unable to fully ensure the safety of products originating from foreign suppliers. The question of accountability is complex, however, the burden is increasingly on firms to ensure food safety and quality throughout their value chains.

Food standards evolve in response to perceived risks. Food products used to be subject to minimum public quality standards but with growing health risks, particularly those brought along by global value chains, it has become necessary to tighten standards and regulations and to incite global firms to self-regulate through the adoption of private standards for safety and quality, i.e. standards developed and enforced primarily by private sector entities. Nowadays, public institutions set and enforce compulsory minimum food regulations and standards while also setting the stage for the development of even tighter standards managed by big agribusinesses or retail chains. Some of these private standards (also known as voluntary standards) have now been widely adopted, and abiding by such standards has become a requisite to gain access to certain markets particularly in developed countries. An example is GlobalGAP. It began as EUREPGAP, a standard for fresh fruits and vegetables in 13 European countries in response to the Food Safety Act of the United Kingdom. Nowadays it has now grown into a worldwide private standard that links farmers and processors to major retailers.

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Source: Adapted from Gereffi and Lee, 2009, pp. 6-12.

6. *Providing support services and improving the operating environment*

Proper services are needed to support value chain development to improve operations, sustainability and the overall environment. This is achieved by promoting public-private dialogue, establishing viable clusters (see box 7 for overall guidelines) and providing adequate support services. Stakeholders would then be able to better identify and respond to arising challenges and opportunities and to increase the level of collaboration and partnerships for improved efficiency. Related actions include the following:

- Identifying the services that could enhance sustainability and quality within the chain;
- Introducing services that have the greatest potential to improve the value chain;
- Identifying and eliminating burdensome policies that negatively impact growth and competitiveness;
- Establishing public-private partnerships and empowering them to implement their decisions;
- Analysing possibilities for clustering by identifying stakeholders and processes, and developing a clear clustering strategy with measurable benchmarks;
- Prioritizing interventions by focusing on initiatives that demonstrate short-term successes,, especially for those with modest funding, to spur interest and commitment;
- Identifying source of financing for larger schemes from stakeholders, governments, financial institutions, donors and others;
- Encouraging cooperation and promoting local champions that could support the initiative after the initial start-up;
- Publicizing results to bring in additional support and commitments.

Box 7. Clustering initiatives

Clusters allow the strengthening of relationships through the development of common strategies. Success is achieved through improved public-private and intra-firm dialogues to identify opportunities for further development. The phases of clustering include the following:

- Discussing the development of clusters in selected areas or for specific crops, which would include assessing the rationale for cluster development and the interest of the various stakeholders or beneficiaries;
- Conducting a detailed industry diagnostic including evaluations and analyses on the value chain to identify strengths, weaknesses and opportunities for further development;
- Implementing the strategy based on a prioritized action plan starting with items that are expected to yield quick results and achieve greater stakeholders confidence and commitment;
- Identifying projects to be implemented and the related source of financing while seeking commitments from governments and financial institutions especially for large projects or those of a more public nature;
- Ensuring sustainability and continued efforts by creating a sense of ownership and promoting cooperation between lead firms or actors who could support most of the initiatives and assist smaller actors.

Source: Adapted from Webber and Labaste, 2010.

7. *Monitoring and evaluating achievements*

The objective of the implementation action is to track progress and evaluate the development and performance of the value chain, and refocus the plans, strategies and implementation programmes if necessary (box 8). Monitoring and evaluation can track implementation, evaluate performance and assess impact. There are various well-established and effective methods and processes to assess overall and localized performance and the impact of the various programmes. Related actions include the following:

- Identifying sensible value chain indicators and other benchmarks that may shed light on performance and bottlenecks;
- Ensuring that value chain actors are aware of the performance indicators and encouraging them to keep appropriate records. Such data and information should be kept confidential and should not be associated them with taxation or other schemes;
- Conducting frequent and rapid analysis of performance and reporting findings to all stakeholders in order to encourage continued participation and sense of ownership;
- Ensuring that deficiencies are addressed as quickly as possible.

It is necessary to regularly check on progress and to assess how projects or programmes are going for the implementation of the value chain initiatives. In particular, monitoring and evaluation allow for continuous improvements as the various stakeholders and the value chain in general builds on successes while learning from mistakes. For this to happen there will be a need to systematically gather and analyse relevant data and information. Some of the data and information, such as costs, revenues and quantities, would be easily obtained while data and information on quality, attractiveness of a product, greening impact on health or livelihoods may be more difficult to gather. Thus, clear and detailed records must be kept even if some date are sensitive. Without those records, it will not be possible to assess outcomes and effectiveness or to identify new strategic orientations.

Box 8. Selected characteristics of monitoring and evaluation

Monitoring	Evaluation	Monitoring and evaluation
• Assess overall implementation, namely, quantity, quality and timeliness of activities; • Identify constraints that hamper programme implementation and effectiveness; • Assess compliance with national, international or other accepted/set standards.	• Identify and document achievements due to the implementation of the concerned action; • Provide data and information to assess cost-effectiveness and comparisons with other programmes or against best-practices.	• Ensure that the interests of all participants are being met; • Facilitate community participation through the dissemination of appropriate data and information; • Inform decision makers and development planners on programme implementation and other initiatives.

Source: Adapted from Levinson and others, 1999.

B. BRINGING TOGETHER THE IMPLEMENTATION ACTIONS

As noted earlier, the suggested implementation actions are not comprehensive. Based on prevailing conditions, additional actions may be needed while some of the suggested actions could be omitted. In any case, a national and regional consensus and shared commitment to improving local and regional value chains would have to be agreed upon before any successes could be achieved. This would also include assessing or identifying ways for countries of the region and concerned value chains actors and stakeholders to work together to more effectively promote the development of their value chains.

The following principles that underlie the above implementation actions must be agreed upon:

- Agricultural value chains are multidimensional as they relate to food consumption and availability and thus to food security and they have strong linkages to other areas of the economy including the distribution of power, job creation, livelihood improvement, social well-being and environmental sustainability. Improving agriculture value chains will lead to positive externalities for the entire economy;
- Policy coherence should be improved, particularly as related to finance, trade, investment, agriculture development and environment protection. Without adequate and enforceable policies little will be achieved as some firms will take advantage of any opportunity for short-term self-interest;
- Value chain development will also require greater macroeconomic stability, a conducive sociopolitical environment, the development of free and competitive markets, a caring institutional framework and the sustainability of resources;
- Strong political will is needed from all countries and at the regional level to develop appropriate institutions, enforce rules and regulations, ensure transparency, empower stakeholders and foster accountability;
- The development of programmes and strategies should be comprehensive and results-oriented, and carried out in a participatory manner through genuine public-private partnerships and the inclusion of all stakeholders;
- Finally, strengthening public institutions will be necessary to set a strong foundation that could allow the development of self-regulating entities.

Taken in isolation, the proposed implementation actions will not lead to meaningful results in the development of agricultural value chains. As a matter of fact, all the actions implemented together will not lead anywhere unless the overall environment is also improved as part of broad-based commitments to enterprise development. A piecemeal approach to development will not go far, but it is possible to develop sustainable and well-functioning agriculture value chains to alleviate the dire food situation countries of the region are facing. Agricultural value chains have the potential to provide an important source of income for farmers, and to play an important role in rural and national development while contributing to improved food availability and affordability. But for this to happen, comprehensive integrated and sustainable reforms must be designed and implemented at local, national and regional levels.

V. LESSONS AND RECOMMENDATIONS

A. LESSONS LEARNED

The development of flourishing agricultural value chains in the region could greatly enhance the performance of the food sector and its related environment, and lead to greater food availability and price stability as a result of gained productivity, efficiency, enhanced capacity, including for food acquisition on better terms on global markets, and reduced waste. It could also lead to enhanced capacity for value addition, which is of great relevance if the region is to compete in global markets but also, and increasingly, in regional and local markets. Major global agricultural value chains are increasingly being attracted to markets of the region following consumer demands and preferences that are evolving as affluence rises.

The agricultural market of the region is currently valued at around US$50 billion. This is the minimum that could be expected if stakeholders of regional agricultural value chains wanted to invest and seriously tap into this market. So, there is plenty of room for improvement and astute investors from the region could build the capacity to take advantage of this lucrative market. However, major impediments include the small size of most agricultural value chain operators especially at farm level, the difficulty of organizing a great number of value chain participants and, of course, the lack of integrated markets. Indeed, most Arab countries view agricultural sectors as a component of national security or use it as a way to provide social benefits to the population. Thus, most Arab countries are unwilling to fully liberalize and/or harmonize agricultural sectors at the regional level.

Nevertheless, better coordination of regional agricultural value chains is both important and relevant, and improved value chains has the capacity to do the following:

- Greatly improve livelihoods particularly in rural areas by involving farmers both small and large and the great number of small processing units and other rural SMEs, a major impetus for economic development;
- Better integrate rural population and businesses, which are mostly agricultural-based, into the overall national and regional economy;
- Allow revenues to flow from urban to rural areas and from the well-off countries to the poorest, such as a small farmer from Yemen selling eggs to a major hotel chain in the United Arab Emirates;
- Strengthen the rural economy as people and businesses are incentivized to stay and invest in their communities while also improving their overall skills, knowledge and capabilities.

In the quest for green value chain development and, ultimately, sustainable economic development, particularly in rural areas, key issues must be addressed as follows:

- Allowing revenues to freely flow towards rural areas, which usually have the greatest need;
- Sharing costs between rural and urban areas and ensuring that the cost of infrastructure and other services is reflected in the final price of commodities or end products;
- Facilitating the adoption of efficient (green) technologies and practices through strong and far-reaching capacity-building programmes and constant awareness-raising aimed at the general public to build support for thriving local green agricultural sectors and products;
- Improving the overall institutional framework, as developing a supporting business environment will translate into improved overall conditions in rural areas such as the increased availability of social services, transport and electricity;
- Developing clusters and integrating them into a comprehensive value chain development strategy, which emphasizes adding value to imported products for reselling at a premium given the increasing scarcity of natural resources in the region and the harsh climatic conditions;

- Ensuring the availability of products and services seldom found in rural areas, namely, financial institutions, marketing/transports agents/forwarders, investments agents, cold storage, and so on.;
- Improving complementarity between production sites in rural areas and management sites in urban areas.

To address those key issues, a number of improvements are needed, including greater harmonization of policies, rules and regulations between countries of the region, on trade, investment and free movement of goods, services and persons to enhance efficiency. Countries must implement the actions identified above to ensure that agricultural value chains become more effective in terms of productivity, resource-use efficiency and the availability of market information.

B. Developing regional agricultural value chains

In the region, the main economic focus is on individual countries, and the fragmentation of agricultural value chains has prevented them from accumulating sufficient economies of scale and participating competitively in global markets. Some countries are populous enough to support domestic consumption, although they may lack the needed revenue or production potential (Egypt, Morocco, Yemen, the Sudan, the Syrian Arab Republic, and so on) while others have sufficient revenue and could build adequate productive capacity but lack the necessary consuming power to absorb excess capacity which is required for competition on global markets (most GCC countries).

The successful development of well-functioning and efficient agricultural value chains will require well-thought-out strategies and implementation programmes, which must follow the setting of appropriate national and regional priorities or ensuring a good sociopolitical environment. Table 13 outlines a few priority areas that could guide policymaking and development planning in the region as related to agricultural value chain development.

Table 13. Selected prerequisites and priorities for regional value chain development

Prerequisites	Short-term priorities	Long-term priorities
• Refining and prioritizing agricultural development strategies at the national and regional levels; • Revisiting policies to promote intraregional trade particularly for products, such as fruits and vegetables, in which the region has relative comparative advantage; • Strengthening national and regional institutions with a view to harmonize rules, regulations and practices; • Improving productivities along agricultural value chains taking into account land and water conservation and environmental protection; • Devising a strategy to acquire certain essential products on world markets (forward contracting) and adding value sustainably, without depleting local or regional resources; • Enacting appropriate macroeconomic policies and ensuring greater stability at the national and regional levels to improve confidence and the business climate; • Promoting regional cooperation and integration to enhance the movement of goods, services, skills and funds.	• Adopting rules to enhance the overall business environment particularly for production and investment; • Removing red-tape that impedes agri-business development including cross-border initiatives; • Adopting policies to support the devlopment of cross-border financial and other incentives to support the emergence of regional champions; • Promoting region-wide infrastructure, such as transport and cold storage, that use green processes; • Harmonizing rules and regulations and supporting the development of voluntary standards in line with existing international standards to avoid duplication of effort in producing separately for local/regional and international markets; • Supporting capacity development through region-wide programmes and institutions; • Easing the development of region-wide marketing structures and services.	• Strengthening existing regional and subregional institutions to enhance the adoption and harmonization of rules, regulation and practices; • Setting up and/or strengthening other regional institutions particularly those for harmonizing standards and building and strengthening capacity; • Developing regional clusters to build economies of scales; • Adopting regional strategies for critical or strategic commodities such as wheat, cereals, and so on, to support the development of regional expertise, champions and economies of scale to better compete globally both in exporting and imorting; • Enhancing overall regional stability and security in order to promote sustainable development while improving the confidence of the various actors from producers to consumers.

Source: Adapted from ECA, 2009.

In order to support the development of regionally integrated agricultural value chains, the region could build on already existing regional frameworks that call for enhanced and integrated markets at the national level, subregional level, or the regional level through existing frameworks such as the League of Arab States, the Arab Organization for Agricultural Development, the Arab Industrian Development and Mining Organization and the Greater Arab Free Trade Area (GAFTA). These frameworks provide a basis for sustainable integration and cooperation and could strengthen existing strategies and priorities that have already been developed and agreed upon through regional and subregional institutions. To this end, it is worth mentioning the already agreed upon "Arab Agricultural Sustainable Development Strategy for the Decades 2005-2025", which stresses the need for a better balance between production and marketing, and to increase the effectiveness of institutions and farmers especially small-scale farmers. To do this, the region must increase the competitiveness of its agricultural products in the international market and revitalize agricultural trade as an engine for development.

Developing and prioritizing related policies and strategies for maximum impact will not be an easy task especially at the regional level, as cooperation and integration in this field is low, notwithstanding the regional and subregional frameworks already in existence. Nevertheless, the implementation actions outlined above provide a good platform to support the development of thriving agricultural value chains at the local/national and regional levels. It may not be necessary to run all of the implementation actions, as most stand alone or could serve as an entry point.

C. IMPROVING SELECTED AGRICULTURAL VALUE CHAINS: CASE STUDIES

The study of fruit and vegetable markets in Lebanon and Tunisia identified four areas that require attention: the organization of the agricultural sector; the sustainable management and availability of resources; the marketing of commodities; and research and infrastructure.

(a) *Organization of the agricultural sector*

Producers appear to be the weakest link in the supply chain, and if they were sufficiently empowered and acquired further skills, the positive impact would benefit the entire supply chain. Capacity-building and better organization of producers could strengthen the supply chain base. Previous attempts to organize producers resulted in failure, and it is apparent that organizations cannot be imposed upon farmers but instead should come from within in order to ensure ownership. For farmers to organize, a proper environment must be in place to ensure appropriate support. Furthermore, benefits accrue from the market, and the current organization of the agricultural sector favour neither producers nor traders, who must fend for themselves when dealing with uncertainties. A proper legal framework and appropriate regulations and enforcement are needed to ensure adequate sanitary control for national and international markets, at the very least. Also, in order to improve collaboration along the supply chain, all parties must be involved in the improvement of the sector. A capacity development programme is needed for all actors of the supply chain, which would be coupled with an analysis of their needs and capacities in order to design better programmes to enhance collaboration and to improve marketing.

(b) *Sustainable management and availability of resources*

Issues of quantity and quality need to be addressed throughout the supply chain. In particular, better practices must be adopted at all levels of the value chains and not only at the farming or producer level. At the post-harvest level, for example, storage practices and respect of health and safety norms are cause for concern, and at the logistics level, safer and greener transportation of food products must be encouraged. Voluntary sustainability standards such as GlobalGAP could help to encourage the implementation of better practices. GlobalGAP deals with issues related to the safe use of inputs and resources and can be adapted to fit local and regional conditions. GlobalGAP certification could provide a competitive edge to producers of the region to enter new markets particularly in Europe. Another problem for agricultural value chains is the lack of qualified workforce, and its failure to attract the young generation. The available workforce is

untrained and changes every year especially for the most difficult and specialized tasks. Producers also lack needed machinery especially for the most difficult tasks such as pollination and pruning. Renting machinery is unaffordable for small producers. There is a need to explore ways to entice farmers to work collaboratively, notably to share some of the machinery, thereby making it more affordable.

(c) *Marketing*

Farmers and producers will be ensured competitive pricing and better outlets for their products if they improve quality and healthiness, which is likely if they implement ISO and HACCP principles. The benefit implementation of such systems of production and post-harvest handling will have a major impact on market performance, as it will set a common understanding on quality and lead to standardized production. In return, standardization will facilitate price determination and limit quality variation. As this system will require substantial investment, producers and processors will have to work together to find innovative ways in which they could become affordable.

(d) *Research and infrastructure*

Continuous research is needed to implement these recommendations in a sustainable manner. Topics may include better production tools and practices such as irrigation techniques, the development of local seeds and seedlings and pollen for palm trees, the development of new varieties, better agricultural techniques, machinery adapted to the specificities of the crop and the local landscape, or the use of secondary products such as pruning waste, kernels, and so on. Further research would also be required on post-harvest technology, namely, machinery use, grading, improved storage such as controlled atmosphere cool storage facilities, the improvement of transport infrastructure, and so on.

Figure 14 presents a summary of gaps in sustainable agricultural development as discussed above and provides a suggests implementation actions that could be used to support development strategies and promote the agricultural sector and ultimately the value chain.

Figure 14. Gaps and proposed implementation actions

	Organization of the sector	Sustainable resource management and availability	Marketing	Research and infrastructure
Census of farms and producers and identification of their problems	Actions 1/2/7			
Policies and regional/ global regulation of the market	Actions 1/5/7		Actions 6/7	
Capacity-building and other programmes to improve skills	Actions 1/6/7	Actions 6/7	Actions 6/7	
Adoption of standards including voluntary standards such as GlobalGAP and HACCP		Actions 5/7	Actions 5/7	
Provision of services/support for increased production and competitiveness	Actions 1/3/4/5/6/7	Actions 5/7		Actions 6/7
Research and development for improved production and post-harvest methods		Actions 6/7		Actions 6/7

Source: ESCWA.

A number of these actions are already being undertaken for sector improvement in the Arab region, and they would only have to be specified and documented so they could be built upon. The implementation of recommendations must take those actions into account, including the stakeholders involved. Local collaboration can contribute to the sustainability of implemented actions. Improvement is also needed in the entire value chain. Every operator in the chain must be considered and involved in the process of making the sector more sustainable to ensure that the benefits are optimized and fairly distributed.

VI. CONCLUSIONS

Globalization has led to increased international competition, which is currently dominated by global firms that set the standard of competitiveness for countries and particular sectors or industries. The overall impact and performance of particular sectors is better understood through the value chain framework. This framework includes every step from production to consumption, and the analysis of value chains can expose successes to build on and problem areas that must be addressed. Value chain analysis sheds light on issues related to production, consumption and trade along with the ways that connected economic, social and environmental issues, such as employment, relationships, health and greening impact development and competitiveness.

In this increasingly globalized world, greater attention must be paid to the dynamics of value chains, especially agricultural value chains, given their impact on food security and livelihoods in each country. This is one of the reasons why the study of value chains has become a major development tool used by various government and development organizations. Thus, staff from 10 United Nations agencies that specialize in value chain development have formed the United Nations Value Chain Development group.[33] The World Bank, the United Kingdom Department for International Development, the United States Agency for International Development and many others are also involved in value chain development.

The two major issues in value chain analysis are governance and upgrading. Governance is concerned with the distribution of power, who determines what should be produced, quality and so on. Regional firms are not exerting much control over their agricultural value chains because they are generally small and lack consolidation. Little is being done to upgrade their activities because of the lack of adequate material, financial and human resources, though there is hope that regional players could find market niches in which they could succeed particularly when it comes to producing and delivering green products that are in tune with local and regional tastes or needs, such as halal products.

Decision makers from the region have not provided enough support for national and regional value chain development though it could greatly enhance food security in the region. They may be reluctant to foster national, regional and international networks of firms especially if they fear the loss of control over what firms and markets are doing. Until recently, internal agricultural growth was seen as the only option to ensure adequate food supplies in countries of the region. However, with the increasing entry of local and regional agribusinesses into global value chains, greater opportunities have opened up to secure food more efficiently for the population while also adding more value to local produce, thereby improving livelihoods. Globalization comes at a price, however, as was seen in the 2007-2008 food price crisis when outside imbalances affected most countries of the region.

Arab countries must improve levels of education and skills and address the distribution of power so that the weakest actors, usually farmers and other small operators are not taken advantage of. Benefits from value chains will remain unevenly distributed in the region unless greater efforts are made to improve them and adopt specific standards and other techniques, practices, rules and regulations and policies that favour value chain development. To this end, the proposed implementation actions are a good starting point to move forward with this agenda.

The development of green value chains, which emphasize using natural resources more efficiently, has not yet taken hold and sufficient support programmes have not yet been developed. More initiatives are needed, along with further assessments of the impact of green value chains and the green economy on economic development in the region to inform policymakers on available alternatives and their impacts. These assessments will have to go beyond economic factors, as environmental degradation cannot be solved with economic policies alone. Social policies that respond to the needs of people and their relation to the

[33] The organizations are FAO, IFAD, ILO, ITC, UNCDF, UNCTAD, ECE, UNDP, UNIDO and WFP.

natural environment will also have to be taken into consideration in solving environmental challenges. Thus, economic, social, cultural and environmental issues must be considered when addressing the root causes of inefficiencies in agricultural value chains.

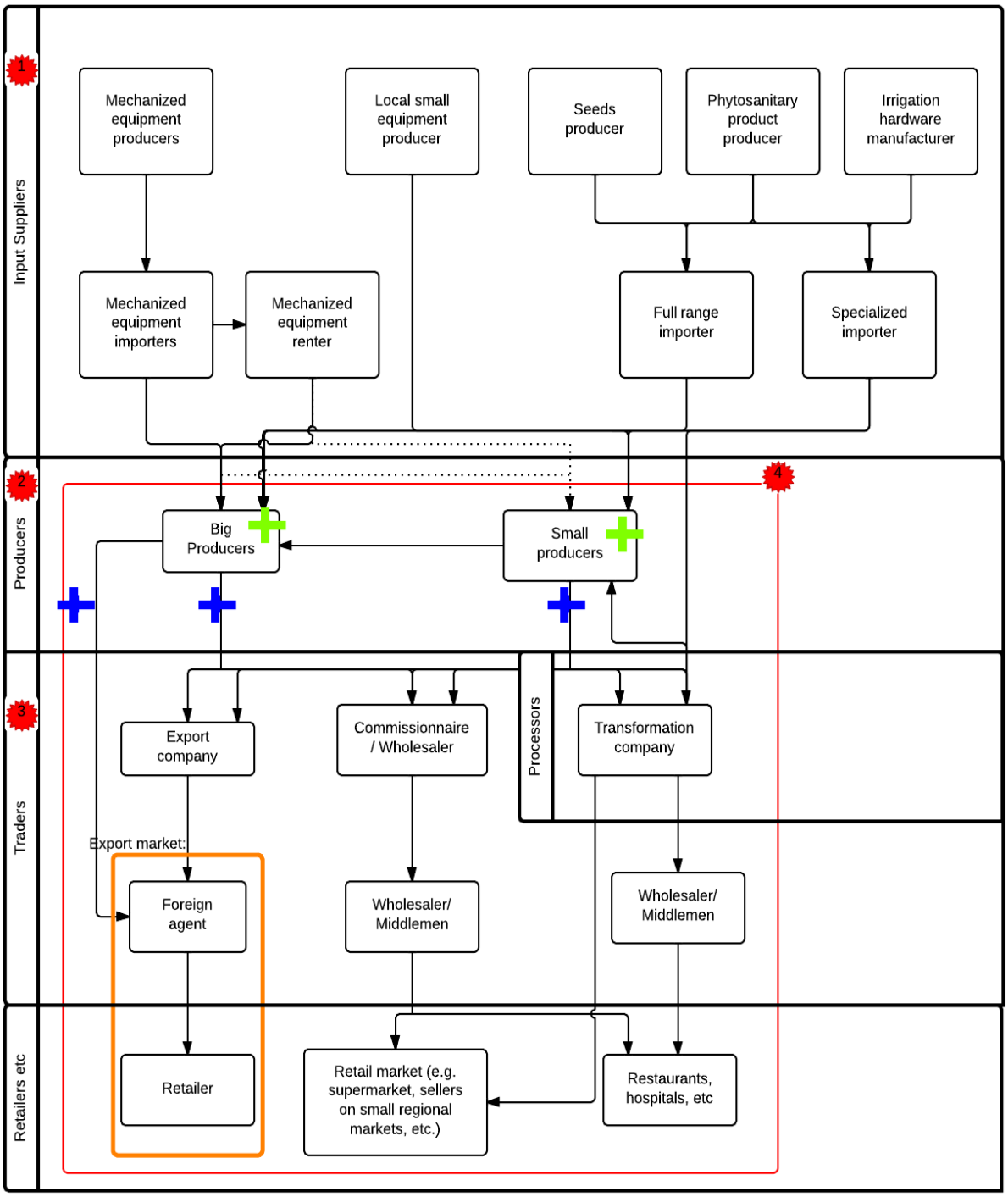
The case studies of the fruits and vegetables sectors in Lebanon and in Tunisia revealed several similarities that are relevant to other countries in the region. The first and most important similarity is that producers are small and scattered and most actors lack skills that are needed for sustainable participation in markets and that would contribute to their own development. Collaboration between different operators in the supply chain for mutual benefit remains very limited. In Lebanon, there is no common representation for producers and their customers while in Tunisia the problem with price fixing for certain products shows that collaboration remains difficult. Giving an advantage to one operator of the chain over another could create unfair competition. Thus, the work of the supply chain can only be efficient if there is global coordination.

The lack of coordination has prevented some producers from being involved in the marketing of their produce. No strategy is in place to allow these producers in to adapt to market demands, as the focus is more on increasing quantity rather than quality. Several producers rely on intermediaries that purchase their entire crop well before harvest, at prices that may not be competitive. Though these intermediaries profit from this exchange, they also give farmers a guaranteed sale well before harvest.

Tunisia and Lebanon both have potential for quality production and agricultural value chain development. With current cultural practices focusing on quantity rather than quality, natural resources are being put at risk, and water availability continues to decrease together with soil fertility. If the already limited land and water resources of the region continue to be put at a risk, food safety and security will also continue to be at risk. These resources must be conserved for present and future generations, and by improving the efficiency of agricultural value chains it will be possible to achieve this objective while also keeping costs low.

Annex

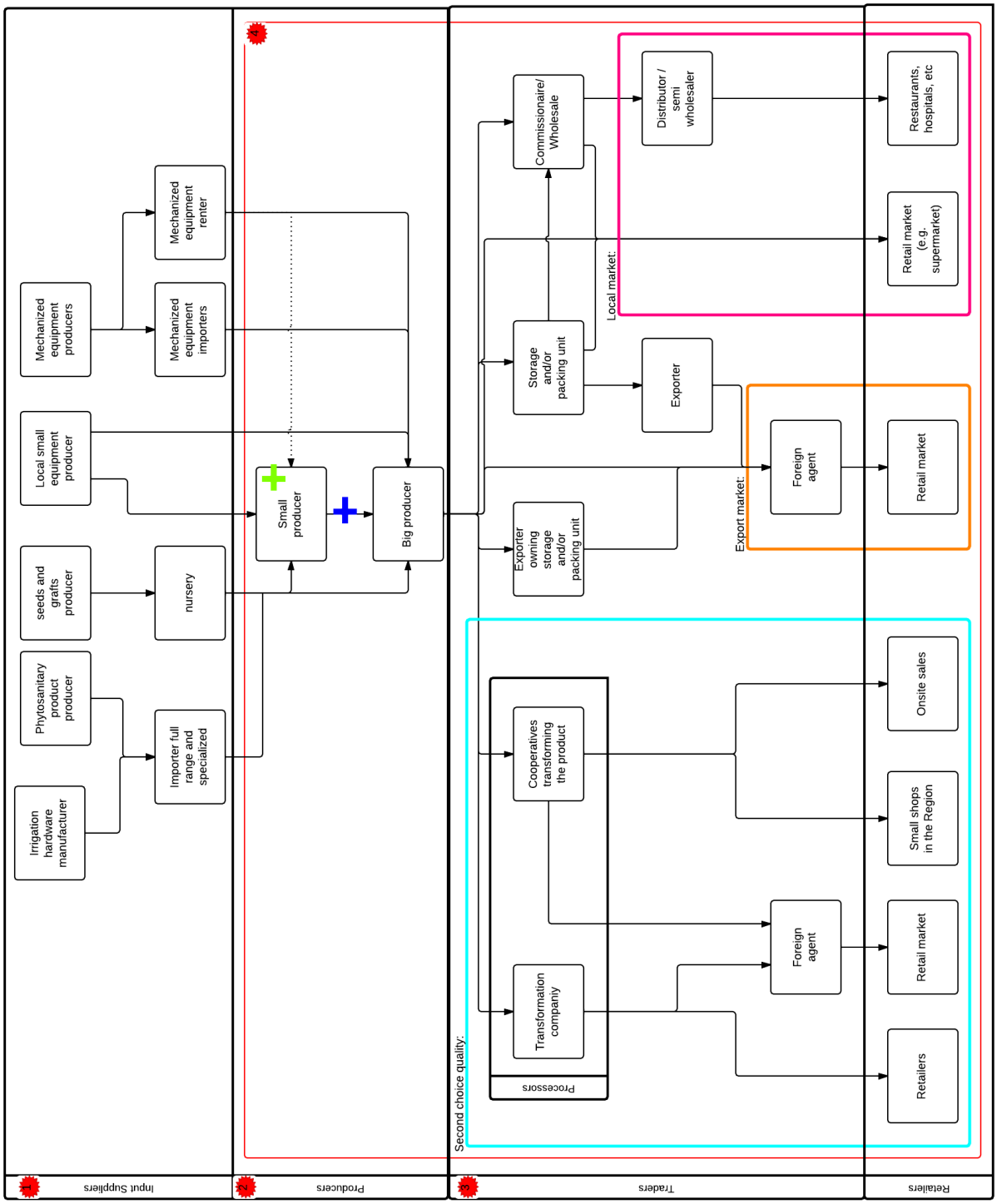
Figure 1. Potato supply chain in Lebanon



Daman buying the entire production "in green" before the production started.

Daman buying the entire production before harvest.

Figure 2. Apple supply chain in Lebanon



Daman buying the entire production "in green" before the production started.

Daman buying the entire production before harvest.

Figure 3. Tomato supply chain in Tunisia

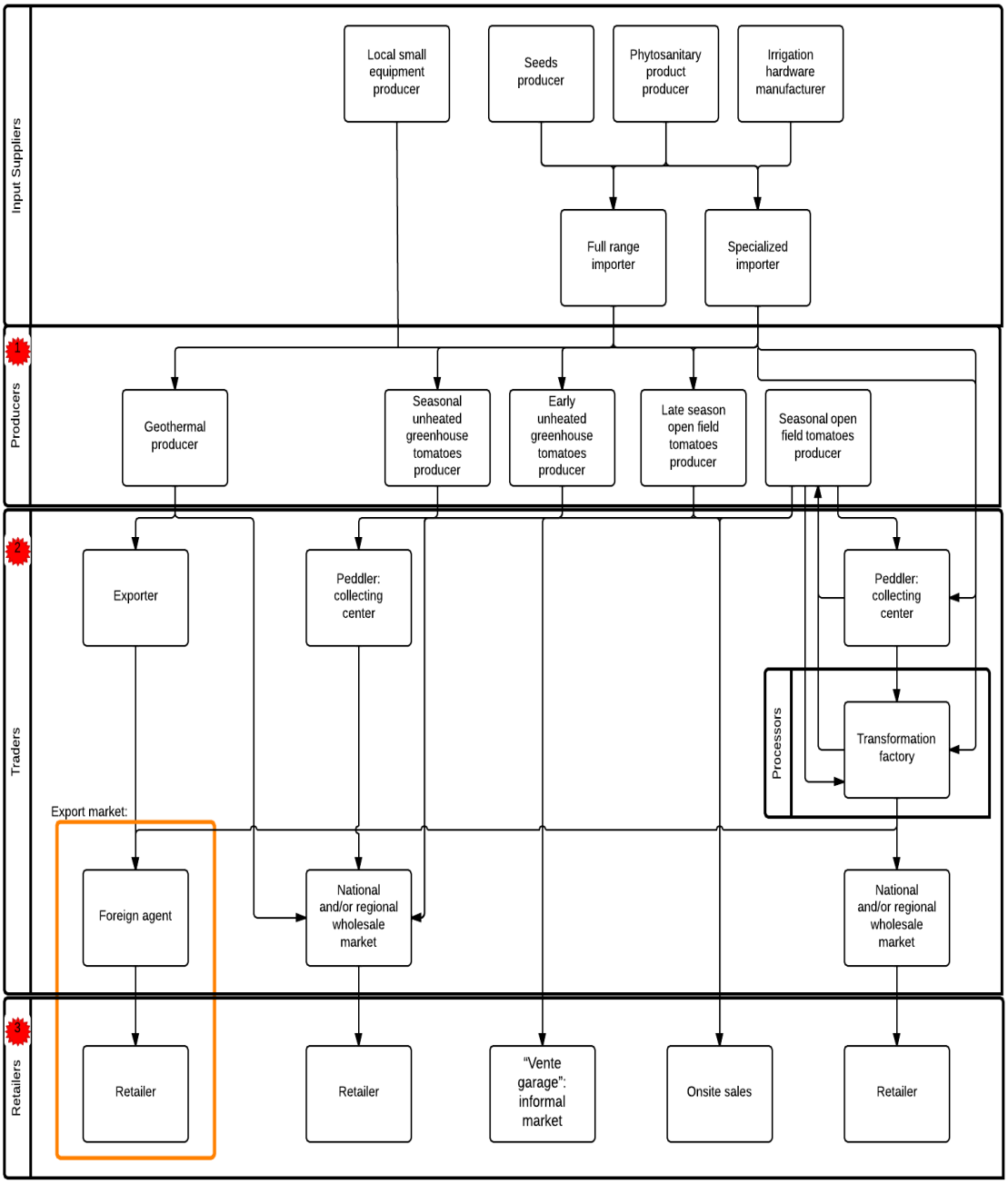
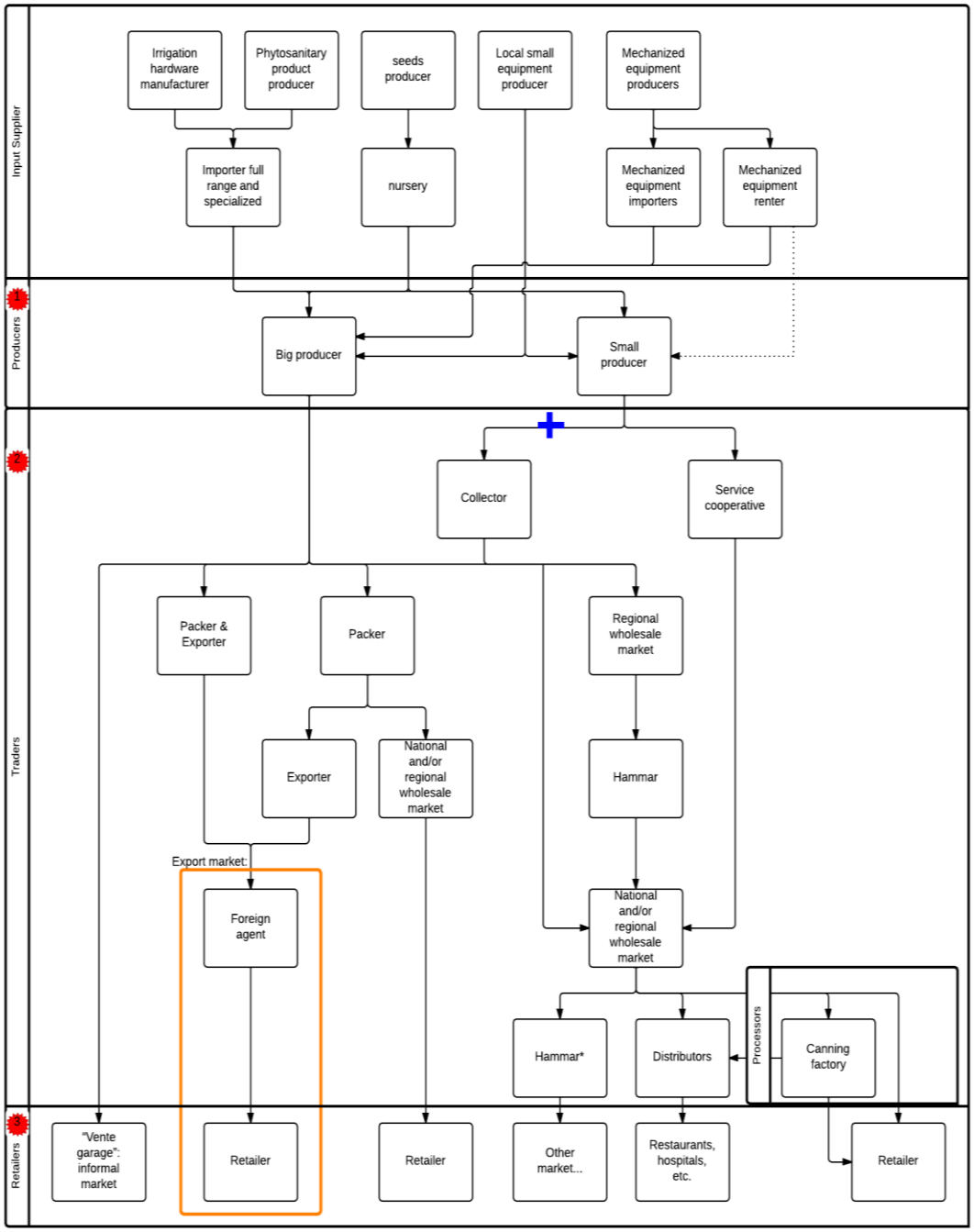


Figure 4. Dates and Maltese orange supply chain in Tunisia



✚ *Khaddar*: operator buying the entire production before harvest (will take harvesting in charge). NB: a retail seller can also be called a *khaddar*.

* *Hammar*: the *hammar* is a merchant working as an intermediary between several markets.

TABLE. SUMMARY OF ACTIVITIES FOR SELECTED RESOURCES AND SEGMENTS ALONG AGRICULTURAL VALUE CHAINS

Resource	Importance	Level/segment of the value chain			
		Farmers	Processors		Retailers
Wheat	One of the most important cereal crops in the world. The most essential food grain in the Arab world	Planting Growing Fertilizing Harvesting	Cleaning Cooking Drying Grinding Packaging Storing		Storing Distributing Marketing Shipping
Fruits and vegetables	They are reducing the occurrence of chronic diseases. They have an undeniable role in poverty alleviation	Planting Growing Fertilizing Harvesting	Cleaning Cooking Canning/Freezing/Drying Packaging Storing		Storing Distributing Marketing Shipping
Meat and milk	They are the main food commodities of animal sources. They play a complex economic, social and environmental role.	Rearing Feeding Treating Milking	Slaughtering Deboning Cutting-up Packaging Storing	Heating Cooling Homogenizing Sterilizing Fermenting Processing Packaging	Storing Distributing Marketing Shipping
Water	The most vital resource for household and agriculture. A scarce natural resource.	<u>For:</u> Irrigating Cooling farms Heating farms	<u>For:</u> Cleaning Heating Cooling Cooking		<u>For:</u> Heating Cooling
Soil	Fundamental to crop and livestock production. A finite, fragile and precious natural resource.	<u>For:</u> Planting Growing crops Grazing	No major activities		No major activities
Energy	Needed in all operations along the agrifood chain. Essential for food security and development.	<u>For:</u> Irrigation Machineries Tractors Cooling farms Heating farms	<u>For:</u> Processing Packaging Cooling Heating Storing		<u>For:</u> Heating Cooling Transporting
Solid waste	An outcome of all segments along agrifood chain. A major threat to the environment and health.	<u>From:</u> Livestock Left-over crops Handling crops	<u>From:</u> Slaughter houses Processing Packaging Storing		<u>From:</u> Storing Transporting Packaging Management

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This report aims at informing and supporting the development of a competitive agriculture and food sector in the Arab region, through a review and analysis of agricultural and food value chains. It also explores available options for their development and greening. There is indeed an urgent need to support the development of an effective agriculture and food sector in the region, particularly in the aftermath of the food price crisis of 2007- 2008 and the food supply disruption which ensued. Available data and information show that regional trade is substantial among countries of West Asia, while countries of North Africa, tend to trade more with their European counterparts. In addition, value chains in the region are generally made up of small and scattered operators, which renders the countries unable to build sufficient economies of scale to become active market participants.

However, in recent years, a few firms have started to emerge and, with appropriate support, could serve as the backbone for striving national and regional food value chains. If the development of food value chains is coupled with the adoption of green processes, the impact on rural livelihoods would be tremendous. Appropriate short- and long-term policies for value chain development and greening that build on existing national and regional frameworks would be highly beneficial.

ESCWA

United Nations House, Riad El Solh Square
P.O. Box: 11-8575, Beirut, LEBANON
Tel.: +961 1 981301; Fax: +961 1 981510
www.escwa.un.org

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