United Nations
Economic Commission for Africa

The potential for the creation of Regional Value Chains in North Africa : a sector-based mapping

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Foreword

North Africa boasts a unique geostrategic location at the intersection of regional and continental dynamics offering valuable opportunities for development and prosperity. As such, North African countries can leverage their strong relationships with Europe, their historic economic partner, to move upmarket and become part of global value chains. The subregion can also reap the benefits of its unique position in the Middle East, as well as of the construction of an African single market, offering considerable opportunities.

Against this backdrop, the prospective analyses of the impact of the project for the establishment of an African Continental Free Trade Area (AfCFTA) reflect the leading role to be played by regional value chains and the substantial contribution of the North African countries to the industrial development expected from this project. North-African countries are expected to benefit particularly from the growing trade in intra-African industrial goods, which is projected to increase by as much as 25 to 30% by 2040, furthering the integration of the continent's productive fabric.

To make better use of African and global opportunities, North Africa must first address its weak economic and trade integration, an obstacle in itself. A number of analyses confirm that regional integration in North Africa is one of the weakest at the continental level. The economic and trade relations between the seven countries of the subregion are not in keeping with the ambitions set and do not fully reflect the geographical, cultural, linguistic and religious proximity of these countries.

The overarching objective of this study is to identify the opportunities and challenges in building specific regional value chains, using a sectoral mapping of existing regional value chains and an analysis of their development potential. A draft action plan and a set of recommendations are incorporated in the analysis presented in this report to facilitate trade, reform the current institutional and regulatory framework and build the capacity of key actors for greater regional integration.

As a result, the development of regional value chains is essential for better regional integration in North Africa, thereby leading to increased economic growth, fuelled by improved intra-regional investment and increased trade among member countries. The productive fabric of the different economies will thus become interrelated and interdependent, serving as a catalyst both for real integration and for structural transformation of the economies of the subregion.

While the general aim of the present analysis is to improve the existing body of relevant knowledge and know-how, it is particularly aimed at building member countries' capacities to implement the public policies necessary for the development of value chains involving the countries of the subregion. As a matter of fact, since 2013, the ECA Office for North Africa, through its support to member countries' efforts, is engaged in advocacy supported by studies and research to promote regional value chains and use them as a suitable instrument for regional integration and structural transformation in these countries.

Lilia Hachem Naas

Director, ECA Subregional Office for North Africa

General introduction

The past two decades have seen an unprecedented decline in transport costs, lower customs barriers and increasing integration of the world's economies. Such developments, compounded by rapidly developing information technologies, fuelled the fragmentation of production processes among countries with differing levels of development. The resulting and rapidly growing trade in intermediate goods illustrates a process commonly referred to as value chain development. All activities involved in the production chain of a commodity from the time of its design to its market entry as a final product are considered an integral part of the value chain, including marketing and transport activities. At the heart of this evolution is the vertical fragmentation of production steps. It calls for a thorough understanding of the global networks for the circulation of goods and services for a better control of costs and delays. The growing importance of large multinationals in the global economy, notably those active in the ICT sector, has contributed to this development (Del Prete, Giovannetti and Marvasi, 2016).

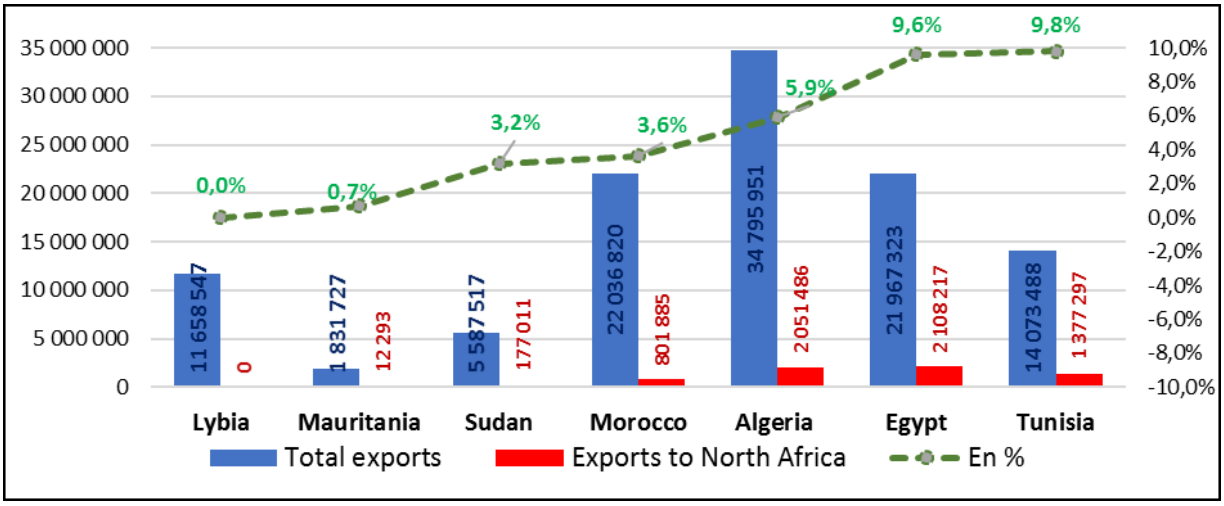
Developing countries have managed to benefit from this favourable development in global value chains (GVCs), by integrating processes for the production of goods so that they can best leverage some of their comparative advantages. Without this segmentation of production, the latter would have remained untapped. GVCs provided these countries with the opportunity to specialize in a segment of the production chain and thereby generate their own added value without having to develop integrated Industries which supply the intermediate goods needed to producers of finished goods (Grossman and Rossi-Hanberg, 2006). GVCs account for a significant share of world trade as the World Trade Organization (2014) estimates that nearly 30% of world trade in goods is comprised of intermediate goods and components. Estimated import content of exports is another indicator of the considerable development of GVCs in the global economy.

The development of value chains at the regional level also serves as an instrument to promote regional integration, based, inter alia, on improved economic relations. Through the production chain, production networks can be shared between several economies. RVCs may be established to stimulate regional integration and support the structural transformation of regional groupings. To this end, the development of regional integrated and coherent sectoral policies would be an incentive for economic actors to take advantage of a segmentation of production chains to address the specific needs of their economies. GVCs also provide a mechanism for promoting the local productive fabric through the creation of economic opportunities greater than those provided by the domestic market. By leveraging the differentiated factor endowments of member countries, firms operating on these chains thus enhance their competitiveness and facilitate the interconnection of the region's economies.

The analysis of the cross-trade between North African countries reveals that in 2015, only 5.8% of the overall exports of North African countries were of intra-North African origin. Equally, imports of goods and services originating from North African countries represented 3.1% of these countries' total imports. All these findings are a further evidence that the degree of regional integration of North African countries continues to be quite low.

At the national level, Figure 1 reveals that in 2015 the share of exports of goods and services destined for North African countries does not exceed 10% of the world' s total exports. Tunisia and Egypt can be regarded as the best engaged in intra-North Africa trade with intra-North Africa exports amounting to 9.8% and 9.6% of total exports, respectively. Conversely, the share of intra-North African exports of Morocco, Sudan and Mauritania is only 3.6% of total exports of goods and services. Lastly, Algeria is in an intermediate position owing to its natural gas exports to Tunisia, Morocco and Egypt.

Figure 1. Exports to North Africa and total exports of goods & services in 2015 (in thousands of $US and in %)



NB. Statistical data on Libya's exports to North African countries are not available.

Source. Calculations are based on the data base of the « *International Trade Centre* » (covering all the sections of the HS 2).

These findings from statistical data on intra North-African trade flows provide a strong case for the fact that RVCs in North Africa are quite limited but that there may be enormous potential to be harnessed, hence the importance of sectoral mapping. Thus, the general objective of this study is to propose, on the basis of a sectoral mapping of existing RVCs and an analysis of their development potential, the opportunities and challenges for the construction of RVCs specific to each of the business sectors.

The analysis of RVCs in North African countries was the focus of a study conducted by ECA in 2014. This report[1] found that the common feature of Algeria, Libya and Mauritania is that their integration into global value chains (GVCs) occurs at the end of chains: they mostly export raw materials such as oil and gas when it comes to Algeria and Libya, iron ore and fishery products when it comes to Mauritania; and they import all or substantially all of their manufactured products and the products needed for their local industry. These countries' economic performance depends to a large extent on fluctuations in commodity prices and economic crises.

Methodology

Our approach involved three phases, which albeit overlapping, were carried out in a sequential manner:

- We began by conducting a desk research to gain a good understanding of the specificities of each of the sectors surveyed in this study, in each of the North African countries. Following an illustration of the importance of each sector of activity, the value chain mapping of each sector allowed for a brief description of each main segment, which included a description of its current structure in the North African countries. It is noteworthy that we have had difficulties in collecting information and statistical data on Libya (due to the current security situation) and in Sudan;

- Subsequently, we further confirmed these information by compiling statistical data from the International Trade Centre's database. The statistical data thus gathered refer to the intra- North-Africa trade in different products and sectors. The determination of the share of intra-North Africa trade in the total trade share provided an opportunity to assess the existence of a potential for the development of value chains ;

- Finally, the analysis was pursued further by a shift from a product classification under HS2 to an HS4 classification. Thus, the statistical data compiled helped to highlight the opportunities and challenges for the construction of an RVC for each sector of activity.

It must however be noted that owing to the lack of statistical data and the specific features of each business sector, the above approach has not been fully applied to all the sectors considered in this study.

1. Textile and garment sector

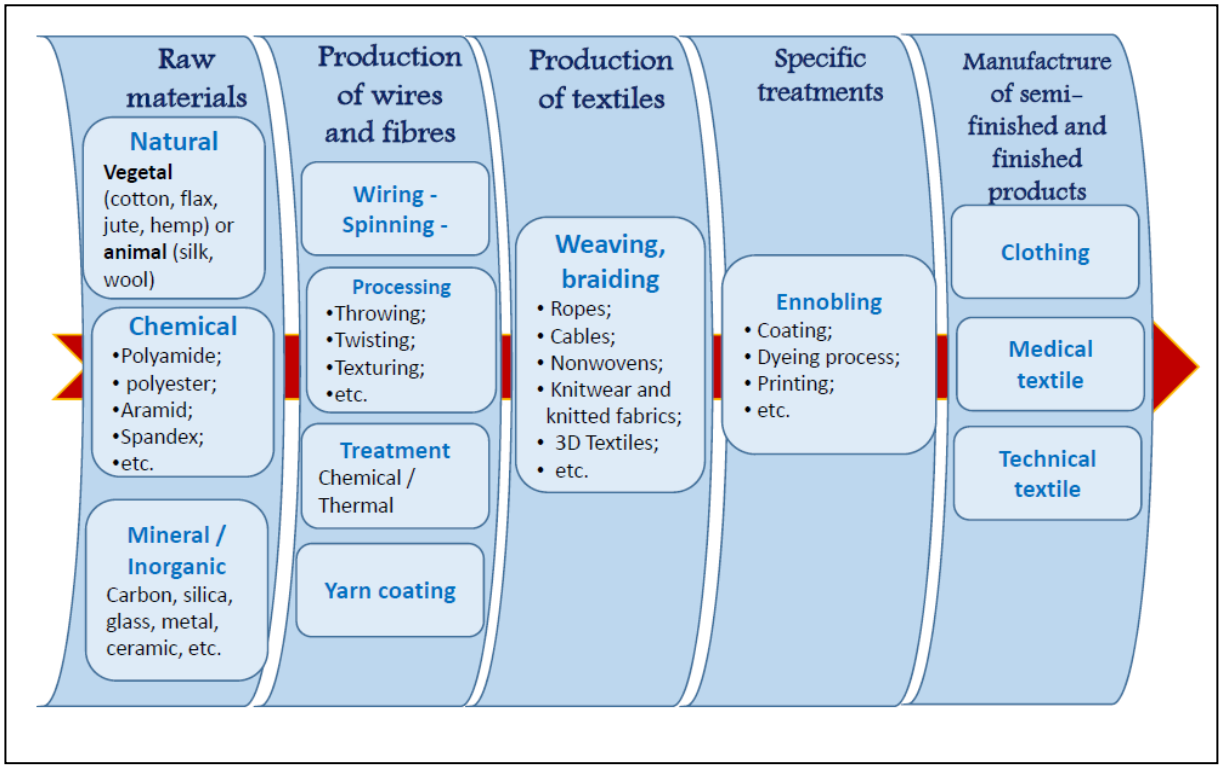
The global textile and garment market shows a high degree of horizontal integration in the areas of design, retail and branding. But the level of vertical integration is lower and much more variable. Some brands and retailers have their own production facilities but are at the same time subcontract to third parties. As such, the extent to which the production chain can be outsourced is still variable. For instance, a major brand or retailer can supply raw materials, design and detailed technical instructions, and only outsource the product assembly phase. These operations are commonly referred to as outward processing operations. In the case of the garment industry, materials, cutting and packaging are procured by the contractor, while sewing, folding, organizing and packaging are handled by the subcontractor.

The organization of the value chain for international trade in textiles is different in each country. As an example, in India and China, all production is done mainly locally. Other countries have a much higher degree of vertical specialization, often with a single step production process. Raw materials and intermediate goods can be exchanged through cross-border trade many times over before the final product is sold (Nordas, 2004).

1.1. Structure of the value chain of the textile and garment sector in North Africa

The value chain of the textile and garment sector is quite complex. In Figure 2, a simplified version of this chain is presented. Using this as a starting point, we will provide a brief narrative of each main segment of the textiles and garment value chain, including a description of its current structure in the North African countries.

Figure 2. The textile and garment sector value chain



Raw materials

Plant-based natural raw materials, particularly cotton, are mainly found in Egypt (6th largest producer in Africa with a 5.2% share in 2015-2016) and Sudan (10th largest producer in Africa with a 3.2% share in 2015-2016). Algeria is among the world's hemp producers. For raw materials of animal origin, wool can be found in almost all countries of North Africa.

Chemical raw materials, manufactured mainly from hydrocarbons, are available mainly in Egypt, Morocco and Tunisia. Also, some raw materials of mineral origin (carbon, silica, etc.) are available in Egypt, Morocco and Tunisia. Table 1 presents the geographical location of every major segment of the textiles and garment value chain. We restricted ourselves to mentioning the existence of the individual segments irrespective of the quantitative abundance of raw materials or the number of companies specializing in each of the activities in the value chain.

Other activities

The other activities in the textile and garment sector value chain (spinning, yarn coating, weaving, ennobling process, manufacturing of finished and semi-finished products, etc.) are mainly located in Egypt, Morocco and Tunisia with varying levels of technical performance. In this regard, the 2014 ECA report indicated that the textile sector in Egypt is active in the whole range of activities related to global value chains (from cotton cultivation to fabric production and ready-to-wear). In comparison to Morocco and Tunisia, Egypt is the only country to demonstrate significant international growth in this value chain.

Table 1. Geographical location of every major segment of the textiles and garment value chain

		Algeria	Egypt	Libya	Morocco	Mauritania	Tunisia	Sudan
Raw materials	**Vegetal** (cotton, flax, jute, hemp)	Hemp	Cotton					Cotton
	Animal (silk, wool)	Wool	Wool	Wool	Wool	Wool	Wool	Wool
	Chemical (polyamid, polyester, aramid, spandex, ...)		x		x		x	
	Mineral (Carbon, silica, ...)		x		x		x	
Yarn manufacturing	**Spinning - Drawing**	x	x		x		x	
	Processing (Throwing, Twisting, Texturization, etc.)		x		x		x	
	Treatment (chemical/ Thermal)		x		x		x	
	Wire coating		x		x		x	
	Weaving, braiding (ropes, cables, nonwoven, knitwear and knitted fabric, etc.)		x		x		x	
	Ennobling (Coating, dying, printing, etc.)		x		x		x	
Garment manufacturing	**Clothing**	x	x		x	x	x	x
	Medical textiles		x		x		x	
	Technical textiles		x		x		x	

Source. Compiled by the Author, based on documentary research.

For the other countries of North Africa, namely Algeria, Mauritania and Sudan, there has been very little development in activities related to the textile and garment sector. These are limited to a few companies whose products are intended for the local market with relatively small market shares. Local demand is mostly met by imports.

Below is a summary of the main characteristics of the textile and garment sector in each North African country:

The textile and garment sector in Egypt

About 1.2 million people currently work in the textile and garment sector, with about 2,525 textile factories, of which 25 are state-owned and 2,500 privately-owned. For the past few years, the Egyptian textile industry made a shift towards higher value-added production to the detriment of the export of raw cotton. The sector boasts a broad range of textile fiber products, notably raw cotton, yarn, fabrics, garments and ready-to-use textiles. World-renowned brands such as Gap, Guy Laroche, Pierre Cardin and Tommy Hilfiger are producing in Egypt under license, in a highly protected domestic market. Key players in the textile value chain are cotton producers, processors (ginning mills, weavers/clothiers, and producers of ready-to-use textiles), and merchants (exporters and retailers). The interlinkages between upstream cotton suppliers and downstream textile sellers are the basis for the long-term competitiveness of the sector. The phases of dyeing and finishing are the shortcomings of the value chain.

Egypt is the only country in the North Africa region with a fully vertically integrated textile industry, where the whole production process, ranging from cotton cultivation to yarn, fabric and garment production, can be carried out at the domestic level.

US$5.6 million worth of cotton and US$2.8 million worth of special fabrics have been exported from Egypt to Morocco in 2015. Egypt has also exported cotton fabric to Tunisia for US$20.9 million. By contrast, garment imports by Egypt from Tunisia and Morocco were quite modest.

The textile and garment sector in Morocco

Textile is a strategic sector in the country's industrial activity due to its contribution to the industrial sector's aggregates (with around 27% of jobs and 7% of industrial value added in 2016). According to the Moroccan Association of Textile and Apparel Industries, Moroccan exports from the textile and apparel Industries reached record levels in 2016 with 34.2 billion dirhams. The leading destinations are Spain (MAD 18.5 billion), France (MAD 7.3 billion), Great Britain (MAD 1.7 billion) and Portugal (MAD 1.2 billion).

EU countries, notably Spain, France and Italy, are still the main countries of origin for Moroccan imports. FTSA fabric, cotton fabric, knitted fabric, garments and FTSA yarn are the main imported products. Roughly 63% of the sector's production is located in the Greater Casablanca region, which constitutes an industrial and service platform for international customers.

In order to meet the targets of the 2014-2020 Industrial Acceleration Plan, the Moroccan authorities are encouraging economic operators to invest in relevant sectors such as knitwear, home textiles and technical textiles. As a result, Morocco is now specialized in *fast-fashion* (with high reactivity and capacity to suggest new models).

Morocco has benefited from competitiveness gains resulting from the logistics reform and the decisive contribution of Tangier Med port. By 2016, Morocco ranked 70th (out of 160 countries) on the Logistics Performance Index (LPI). The competitiveness of Moroccan textiles is the result of the country's economic and political stability. Morocco's biggest competitors in the Mediterranean region (Turkey, Tunisia, Egypt, etc.) do not have the same advantages.

In 2015, Morocco's export of clothing and clothing accessories to Algeria amounted to US$16.2 million, or 90.4% of textile and garment sector exports destined for Algeria. It mainly exports cotton fabric to Tunisia valued at US$6.9 million and to Egypt valued at US$2.7 million.

The textile and garment sector in Tunisia

The textile and garment sector is one of the linchpins of the Tunisian industry and maintains a very important place in the country's economy. It ensures a strong contribution to the socio-economic sustainability of Tunisia. It is broken down into 6 branches of activity, namely Drawing, Weaving, Finishing, Hosiery, Garment Manufacturing and various Industries in the sector (accessories...). In Tunisia, all these branches enjoy a number of assets making them one of the most competitive in the region and positioning Tunisia as a leading location for foreign direct investment.

The textile and garment industry is still the leading manufacturing sector both in terms of jobs created (158,301 jobs) and the number of businesses with 1,603 companies (with 10 or more employees) established. Of these companies, about 83% are totally export-oriented and 45% are in partnership or with 100% foreign capital. According to FIPA (Foreign Investment Promotion Agency), up to the end of 2015, the textile and garment sector generated a total stock of FDIs amounting to 1,342 million dinars, i.e. 6.7% of the total stock of FDIs excluding energy. The FDIs were made by 1,142 companies which created 125,274 jobs, i. e. 42.7% of the total number of jobs provided by FDIs in the manufacturing sector.

The sector draws in particular on the advantages of Tunisia's geographical proximity with the European market, the quality of production and the promptness of the delivery of orders, etc. Tunisia's strategic plan for the support of the textile and garment sector provides for the development of the "ennobling" activity to palliate the sourcing problem and to allow clothing companies to produce dyes and/or printings specific to their collections in a very short time (responsiveness, exclusivity, etc..).

Notwithstanding the increase in wages, as a result of the social demands following the 2011 revolution, the decline of the Tunisian dinar against both the US dollar and the euro may well prove instrumental in stimulating exports and attracting more foreign companies to set up shop in Tunisia. Tunisian textiles have already focused on the growth niches of high-fashion collections, technical textiles, hosiery, finishing, fabric ennobling and fashion design and modeling. The aim being to span the entire value chain well beyond garment manufacturing. In the upstream, the process involves weaving and finishing, particularly of ever more technical textiles. A number of examples of target activities for technical textiles are available: flame retardant, antiseptic, antibacterial, biodegradable, climatic, composite, breathable waterproof (membrane) textiles, to name but a few.

In 2015, Tunisia exported to Algeria mainly made-up textile articles (US$1.9 million), special yarns and rope products (US$1.8 million) and synthetic fibres (US$1.5 million). The main export to Morocco was cotton fabric for a total value of US$1.5 million. Exports to Libya are predominantly made up of finished products (wool apparel and made-up goods). Exports to Egypt are quite limited and are comprised of cotton fabric equivalent to US$0.2 million.

The textile and garment sector en Algeria

The textile and garment market in Algeria amounts to about 500 million linear meters, with annual needs of around 150 million items, while the national sector covers only 6% of the needs, and the remaining 94% are being invaded by imports (from Turkey and Asian countries,

particularly China[1]. Algeria has untapped production capacities of 250 million meters of fabric per year, yet it is finding it difficult to diversify its economy. Nevertheless, the textile sector enjoys enormous potentialities that need to be harnessed to reactivate this sector, capture the internal market and capitalize on the advantages of its position in the Mediterranean and its abundant young and active labour force.

According to the International Trade Centre (ITC) database, Algeria's global textiles and apparel exports (wool, cotton, fabric, garments, etc.) to the world are less than US$2 million, equal to 0.01% of Algeria's total exports in 2015. On the other hand, Algerian imports of textile and apparel products coming from Morocco climbed from US$19.6 million in 2015 to US$47.1 million in 2016. This substantial increase relates mainly to garments and apparel accessories.

Textile and garment sector in Mauritania

Imports of fabrics, garments and other textile products reached 2.6% of Mauritania's total imports in the first quarter of 2016 (National Statistics Office, quarterly report on foreign trade). A substantial part of these imports is sourced from Asia. The Mauritanian exports of textiles and garment sector are marginal.

The textile and garment sector in Libya

Global exports from Libya reached US$11.66 billion in 2015, with mineral products as the main component. Textile and garment sector exports only represent 0.03% of these exports, including mainly raw materials such as animal wool. This finding is further proof as to the absence of a productive textile and garment sector in this country.

The textile and garment sector in Sudan

Though Sudan is known for its cotton production, ITC data reveal that in 2015, global cotton exports accounted for 0.71% of the country's total exports, or nearly all of its textile and garment sector exports. A high proportion, 31.9% of total cotton exports, is destined for Egypt, to the tune of US$12.6 million.

1.2. Analysis of the sector's intra-regional trade and existing RVCs

The statistical data on cross-sectoral trade in textile products and garment sector between North African countries (see table 2) clearly show that Algeria, Libya and Mauritania do not export to the other countries of North Africa. The shortage of export flows reflects the lack of a sufficiently developed productive industry in these three countries. While the situation in Sudan is quite similar, 31.7% of its cotton exports are however directed to Egypt. This finding confirms the results of the study conducted by ECA in 2014 whereby Algeria, Libya, Mauritania and Sudan are not included in the textile and garment sector RVC. Only Sudan can be considered poorly integrated upstream of this value chain given the country's exports of raw material and cotton to Egypt.

On the other hand, the export of Egypt, Morocco and Tunisia are relatively high although their shares in relation to world exports remain quite low, and in the case of Egypt as low as 3.18%. The explanation for this can be found in the fact that the national textile and garment sector production of these three countries is mainly in the hands of foreign companies (multinationals) set up to benefit from the specific advantages of each country and which are export-oriented to the markets of the developed countries (European Union countries). More specifically, Tunisia and Morocco's intra-regional exports, made of finished products, are

[1] According to the International Textile and Fashion Fair « TEXTYLE-EXPO », http://www.textyle-expo.com/textile-algerie.php, November 2017.

destined largely to Algeria in order to cover local demand. On the other hand, exports from Egypt to Tunisia and Morocco are comparatively more important. This observation reflects the fact that Egypt is the country relatively best integrated into the current textile and garment sector RVC.

Table 2. Reciprocal exchanges among North African countries in the textile and garment sector in 2015 (thousands of $US)

		Country of destination							Total exports to North Africa	Total exports to the rest of the world	Intra north-Africa exports as a % of total exports
		Mauritania	Morocco	Algeria	Tunisia	Libya	Egypt	Sudan			
Country of origin	Mauritania	--	0	0	0	0	0	0	0	0	0,00%
	Morocco	5 017	--	17 935	10 692	2 692	3 496	28	39 860	3 200 655	1,25%
	Algeria	0	58	--	127	0	1	0	186	2 008	9,26%
	Tunisia	545	2 474	6 885	--	4 655	339	0	14 898	2 544 521	0,59%
	Libya	0	0	0	0	--	0	0	0	3 353	0,00%
	Egypt	388	17 074	21 191	19 637	14 073	--	21 677	94 040	2 958 269	3,18%
	Sudan	0	0	0	0	0	12595	--	12 595	39 689	31,73%
Total imports from North-African countries		5 950	19 606	46 011	30 456	21 420	16 431	21 705	161 579	8 748 495	1,85%

Source. Calculations are based on the « *International Trade Centre* » data base (covering all the sections of the HS from 50 to 63).

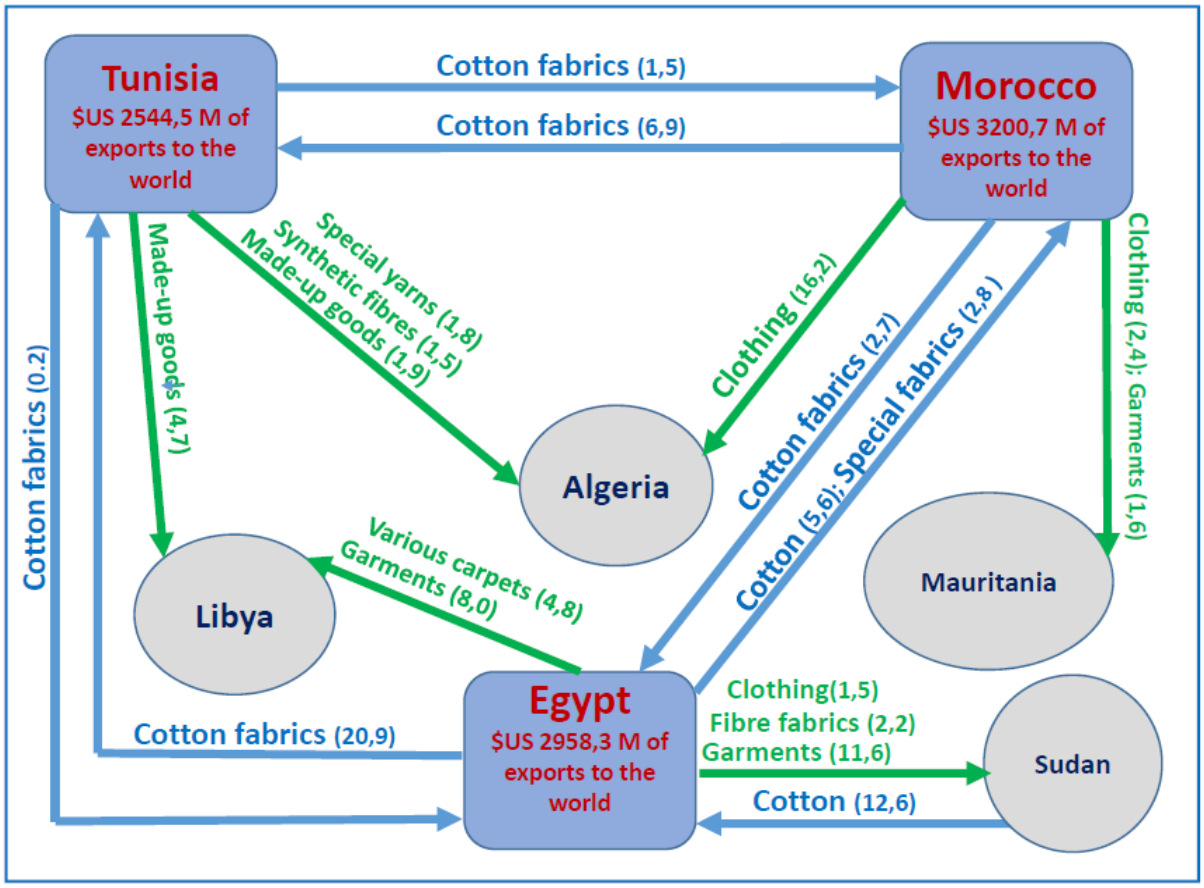
1.3. Opportunities and challenges for the construction of textile and garment sector RVCs

Table 2, on the intra-regional trade of the textile and garment sector, highlights the high potential for developing an RVC between North African countries in the textile and garment sector. This finding is not relevant for Libya and Mauritania, who are currently unable to implement an RVC in this sector.

An in-depth analysis of the cross-trade flows of textile and garment sector products (based on a shift from the HS2 to the HS4 nomenclature) provides an overview of the nature of the products exported by each of the North African countries. The findings of this analysis are summarized in Figure 3.

It is clear that the cross-trade between Egypt, Morocco and Tunisia is mainly in intermediate and semi-finished products such as cotton, cotton fabric and special fabrics. The share of exports of these products in the aggregate exports of each of the three countries (Egypt, Morocco and Tunisia) remains marginal. On the other hand, exports to other North African countries (Algeria, Libya, Mauritania and Sudan) are primarily exports of finished products such as apparel, textile articles, made-up goods, etc. The aim of these exports is to cater for the local demand of these four countries, currently mainly catered for by imports.

Figure 3. Main flows of the textiles and garments' exports of North African countries (in 2015)



N.B. Numbers in brackets are expressed in millions of US dollars.

Source. Compiled by the author from the ITC data base , November 2017.

Globally, wages are expanding rapidly in China (the world' s largest producer and exporter of textile products and garment), raising the potential for the North Africa region to become more competitive as a platform for the production and export of tex tile products and garment. Similarly, the association and free trade agreements concluded by the various North African countries with the European Union, together with exchange rates, can provide a major contribution to strengthening the competitiveness o f the textile and garment sector.

The above analysis found that there are substantial opportunities to build RVCs in the North African textile and garment sector. The cross -trade between the different countries is fairly low compared to the rest of the wo rld's. In the same way, the domestic demand for textile and garment products is to a large extent catered for by imports from countries such as China and Turkey. As a consequence, Egypt, Morocco and Tunisia are required to import more raw materials (wool, cotton, etc.) from the countries in the region. They also must benefit more fully from the Agadir Agreement, which foresees a revitalization of trade, the strengthening of the industrial fabric, the promotion of economic activity and employment, the impr ovement of productivity and living standards in the member countries (Egypt, Morocco, Tunisia and Jordan).

The creation and competitiveness of a North -African RVC for the textile and garment sector is driven by the following factors:

- Available supply of regional fabric in different varieties, at competitive rates. Such a scenario would allow regional companies in the downstream clothing sectors not only to gain access to profitable inputs but also to have faster and more flexible access to these inputs;
- Improved capacity of local firms, including the uptake of new production techniques and technologies. As a result, regional firms would be able to improve quality and productivity to counter the relative weak competitiveness associated with relatively high labour costs;
- The swiftness and flexibility of the market, coupled with both the transport and logistics environment, would enable regional firms to compete in non -price competition environments and move into higher value -added activities.

But difficulties may limit the development of RVC s in the textile and garment sector. Such difficulties are related to:

- A shortcoming in logistics and international freight transport between the countries of North Africa. As such, further trade and transport facilitation measures must be adopted;
- The social instability which particularly affects the textile and garment sector (primarily in terms of workers);
- The political and economic instability of certain countries in the region (particularly Libya) ;
- The lower European demand, and the accelerating relocations of multinationals to new destinations (Eastern Europe, Asia, etc.);
- the growing predominance of the informal market in certain North African countries .

2. The mineral wealth sector: the case of the phosphate and its derived chemicals sectors

Mineral resources are an essential element for human well-being and economic development of nations. This term is used to describe any substance extracted from the continental crust by man. They may be divided into three categories (see Table 3) including energy resources (oil, natural gas, coal, etc.), metal resources (iron, lead, aluminium, gold, silver, etc.) and non-metal resources (phosphate, marble, sand, etc.).

Table 3. Segmentation of the mining industry

Minerals							
	Energy minerals	Metallic minerals			Non metallic minerals		
		Precious metals	Ferrous metals	Non ferrous metals	Construction minerals	Industrial minerals	Precious stones
Minerais	Oil, Natural gas, Coal, Uranium	Or, platine, argent	Minerai de fer, niobium, tantale, titane	Bauxite, cobalt, copper, lead, magnesium, molybdenum, nickel, zinc	Building stones slabs, cement, clay, aggregates, gypsum, sans and gravel, ardoise	bentonite, industrial carbonates, Kaolin magnesia, potassium salt, silica, Sulfur, phosphate	Diamond, Stones
Utilisation finale	Electricity, Chemicals, Organic, Fuels and Industrial products	Jewellery, Minting, Industry	Aerospace activities, Building, Electronics, Engineering, manufacturing sector, Steelmaking	Construction, electricity electronics, engineering, manufacturing sector	Construction	Ceramics, chemistry smelting, molding, pigments, fuels, gas, steelmaking, metallurgy, water treatment	Jewellery, Industry

Source. Performances Management Consulting (2010), « The mining sector in Subsaharan Africa: Issues, challenges and outlooks », p. 4, web site: www.performancesconsulting.com.

Given the mining resources diversity, the North-African countries enjoy more or less resources of each of the categories. However, we observed that the phosphates resources of Morocco and Tunisia are fairly high. According to the Mineral Commodity Summaries (2017) Morocco holds 73.5% of the world's phosphate reserves. In addition, over the period 1996-2005, these two countries' average phosphate production accounted for 22.68% of world production (see Table 4).

Table 4. Average phosphate production over the period 1996-2005

	United-States	China	Morocco	Russia	Tunisia	Others	World
In million tons	39,0	23,5	**23,4**	10,2	**7,8**	33,8	**137,6**
In %	28,34%	17,08%	**17,01%**	7,41%	**5,67%**	24,56%	**100,0%**

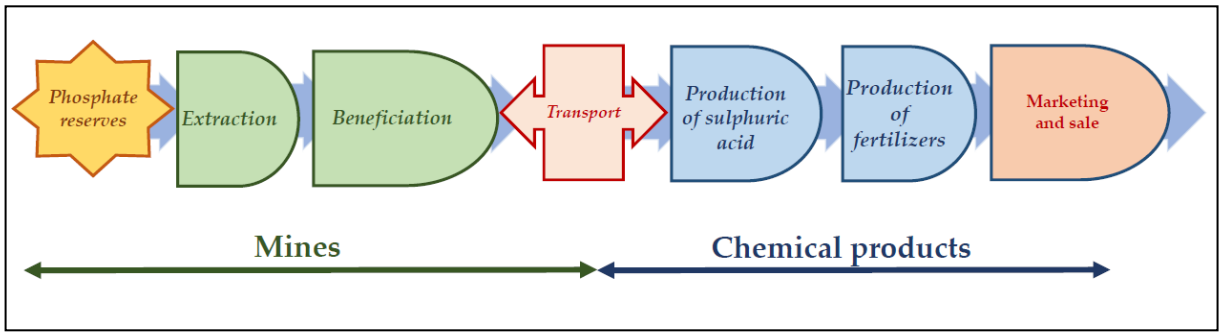
Source. futura24.voila.net

The abundance of phosphate resources in North African countries leads us to analyze the RVC of this sector, which is fundamental to economic development and an important source of income for the government budget in each country.

2.1. Structure of the value chain of the phosphate sector in North Africa

The value chain of the raw phosphate sector and the derived industrial chemicals is quite complex. It is broken down into the mining sector and the chemical industry sector. A streamlined version of this value chain is shown in Figure 4. The latter will be followed by a brief description of each main segment of the phosphate value chain, with a brief description of its current structure in the North African countries.

Figure 4. The value chain of the phosphate sector and its derived chemicals



Phosphate reserves

The phosphate reserves of the North-African countries are fairly significant. The statistical data on table 5 indicate that for 2015, the phosphate reserves of the four countries of North Africa (i.e. Algeria, Egypt, Morocco and Tunisia) represent 78.68% of the world reserves, mainly concentrated in Morocco. This country holds de 73.53% of the world's phosphate reserves.

Table 5. Production and phosphate reserves of North African countries

Countries	Production in 2015		Reserves	
	In thousands of tons	In %	In thousands of tons	In %
Algeria	1 400	0.58%	2 200 000	3.24%
Egypt	5 500	2.28%	1 200 000	1.76%
Morocco	29 000	12.03%	50 000 000	73.53%
Tunisia	2 800	1.16%	100 000	0.15%
Total 4 countries	38 700	16.06%	53 500 000	78.68%
Total World	**241 000**	**100,00%**	**68 000 000**	**100,00%**

Source. U.S. Geological Commodity Summaries, January 2017, page 125.

The Mauritanian, Sudanese and Libyan phosphate reserves are fairly low in comparison to the other countries of the regions.

Phosphates are widely used in agriculture given that its contents in derived chemicals. The latter are mainly straight, binary and complex fertilizers. Phosphates are also used by the detergent industry, metal machining, chemical and pharmaceutical industry (Smirnov V., 1982)[2].

[2] Smirnov, V. (1982). Geology of useful minerals. Translated to French in 1988 Edition Mir Moscou, 623 p.

Extraction of phosphates

Extractive mining can be made either by artisanal or industrial means. Industrial mining is any operation in which activities consist of extracting and concentrating mineral substances, and reclaiming marketable products by modern and mechanized methods and processes. Phosphate mining is considered a fairly important economic activity for several North African countries (mainly Morocco and Tunisia) and is one of the leading sources of foreign exchange earnings, through incomes derived from mineral exports. Yet, since the 2011 revolution, Tunisia's mining activity has experienced a number of problems (fuelled by social demands) which have caused the shutdown of a number of mining operations, leading to a significant decrease in phosphate production.

The mining operations in Morocco and Tunisia are run by State-owned companies (the Office Chérifien des phosphates in Morocco and the Compagnie de Phosphate de Gafsa in Tunisia), which are responsible for the majority of investments and mining activities in these countries since several decades.

Phosphate beneficiation

The beneficiation of phosphates consists of a set of processes aiming to improve the quality of the extracted product. The value of phosphate beneficiation, whereby the product is transformed from a lower to a higher category grade, cannot be overlooked, although there are additional costs associated with this process. Different beneficiation processes can be used, namely the treatment based on washing, calcination and electrostatic separation. In Morocco and Tunisia, phosphate beneficiation is primarily made through washing treatment, which involves large quantities of water.

Transport

During the so-called transport stage, the beneficiated phosphate is shipped either to chemical industry units or to foreign markets. As shown in Figure 4, the phosphate value chain is subdivided into the mining and chemical industry sectors. The latter can use raw phosphate as an input to produce sulphuric acids or fertilizers (in different forms). It produces a wide range of phosphate-derived chemicals

Production of sulphuric acid

Sulphuric acid is the world's largest manufactured chemical (200 million tons a year). Concentrated sulphuric acid (93-98%) is used in the manufacture of fertilizers, explosives, dyes and petroleum products. The starting material for the manufacture of sulphuric acid is clean and dry gaseous sulphur dioxide (SO2). Some of the uses of sulphuric acid include: the manufacture of fertilizers (superphosphates); the artificial textile industry; the processing of ores; the refining of petroleum; the storage of electricity (lead batteries); the etching of metals used for steel making; the synthesis of a variety of compounds (dyes, explosives, detergents, salts, other acids, etc.). Production units of sulphuric acid are located mainly in Morocco, Tunisia, Algeria and Egypt.

Production of phosphate fertilizers

Rock phosphate is the raw material used to manufacture most phosphate fertilizers. With access to phosphorus-rich minerals, Morocco, China and the United States are the world's most important players in the phosphate industry. Before 2011, Tunisia used to be a major producer of phosphate fertilizers.

The rock collected from the mines is firstly conveyed to the upgrading units where sand and clay are separated and impurities removed. Most processes are wet to facilitate transport and minimize dust.

2.2. Analysis of intra-regional trade in the phosphates and derived chemicals sectors and existing RVCs

Statistical data on cross trade of phosphate and its derived chemicals (also referred to as inorganic chemicals and fertilizers) between North-African countries are illustrated in table 6. These data indicate that only 3.6% of world exports by these countries are intra-regional. Furthermore, these exports make it possible to meet only 9.3% of the North-African countries' import demand.

It is hence plain to seen that Libya, Mauritania and Sudan do not export to the other North African countries. The lack of export flows is explained by the absence in these three countries of the phosphate sector. Conversely, Algeria, Egypt, Morocco and Tunisia's total exports are quite high although their shares in intra-regional trade are low. Only Tunisia is well integrated in the North Africa region. In effect, exports of inorganic chemicals and fertilizers from Tunisia to other North African countries make up 18.55% of its exports to the rest of the world. For the other countries, this share does not exceed 4.09% in the case of Egypt. The share of Morocco, one of the world's leading phosphate producers, remains below 1.20%. As shown, with the exception of Tunisia, exports of phosphate and its derived chemicals from the different North African countries are to a large extent destined for other countries in the world, mainly China, the US, Turkey and the European Union countries.

Table 6. Cross trade of phosphates and its derived chemicals between countries of North Afri (HS28 + HS31) in 2015 (in thousands of $US and in %)

		Country of destination							Total exports to North Africa	Total exports to the rest of the world	Intra north-Africa exports as a % of total exports
		Algeria	Egypt	Libya	Morocco	Mauritania	Sudan	Tunisia			
Country of origin	Algeria	---	0	0	18 024	0	0	723	18 747	927 940	2,02%
	Egypt	3 614	---	3 460	5 165	0	10 682	6 094	29 015	709 542	4,09%
	Libya	N-A	N-A	---	N-A	N-A	N-A	N-A	N-A	--	--
	Morocco	29 447	0	4 978	---	303	3 955	3 774	42 457	3 546 594	1,20%
	Mauritania	0	0	0	0	---	0	0	0	0	--
	Sudan	0	0	0	0	0	---	0	0	902	0,00%
	Tunisia	44 094	45 543	21 482	5 453	413	0	---	116 985	630 714	18,55%
Total imports from North-African countries		77 155	45 543	29 919	28 642	716	14 637	10 591	207 204	5 815 692	3.6%
Total imports		435 107	552 244	N-A	840 377	47 969	141 285	212 933	2 229 915		
Intra-North African imports expressed as a % of total imports		17.73%	8.25%	N-A	3.41%	1.49%	10.36%	4.97%	9.3%		

N-A means statistical data are **N**ot **A**vailable.

Source. Calculated based on the « *International Trade Centre* » data base, covering all the sections of the HS28 (inorganic chemicals) and HS31 (Fertilizers).

Domestic demand for inorganic chemicals and fertilizers also indicates that imports from North African countries are fairly low. In effect, the share of intra-North African imports in the overall imports ranges from 17.73% for Algeria and 1.49% for Mauritania.

While the statistical data used concern a HS2 products classification, it may be inferred that, overall, North African countries have little integration into the phosphate sector RVC. Equally, it may be noted that, according to the results of table 6, there is still a relatively high potential for developing RVCs in the field of phosphates. This sector has rather large world reserves, and export revenues are a key factor in the supply of foreign currencies (such as in the cases of Morocco, Tunisia, Algeria and Egypt).

2.3. Opportunities and challenges for the construction of an RVC in the phosphates sector

Table 6, on intra-regional exchanges in the sector of phosphates and its derived chemicals, shows the existence of a strong RVC development potential between North African countries. In view of this, we have tried to analyze in more detail the cross-country trade in North Africa, by: (i) separating fertilizer trade from inorganic chemicals trade, that is by making a distinction between the phosphate that has been enriched and the phosphate used by the chemical industry (derived chemicals); (ii) determining the weight of exports from the country of origin to the total exports and calculating the share of imports from the country of destination (from each of the North African countries) in relation to total imports from these commodities. The findings of this in-depth analysis, based on a product classification shift from HS2 to HS4, are illustrated in Tables 7 and 8.

Regarding the cross-trade of phosphate, table 7 shows that the level of trade between the different countries is fairly low compared to trade with the rest of the world. If Algeria is importing its products from Tunisia (the main producer and exporter of this product), Egypt and Sudan are looking to China to supply their needs. Similarly, although Egypt is the main exporter of carbonates in North Africa, Algeria, Morocco and Tunisia are importing this product from the United States, Spain and Turkey. All these findings support the view that the potential for trade development and for the creation of an RVC between North African countries is still not being fully exploited.

Table 7. Cross trade in « Inorganic chemicals » between North African countries (in thousands of $US and in %)

Countries	Exports (HS2)			Main products exported (HS4)		Imports of inorganic chemicals (HS4)			
	To the rest of the world	To North Africa In thousands of $US	In %	Product names	In thousands of $US	Main countries of North Africa	In thousands of $US	Total imports from the country of destination	In %
Tunisia	372 961	100 845	27,04%	Diphosphorus pentaoxide; phosphoric acid; polyphosphoric acids, of a defined or undefined chemical constitution	163 524	Algeria	2 712	15 277	17,8%
						Egypt	0	12 428	0,0%
						Morocco	0	2 392	0,0%
				Phosphinates phosphonates and phosphates ; polyphosphates, of a defined or undefined chemical constitution	123 753	Egypt	34 238	38 417	89,1%
						Algeria	19 812	52 100	38,0%
						Morocco	4 733	13 823	34,2%
Morocco	1 676 544	23 197	1,38%	Diphosphorus pentaoxide ; phosphoric acid ; polyphosphoric acids, of a defined or undefined chemical constitution	1 647 654	Algeria	10 955	15 277	71,7%
						Tunisia	0	1 691	0,0%
						Sudan	0	205	0,0%
				Phosphinates phosphonates and phosphates ; polyphosphates, of a defined or undefined chemical constitution	9 954	Algeria	0	52 100	0,0%
						Egypt	0	38 417	0,0%
						Sudan	0	3 761	0,0%
Egypt	286 713	16 671	5,81%	**Carbon**	146 941	Tunisia	3 525	4 338	81,3%
						Algeria	256	965	26,5%
						Morocco	95	1 827	5,2%
				Carbonates ; peroxocarbonates	37 834	Algeria	2 944	50 493	5,8%
						Tunisia	350	34 455	1,0%
						Morocco	802	33 966	2,4%
Algeria	506 950	18 747	3,70%	Anhydrous ammonia or aqueous ammonia	478 788	Morocco	18 024	360 867	5,0%
						Tunisia	0	68 225	0,0%

Source. Calculated according to the « *International Trade Centre* » data base, covering code 28 of the harmonized system (Inorganic chemicals).

Table 8. Cross trade in « Fertilizers » between North African countries (in thousands of $US and in %)

Countries	Exports (HS2)			Main products exported (HS4)		Imports fertilizers (HS4)			
	To the rest of the world	to North Africa		Product names	In thousands of $US	Main countries of North Africa	In thousands of $US	Total imports du Country of destination	In %
		In thousands of $US	In %						
Tunisia	257 753	16 140	**6,26%**	Mineral or chemical fertilizers containing 2 or 3 of the fertilizer nutrients: nitrogen, phosphorus and potassium	119 970	**Libya**	15 295	N-A	**N-A**
						Algeria	517	84 566	**0,6%**
						Morocco	141	29 773	**0,5%**
				Mineral or chemical phosphate fertilizers	137 534	**Algeria**	0	458	**0,0%**
						Libya	0	N-A	**N-A**
Morocco	1 870 050	19 260	**1,03%**	Mineral or chemical fertilizers containing 2 or 3 of the fertilizer nutrients: nitrogen, phosphorus and potassium	1 554 496	**Algeria**	14 253	84 566	**16,9%**
						Tunisia	0	13 360	**0,0%**
						Sudan	0	3 221	**0,0%**
				Mineral or chemical phosphate fertilizers	313 936	**Algeria**	0	458	**0,0%**
						Egypt	0	339	**0,0%**
						Sudan	0	4 997	**0,0%**
Egypt	422 829	12 344	**2,92%**	Mineral or chemical nitrogen fertilizers.	332 400	**Sudan**	3 594	73 928	**4,9%**
						Tunisia	1 251	20 725	**6,0%**
						Algeria	0	93 294	**0,0%**
						Morocco	578	144 251	**0,4%**
				Mineral or chemical phosphate fertilizers	60 047	**Sudan**	2 548	4 997	**51,0%**
						Algeria	0	458	**0,0%**
Algeria	420 989	0	**0%**	Mineral or chemical nitrogen fertilizers.	420 989	**Tunisia**	0	20 725	**0,0%**
						Egypt	0	66 779	**0,0%**
						Sudan	0	73 928	**0,0%**
						Morocco	0	144 251	**0,0%**

Source. Calculated according to the « *International Trade Centre* » data base, covering code 31 of the harmonized system HS (Fertilizers).

In addition, the statistical data contained in Table 8, on cross-trade fertilizers, suggest that Algeria is expected to import more mineral or chemical fertilizers from Tunisia or of Morocco. Conversely, to replace chemical nitrogen fertilizer imports from Russia with imports from Algeria would be worthwhile for Morocco and Tunisia. In the same way, Sudan would benefit from replacing its imports of chemical nitrogen fertilizers from Jordan with imports from Egypt or Algeria. Such findings confirm the existence of a significant potential to create a common RVC among North African countries.

All in all, the share of trade in the phosphates and its derived chemicals between North African countries is still relatively low in comparison with the trade with the rest of the world. In effect, local demand for inorganic chemicals and fertilizers in Egypt, Algeria and Sudan is to a large extent met by imports from other countries such as China, Belgium and Turkey.

This analysis revealed that there are significant opportunities to create RVCs in the phosphate sector. However, the creation and competitiveness of this RVC in the phosphate sector in North Africa, will be dependent on the following factors:

- The readiness of North African countries to replace the trading in these products with third countries (China, Turkey, Belgium, etc.) by intra-regional exchanges;
- The development of an efficient overland and railway transport network, given the fairly heavy and usually fairly dangerous products to transport (chemical industry products);
- - The adoption of additional measures (simplifying customs procedures, border control procedures, etc.) to facilitate trade between countries of North Africa.

3. Gas and oil extraction and processing sector

RVCs focusing on oil and gas extraction and processing could emerge as key competitiveness factors in the North African region. Algeria, Egypt and Libya are among the main players in the global oil and gas markets, with a large amount of reserves and production capacity. For these three countries, oil, gas and its derivatives (mineral fuels, mineral oils and products of their distillation) were the main products exported in 2015. As an illustration, the statistical data in Table 9 show that in 2015, exports of oil, gas and derivatives accounted for 95.8% and 83.7% respectively for Algeria's and Libya's total exports.

Mauritania also has some significant reserves, but limited production. Tunisia and Morocco are net importers, with only limited reserves of conventional gas and oil. According to the ECA report (2015), all North African countries are presumed to have significant unconventional reserves (oil shale and shale gas), subject to confirmation by field research. Key exports consist of crude oil and gas and are directed to Europe, as the main market.

Table 9. Share of exports of mineral fuels, mineral oils and products of their distillation **(HS 2 in total exports in 2015 (in millions $US and in %)**

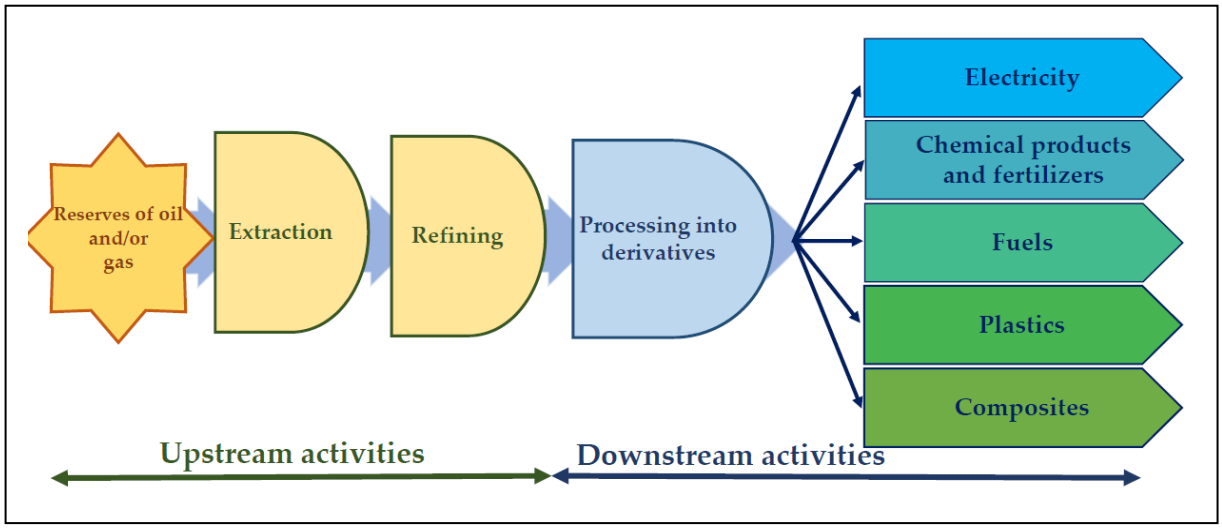
	Algeria	Egypt	Libya
Exports	33 348,4	3 951,4	9 760,0
Total exports	34 796,0	21 967,3	11 658,6
Share in %	95.8%	18.0%	83.7%

Source. Calculated based on the « *International Trade Centre* » data base.

3.1. Structure of the North African countries' oil and gas value chain

The value chain of the gas and oil extraction and processing sector is relatively straightforward. Figure 5 presents a simplified version of this value chain. Using this as a starting point, we will provide a brief overview of each main segment of this value chain, outlining its current structure in each of the North African countries.

Figure 5. Value chain of the oil and gas processing sector



Oil and gas reserves

As previously mentioned, oil reserves in North Africa are primarily concentrated in Algeria and Libya in the North, and to a lesser extent in Egypt. Before the fall of the Gaddafi regime, Libya was the world's 17th largest oil producer. Its estimated reserves are among the largest in Africa. All the more so as its crude oil is first-rate and its deposits are close to European refining centres, which are among the most important worldwide. Meanwhile, gas remains vastly under-exploited.

Oil and gas extraction

Oil extraction refers to the process of extracting and removing usable oil from the subsoil. The search for oil involves looking for sedimentary basins in which gas and oil may have formed. Gas and oil would then have had to be able to migrate through porous rocks capable of holding large quantities.

Algeria is ranked Africa's 3rd producer of oil, with a production in 2015 of 1,671 barrels/day, i. e. 19% of African production. With about 707 thousand barrels/day, Egypt has emerged as the 4th oil producing country in Africa after the armed conflict in Libya reduced production in that country to 461 thousand barrels/day, bringing it down to 5th position. The production of oil in Libya, the country's first wealth, has experienced several problems in the aftermath of the fall of the Gaddafi regime in 2011. Political instability and security problems are preventing us from offering a detailed overview of the country's oil sector situation.

Meanwhile, Tunisia ranks 14th in Africa with an output of only 51 thousand barrels/day. After a decade of exploration, Mauritania officially became an oil producer in 2006. But it still remains a very small producer (with barely 5.2 thousand barrels/day). Gas production is expected to occur in 2021 with the development of the "Grand Tortue/Ahmeyim-GTA transboundary offshore gas field between Mauritania and Senegal. This world-class reservoir will be developed and operated by Kosmos ENERGY and British Petroleum (BP) consortium. The estimated reserves of this field stand at 15 million cubic feet of gas (approximately 425 billion cubic meters).

Refining

Crude oil is in a sense a "mixture" of several products (both heavy and light) of energy consumption; as such, it must be refined in order to extract, separate and process these products so that consumer needs can be met. Gasoline or diesel fuel used in cars, fuel oil burned to heat in winter, natural gas used for cooking are as many fuels and heat sources derived from oil and gas mined in the various fields around the world.

There are currently six refineries in operation in Algeria (Algiers, Arzew, Skikda, Hassi-Messaoud and Adrar). The annual treatment capacity comes to 27 million tons, including 5 million tons/year in condensate at Skikda and 0.6 million tons/year for the Adrar refinery. Owing to its characteristics, the refining industry is vulnerable to developments and shifts in the national and international markets, primarily relating to the supply and demand for petroleum products in both qualitative and quantitative terms.

There are currently nine oil refineries in Egypt for a refining capacity of 840,000 barrels/day. Work on the construction of a new major oil refinery is expected to be completed by the end of 2018 and the plant will come on stream three months later.

The refining of oil in Tunisia is carried out by Société tunisienne des Industries de raffinage or STIR, a state-owned company. The latter is in charge of importing and refining crude oil. With a domestic consumption of 3.746 million tons of refined oil, STIR produces 1.683 million tons while it imports 2.790 million tons.

Based in Mohammedia, Morocco, Société Anonyme Marocaine de l'Industrie du Raffinage (SAMIR) was the only company specializing in the refining of petroleum products. Ever since its controversial privatization in 1997, it is under the control of Corral Petroleum Holding, a Swedish-Saudi group. In August 2015, the refinery was forced to cease operations due to financial difficulties.

Processing in derivatives

In order to be suitable for use, oil must undergo several processes. Products resulting from the processing of crude oil are diverse and can be used in several forms:

- Energy sources: fuels such as kerosene (aircraft engine), gasoline, diesel (diesel engine) are used to produce energy;
- Domestic fuels: kerosene, butane as household gas;
- Plastic materials: packaging, mattresses (foam), shoes, varnish, paint, toothbrush..;
- Pharmaceutical product: beauty oils, cleansing milk.

The vast number of by-products can now be used in a variety of ways (diesel, fuel, petrochemicals, plastics, etc.). These by-products can sometimes be directly valued (petrol, diesel, etc.) and sometimes they will have to be further processed before they can be exploited. Some of these are lethal, with no real market outlets.

3.2. Oil and gas intra-regional trade analysis and existing RVCs

Statistical data on trade of oil, gas and derivatives, between North African countries (see table 10) reveal that only 3.9% of the world exports of these countries are intra-regional in nature. Similarly, these exports cover only 8.1% of the import demand of North African countries. These findings are further confirmation that the degree of integration in the Maghreb is fairly low and that there is still enormous untapped potential.

It is plain to see that 5.8% of Algerian exports, consisting mainly of natural gas, are destined for the countries of North Africa (Morocco and Tunisia). On the other hand, the share of exports from Egypt, Morocco and Tunisia destined for the North Africa region is quite low. They are mainly intended for Italy, France, the United States, China and India. In addition, Tunisia imports 28.5% of its oil and gas needs from North African countries. About 9% of imports of Morocco and Mauritania come from North African countries (mainly Algeria). This mainly concerns Algerian natural gas exports destined for Morocco, Mauritania and Tunisia.

While the statistical data used relate to a HS 2 product type classification, it can be concluded that North African countries as a whole are poorly integrated into the gas and oil extraction and processing sector RVC. Equally, according to table 10, there exists an untapped potential to develop RVCs as national demand is generally met by imports from third countries (mainly Italy, Russia, Spain, the United States, Saudi Arabia and Kuwait).

Table 10. Cross trade between countries of North Africa in mineral fuels, mineral oils and produc of their distillation (HS27) in 2015 (in million $US and in %)

		Country of destination							Total exports to North Africa	Total exports to the rest of the world	Intra north-Africa exports as a % of total exports
		Algeria	Egypt	Libya	Morocco	Mauritania	Sudan	Tunisia			
Country of origin	Algeria	---	493,9	17,1	607,6	52,8	0	806,6	1 924,0	33 348,40	5.8%
	Egypt	1,0	---	0,8	33,5	0	11,9	11,5	58,7	3 951,4	1.5%
	Libya	N-A	N-A	---	N-A	N-A	N-A	N-A	N-A	9 760,0	N-A
	Morocco	8,3	0	0	---	2,5	2,9	0	13,7	441,6	3.1%
	Mauritania	0	0	0	0	---	0	0	0	80,2	0.0%
	Sudan	0	0	0	0	0	---	0	0	3 000,50	0.0%
	Tunisia	0,1	0	1,6	4,1	0,1	0	---	5,9	1014,9	0.6%
Total imports from North-African countries		9,4	493,9	19,5	645,2	55,4	14,8	818,1	2002,3	51 597,00	3.9%
Total imports		2 341,9	11 862,1	N-A	6 790,5	592,1	222,4	2 874,5	24683,5		
Intra-North African imports expressed as a % of total imports		0.4%	4.2%	N-A	9.5%	9.4%	6.7%	28.5%	8.1%		

N-A means statistical data are Not Available.

Source. Calculated from the « *International Trade Centre* » data base, covering the whole HS27 section (mineral fuels, mineral oils and products of their distillation).

3.3. Opportunities and challenges for the construction of RVCs in the oil and gas sector

Table 10, on the intra-regional exchanges in the oil and gas sector, reveals a high potential for developing an RVC between North African countries. This has led us to conduct an in-depth analysis of cross-trade between North African countries, by determining: (i) the nature of the main products exported; (ii) the principal destinations of exports; (iii) the extent to which the North African countries' imports fulfil local demand. The findings of this in-depth analysis, based on a shift from HS2 to HS4 product classification, are illustrated in Table 11.

Table 11. Exports of « mineral fuels, mineral oils and products of their distillation » between North African countries (in million $US and in %)

Countries	Exports (HS2)			Main products exported (HS4)		Final destination of exported products (HS4)			
	To the rest of the world	To North Africa		Product names	In thousands of $US	Main countries of North Africa	In million[3] $US	Total imports of the Country of destination	In %
		In thousands of $US	In %						
Algeria	33 348,367	1 924,0	5,8%	Petroleum gases and other gaseous hydrocarbons	14 717,761	Tunisia	800,926	888,183	90,2%
						Morocco	556,597	1349,609	41,2%
						Egypt	459,289	3 197,641	14,4%
				Crude petroleum oils and oils obtained from bituminous minerals	11 891,366	No exports to North African countries			
EGYPT	3951,391	58,7	1,5%	Crude petroleum oils or oils obtained from bituminous minerals	1994,1	No exports to North African countries			
				Petroleum oils or oils obtained from bituminous minerals (other than crude oils); preparations N-A	1485,5	Tunisia	10,8	1533,1	0,7%
						Morocco	26,7	3325,8	0,8%
Tunisia	1014,898	5,9	0,6%	Crude petroleum oils and oils obtained from bituminous minerals	632,5	No exports to North African countries			
				Petroleum oils or oils obtained from bituminous minerals (other than crude oils); preparation, N-A	291,7	Libya	1,0	1052,1	0,1%
						Morocco	0,1	3325,8	0,0%
						Mauritania	0,1	539,8	0,0%
Sudan	3000,499	0	0%	Crude petroleum oils and oils obtained from bituminous minerals	2973,9	Entirely exported to China			

Source. Calculated according to the « *International Trade Centre* » data base, covering the code 27 of the harmonized system HS (mineral fuels, mineral oils and products of their distillation).

[3] This figure was obtained from the ITC data base, defined as the value of exports of the country of origin. This amount is different from that concerning the value of imports of the countries of destination.

While they only amount to 5.8% of total exports, Algerian exports to North African countries consist exclusively of natural gas. They make up 90.2% of the imports of Tunisia, 41.2% of those of Morocco and 14.4% of those of Egypt. For all three countries, Algeria can be considered as the main supplier of natural gas. Conversely, oil exports from Algeria, Egypt, Sudan and Tunisia are destined for countries outside the North Africa region. This is due to the fact that most of the countries in this region produce and export crude oil, except Tunisia and Morocco, which are net oil importers and who source their imports of refined oil from Italy, Russia and Spain. It would appear that the latter import crude oil from Algeria and Egypt and then export refined oil to Tunisia and Morocco.

These findings reinforce the idea that there is still untapped potential to develop RVCs associated with oil and gas refining and processing in North African countries. In this regard, we can recommend:

- Setting up additional refining units and/or expanding the capacity of existing oil refining units both in exporting countries (Algeria, Egypt, Sudan) and in net oil importing countries (Morocco and Tunisia);
- The production of oil (crude and refined) and of natural gas must be used to supply the processing plants with the following products:
    - Plastics and composites (including plastic and composite parts used in automotive and aeronautical industries). These plants can be located in Morocco and Tunisia, as the automotive and aeronautical components sectors are quite developed;
    - Synthetic fibres and fabrics for the clothing industry (e. g. in Morocco and Tunisia);
    - Chemicals and fertilizers from gas and phosphates (in Algeria or even in Morocco and Tunisia, in which phosphate production is quite high);
    - Electricity for export to European and the Middle-Easter countries, as part of the project to create a Mediterranean energy market (MED-TSO);

As mentioned in the 2015 ECA report, the realization of these opportunities will however require a number of integrated policy initiatives, such as creating an integrated electricity market (with some regulatory change) and investing in the regional electricity grid and gas network.

4. The renewable energy sector

The renewable energy industry may be regarded as a rapidly expanding sector given its long-standing double-digit growth rates. Altogether, there are five main types of renewable energy: solar, wind, hydro, biomass and geothermal. They all have one thing in common: they do not produce (or produce very little) polluting emissions, thereby contributing to the reduction of the greenhouse effect. The North Africa region has enormous potential for renewable energy, particularly solar. In fact, North African countries have some of the world's greatest amount of sunshine hours. The region is also home to a record number of sunny hours per day. The statistical data in table 12 suggest an approximate number of radiation hours per year of 3,900, hence the relatively high average annual values of solar radiation. On a national level, these countries are setting out energy guidelines in which renewable energies, in particular solar energy, now play an important role.

Table 12. Number of hours of irradiation/year in North African countries

Countries	Algeria	Egypt	Morocco	Tunisia
Sunshine hours/year	2000 - 3900	3200 - 3600	2800 - 3400	2800

Source. GIZ (2013), page 54.

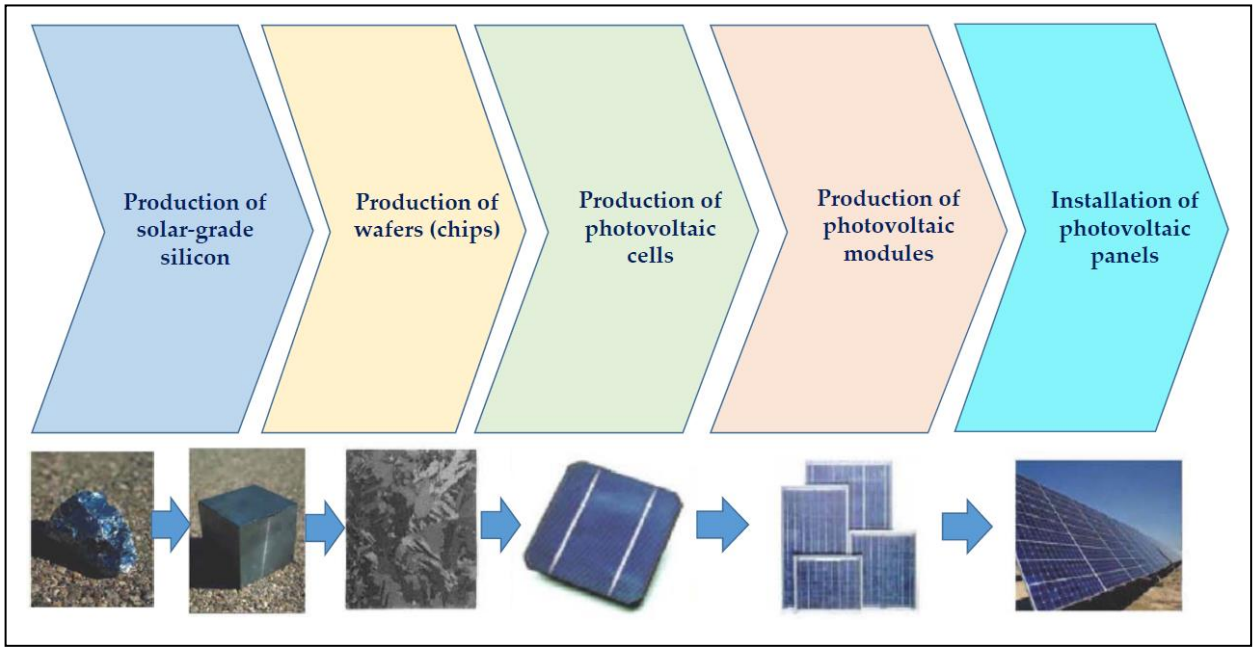
Photovoltaic solar energy comes from the direct transformation of a portion of the sun's rays into electrical energy. The energy conversion takes place through what is commonly referred to as a photovoltaic cell, using a physical phenomenon known as the "photovoltaic effect", in which a current is produced when the cell's surface is exposed to light. The photovoltaic sector has expanded significantly in recent years, with the introduction of support policies and lower photovoltaic module prices.

As a matter of fact, in 2015 China edged out Germany to become the leading producer of photovoltaic panels and, therefore, of solar energy. At the other end of the spectrum, North African countries, with plenty of sunshine, are importers of photovoltaic panels. They are therefore a prime target for European countries active in the field of solar energy. At present, a number of cooperation and partnership projects exist between North African countries (Algeria, Egypt, Morocco and Tunisia) and European countries (Germany, Italy, Spain and France), to invest in the field of solar energy and then to export to Europe. These projects provide opportunities to expand foreign investment and develop solar energy production and distribution, thereby creating a growing regional market for electricity.

4.1. Structure of the value chain of the solar energy sector

The value chain of the solar energy sector is fairly complex. It is subdivided into the photovoltaic industry, the installation of photovoltaic panels, solar condensation and eventually the transformation of solar energy into electricity. An overview of the basic value chain of the photovoltaic industry is shown in Figure 6. We will henceforth be using this as a basis to provide a brief description of each main segment of this value chain, including an outline of its current structure in North African countries.

Figure 6. The basic value chain of the photovoltaic industry



Production of solar grade silicon

It is made from an electrometallurgical process, namely a mixture of quartz, coal and wood and is brought to an ultra high temperature in a furnace. Obtaining metallurgical silicon implies that the silicon obtained has a purity of nearly 99%. Then, using metallurgical silicon as a starting point, a chemical purification process is required. A number of processes have been developed by various global silicon producers. Ultimately, the purification process results in the production of ingots of silicone purified to 99.99%.

Global production of industrial grade silica sand is dominated by the US and the Netherlands. For the North Africa region, mention can be made of the example of Tunisia with production potential, considering the proportion of 98% of silica in the sand in some regions of Southern Tunisia. The figure for Algeria is reported to be 71%.

Wafer Production

After cooling, the silicon ingot will undergo a process whereby circular plates (wafers) are manufactured. These will, in turn, serve to produce the components found in all electronic devices. In other words, the silicon ingots formed at the end of the solidification process are subsequently sawn into fine plates called "wafers". The sawing step is a defining factor in the cost of production of photovoltaic cells. At the global level, production of wafers is predominantly driven by Asian countries, with the three leading producers being Taiwan, South Korea and Japan. China is the fifth largest wafer producer right after the United States.

Production of photovoltaic cells

The cell is the core element of solar panels. It is a plate made of silicon (or other semiconductor) with a glass topcoat and an anti-reflective film. Photovoltaic solar energy is derived from the direct transformation of a portion of the incoming solar radiation into electrical energy. This energy conversion is made using a photovoltaic cell, using a physical phenomenon known as the photovoltaic effect, which generates a current as the cell's surface is exposed to light. The world production of photovoltaic cells is dominated by four countries: China, Germany, Japan and the US.

Production of photovoltaic modules

A photovoltaic solar module (or photovoltaic solar panel) is a direct current electrical generator comprising a set of photovoltaic cells that are connected together electrically.

Installation de photovoltaic panels

Using the different components listed above, photovoltaic panels can generate electricity under sunlight. The current produced is a direct current that may be stored in batteries in case of remote sites (not connected to the grid). For connected sites, it is converted into alternating current by an inverter, used for supply and direct consumption or resale to the grid.

In a nutshell, in North African countries, photovoltaic panels are installed to generate electricity. The various equipments are generally imported as a whole or as spare parts to be assembled locally before installation. Currently, national and foreign companies working in each of the North African countries' national markets are instead photovoltaic panel installers.

4.2.Opportunities and challenges for the construction of RVCs in the solar energy sector

As noted above, North African countries hold enormous potential for renewables, particularly solar energy. In the absence of precise statistical data, it is impossible to assess the extent of this potential in a quantified manner. Nevertheless, from the analysis presented above, it can be argued that North African countries can develop a two-tiered RVC: one for photovoltaic industry and one for solar energy production.

The RVC of the photovoltaic industry

It would seem difficult for the countries in the region to take up all the value chain segments making up the photovoltaic industry, considering that this industry is still in the infancy stage and that some segments (such as wafers production) are relatively high-technology intensive. They do, however, possess the resources to start manufacturing basic materials such as solar grade silicon. An RVC in the photovoltaic industry can be developed through the entry on the marketplace of one or more multinational companies specialized in the production of wafers, cells and photovoltaic modules. Local firms can then work on silicon production and component assembly that go in the manufacturing of photovoltaic panels. In other words, local firms can handle the two segments at both ends of the value chain of this industry.

The RVC of solar energy

The implementation of RVCs in the photovoltaic industry will facilitate the capture of opportunities in the production of solar energy. According to the 2014 ECA report, the countries of North Africa are part of a global strategic plan to provide Europe with clean energy, planning to use at least 20% of clean energy by 2030. The projects of the Mediterranean Solar Plan for North Africa, established by the Union for the Mediterranean, anticipate an aggregate export capacity to Europe of approximately 22,000 MW by 2030. For the region, this is a major opportunity, however, no single country can, on its own, develop this industry.

Furthermore, a brief overview of the general trends of current national policy of the main countries of North Africa, in terms of renewable energies may be given below:

- At the national level, Morocco aspires to become the champion of renewable energies by implementing several large-scale wind and solar energy projects. Morocco aims to « raise the contribution of renewables in its consumption of primary energy to reach 10 to 12% in 2020 and 15 to 20 % in 2030. A number of large-scale projects are now under way, notably the Ouarzazate solar complex and the Aïn Beni Mathar wind farm extension, two new small hydropower plants, etc. ;

- Since the beginning of the millennium, Tunisia has been working to progressively integrate renewables in its energy mix, to the tune of 30% of the electrical production by 2030. For this purpose, Tunisia has considerable renewables development potential, especially wind and solar. For the Tunisian Ministry of Energy, Mines and Renewable Energies, the latter remain a strategic choice, in light of the drop of national oil production to 45,000 barrels per day;
- Egypt also has the political will to increase the production of renewable energies in order to reduce its dependency on fossil resources. In 2017, renewable energies accounted only for 8% of the energy mix;
- Lastly, according to the Algerian Ministry of Environment and Renewable Energies, the government policies are geared to national integration for the development of a national renewable energy industry, allowing the country to reach its objective of producing 37% of its energy mix from renewables by 2030. Algeria made significant investments in renewable energies, leading to the birth of this industry, which is beginning to take shape.

Besides the development of the value chain of the industry of photovoltaic panels, the development of the solar energy RVC in North Africa requires the implementation of the following measures:

- Implementing the agreements and cooperation projects with European countries for the production of solar energy;
- Encouraging multinational firms specializing in the production of photovoltaic panels to set up subsidiaries in at least one of the countries of the region;
- Creating a regional market for electricity generation and export;
- Developing transport infrastructure and electricity distribution networks (between North African countries and European countries);
- Establishing a regulation conducive to the promotion of investments by local operators in solar installations.

5. Sector of essential oils and derivatives

Essential oils consist of raw materials destined to a number of uses (as final consumer goods) as well as to various business sectors (as intermediate products). There has been an ever growing awareness about essential oils these past years. In fact, the industrial demand for these high value-added products has been increasing, thanks to its wide number of uses in various industrial sectors and the recent consumer's enthusiasm for these high-quality products.

Overall, essential oils are extracted from more than 3,000 plants and flowers, of which some 300 are marketed throughout the world. They are known for their scents and perfumes and mainly used for food seasoning and by the perfumery industry. Essential oils are increasingly used by the beauty, toiletries and cosmetics industries.

According to the ISO 9235 standard, an essential oil is a « product derived from a natural raw material of vegetable origin, either through extraction by steam distillation, mechanical processes from the epicarp of citrus fruits or through dry distillation, following the likely separation of the aqueous phase obtained by physical processes »[4]. They can be classified into biochemical families. Fourteen families and sub-families of essential oils can be distinguished[5]. They are used in the manufacture of cosmetic products and creams and for household products (detergents, laundry products…) and sometimes food flavourings.

Three countries of North Africa are known to produce essential oils. While Tunisia produces mainly neroli (produced from the blossom of the bitter orange tree), the range is broader in Egypt (Cumin, marjoram, Egyptian geranium) and in Morocco (khella [ammi visnaga], Atlas cedar, ladanum-bearing cistus, evergreen cypress, lemon verbena, cineol rosemary)[6].

The following section describes the sector's value chain structure, with a focus on the following products:

- Essential oils and resinoids; perfumery of toilet prepared and cosmetic preparations (code 33 of the nomenclature of the harmonized system);
- Soaps; surface-active agents; washing preparations; waxes; candles; cleaning products; modelling pastes; dental wax (code 34 of the nomenclature of the harmonized system).

5.1. Structure of the value chain of the essential oils sector in North Africa

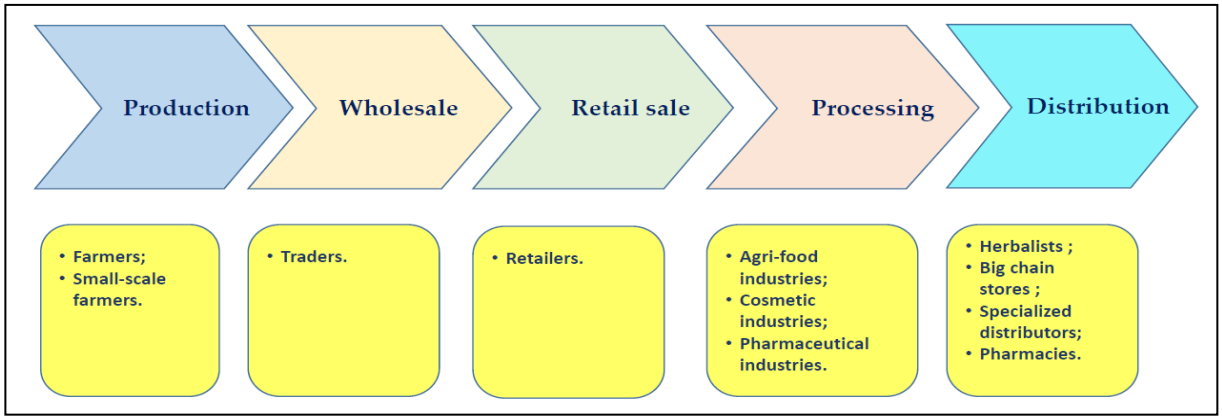
The value chain of the essential oils subsector and its derived products depends on the precise nature of the product in question. Figure 7 provides an overview of this value chain. Using the latter as a starting point, we will provide a brief description of each main segment of the value chain.

[4] https://www.iso.org/obp/ui/#iso:std:iso:9235:ed-2:v1:fr

[5] http://www.aromatherapie-pour-tous.com/Huiles-essentielles-par-famille.html

[6] http://www.aromatherapie-pour-tous.com/Huiles-essentielles-par-pays.html

Figure 7. Value chain of the essential oils subsector



The starting point of this chain is the production of the different categories of plants and flowers. This step can be carried out by growers. In certain cases, it is possible to harvest plants from forests and mountains. After the harvest of plants, comes the wholesale and retail phases, where traders and retail merchants buy plants from growers. As they are transferred from the farms to the processing facilities, plants and flowers follow a fragmented and poorly organized supply chain circuit and are traded through a system which does not require them to undergo calibration and standardization. Such markets are typically not formally organized. Across the different countries of North Africa, the conditions are affected by the poor road transport infrastructure, which adds to the transport time of flowers and reduces their quality.

Distillation remains the most widely used extraction method for essential oils. Depending on the nature of the plants and flowers, essential oil extraction can be done by either the food, cosmetics or pharmaceutical industry. Such Industries may utilize essential oils as an input to manufacture other categories of goods.

An analysis of overall trade of North African countries in this subsector (see Table 13) suggests the following comments:

- Algeria, Libya, Mauritania and Sudan are mainly importers of these products. As a matter of fact, the coverage rates are extremely low, at less than 1% ;
- Morocco and Tunisia are net importers, with coverage rates under 50% (respectively 24.38% and 45.60%). Be that as it may, the exports are relatively important (US 104 million and US 109 million dollars) ;
- Egypt stands out as the only net exporter in the region. Exports exceeded US 650 million dollars in 2015, with a coverage rate of 114.3%.

Table 13. The international trade flows in the subsector, 2015 (in thousands of $US and in %)

Countries	Exports	Imports	Coverage rate
Algeria	1681	552178	0,30%
Egypt	654512	572630	114,30%
Libya	138	257601	0,05%
Morocco	104486	428602	24,38%
Mauritania	22	16803	0,13%
Tunisia	109746	240669	45,60%
Sudan	964	125204	0,77%
Total for all North-African countries	**871549**	**2193687**	**39,73%**

Source. « International Trade Centre » data base, covering the code 33 and 34 of the harmonized system HS.

The 2015 coverage rate for all North African countries does not exceed 39.73%. Such a situation may be attributed to the fact that, despite the availability of plants and flowers, their potential for processing remains untapped due to the weakness of the value chain in the country as a whole. The development of an RVC can be a major opportunity for this sector.

A fine-grained analysis indicates that the "essential oils and resinoids, perfumery or toiletries and cosmetic preparations" make up the largest part of total exports: 68%, 86% and 79% in Egypt, Morocco and Tunisia respectively. Table 14 provides statistics on the main products exported by these three countries.

Having described the exports of the North African countries, we will now turn our attention to describing intra-regional exchanges.

Table 14. Main products exported by Egypt, Morocco and Tunisia

	Main products exported	In thousands of $US
Egypt	Mixtures of odoriferous substances and mixtures, (including alcoholic solutions) with a basis of one of ...	243665
	Hair preparations	79543
	Essential oils, (terpeneless or not), incl. concretes and absolutes; resinoids...; ...	31293
	Preparations for oral or dental hygiene, incl. denture fixative pastes and powders to facilitate...	33452
	Beauty or make-up preparations and preparations for the maintenance or care of....	24945
	Organic surface-active agents (other than soap); surface-active preparations, preparations for...	142555
	Soap and organic surface active products and preparations, in the form of bars, cakes, moulded pieces or shapes...	60434
Morocco	Essential oils, (terpeneless or not), incl. concretes and absolutes; resinoids...; ...	27680
	Beauty or make-up preparations and preparations for the maintenance or care of....	28928
	Perfumes and toilet waters (excl. preparations for after-shave [after-shave lotions] ..	11174
	Soap and organic surface active products and preparations, in the form of bars, cakes, moulded pieces or shapes...	9390
Tunisia	Perfumes and toilet waters (excl. preparations for after-shave [after-shave lotions] ..	19312
	Hair preparations	20960
	Pre-shave, shaving or after-shave preparations, personal deodorants, bath preparations...	16667
	Organic surface-active agents (other than soap); surface-active preparations, preparations for...	16870
	Essential oils, (terpeneless or not), incl. concretes and absolutes; resinoids...; ...	14854

Source. « International Trade Centre » data base.

5.2. Analysis of the sector's intra-regional trade and existing RVC

A description of intra-North Africa trade in essential oils and derivatives is provided in Table 15 below. With regard to exports, 14.87% of the products manufactured in Egypt are intended for other North African countries, equivalent to almost $24.4 million in intra-regional exports. These products are mainly intended for Algeria, Morocco and, to a lesser extent, Tunisia and Sudan. As the region's second largest exporter, Morocco also lacks intra-regional relations in this sector: 3.92% of exports are destined for the countries of the region

(more than US$4 million), mainly Libya, Mauritania and Algeria. With regard to Tunisia, almost 35.52% of the 2016 exports were destined for the other countries of the region (mainly Libya, Morocco and Algeria).

As regards imports, Sudan sources most of its needs from the other North African countries: almost one fifth of Sudan's imports are from the region (mainly Egypt). Libya also has relatively important regional trade in this subsector with Tunisia and, to a lesser extent, Egypt. In 2016, more than 17% of the region's imports originated from other countries. And finally, Mauritania sources nearly 8.31% of its supplies from Morocco.

Table 15. Cross trade in « essential oils and its byproducts » between North African countries in 2016 (in thousands of $US and in %)

		Country of destination							ort s to No rth Afri	s to the res t of the exp	ort s as a % of
		Algeria	Egypt	Libya	Morocco	Mauritania	Tunisia	Sudan			
Country of origin	Algeria	---	0	71	757	15	520	0	1363	1681	**81,08%**
	Egypt	18262	---	18807	18716	43	17079	24438	97345	654512	**14,87%**
	Libya	0	0	---	0	0	0	0	0	138	**0,00%**
	Morocco	1069	153	67	---	1241	1537	25	4092	104486	**3,92%**
	Mauritania	0	0	0	3	---	0	0	3	22	**13,64%**
	Tunisia	5269	2025	26017	5569	98	---	4	38982	109746	**35,52%**
	Sudan	0	8	0	1	0	0	---	9	964	**0,93%**
Total imports from North-African countries		24600	2186	44962	25046	1397	19136	24467	**141794**	871549	**16,27%**
Total imports		552178	572630	257601	428602	16803	240669	125204	2193687		
Intra-North African imports expressed as a % of total imports		**4,46%**	**0,38%**	**17,45%**	**5,84%**	**8,31%**	**7,95%**	**19,54%**	**6,46%**		

Source. Calculated based on the « International Trade Centre » data base, covering the codes 33 and 34 of the harmonized system HS.

Finally, we cannot come to the conclusion that there are no RVCs in the supply chain as there is no real fragmentation of production processes. It would appear that the countries of the region do not source their products from the other countries for inward processing (import-processing and re-export). It is worth noting therefore that essential oils and their derivatives are mainly exported to European countries, where they are used mainly for perfume manufacturing.

5.3. Opportunities and challenges for the construction of RVCs in the sector of essential oils and byproducts

The socio-economic stakes of the oil production sector are not negligible. This sector of activity: (***i***) is a driver of economic growth; (***ii***) has the advantage of being an activity with fairly available labour, is a source of job creation and, is likely to reduce poverty mainly among rural population; (***iii***) generates profitable revenue streams for the local populations; (**iv**) has high-added value, fostering the development of niche markets. Thus, the development of an RVC will help meet the growing demand for essential oils while providing jobs at the local scale.

Further analysis of the destination of the main products exported by Egypt (see Table 16) shows that hair preparations and mixtures of odoriferous substances are mainly intended for Algeria, Libya and Tunisia. These help ensure that significant shares (up to 58.37%) of local demand for imported products are met. Although their share in local demand in Algeria and Tunisia is low, essential oils and beauty or make-up product preparations are the main products exported by Morocco. On the other hand, hair preparations, perfumes and toilet waters are Tunisia's main export... These exports are destined for Algeria, Morocco and Egypt with a maximum share in local demand of 6.56%. Such statistics support the fact that although their exports represent relatively small shares in the local demand of the countries of North Africa, Egypt, Morocco and Tunisia there are differences in the nature of the products exported. This finding confirms a certain specialization of these three countries in the production of essential oils and their derivatives. Despite the unavailability of accurate data on plant and flower production, it is possible to identify opportunities for the construction of RVCs in the essential oils and derivatives sector.

We may, however, suggest the need for more detailed analyses (or mapping) to more accurately assess the possibilities for RVC construction. As an example, we can suggest the following products: aromatic and medicinal plants, argan tree, rosemary, thyme, lavender, etc. Thus, the creation of a more efficient RVC depends on the fragmentation of the production phases of essential oils and their derivatives between North African countries. Accordingly, we can recommend the following:

- The rural populations of the different North-African countries must be supported and encouraged to harvest the plants used to produce essential oils. Similarly, it is important to help farmers and beekeepers producing plants and flowers, as they are the backbone of the extraction of essential oils;
- The development of logistics and infrastructures for the appropriate transport of plants and flowers. This measure should involve both the national and international transport of plants between North African countries;
- The level of processing of essential oils into perfume and toilet waters is fairly developed in Tunisia, which has gained a competitive advantage thanks to the knowledge acquired in this field. In 2015, Tunisian exports to Algeria were less than 1.83% of the local demand for the import of these products;
- Egypt and Tunisia appear to have a comparative advantage in the development of the processing of essential oils in cosmetic products and hair preparations. In fact, it appears that according to the statistical data on exports, Egypt has built-up an important knowhow in this field. Table 16 shows that in 2015, the Egyptian and Tunisian exports of hair preparations to Morocco and Algeria did not exceed 10% in the best cases of the local demand.

Table 16. Exports of « Essential oils and byproducts » by countries of North Africa (in thousands of $US and in %)

Countries	Exports (HS2)			Main products exported (HS4)		Final destination of exported products (HS4)			
	To the rest of the world	To North Africa		Product names	In thousands of $US	Main countries of North Africa	In million[7] $US	Total imports of the Country of destination	In %
		In thousands of $US	In %						
Egypt	654512	97345	14,87%	Mixtures of odoriferous substances and mixtures, (including alcoholic solutions) with a basis of one of or de plusieurs de ces substances	243665	Algeria	29 641	88110	33,64%
						Tunisia	13892	23801	58,37%
						Libya	1362	N-A	N-A
				Hair preparations	79543	Morocco	9545	54422	17,54%
						Algeria	3 787	80750	4,69%
						Tunisia	2185	26821	8,15%
Morocco	104486	4092	3,92%	Beauty or make-up preparations and preparations for the maintenance or care of....	28928	Algeria	283	43088	0,66%
						Tunisia	85	35931	0,24%
				Essential oils, (terpeneless or not), incl. concretes and absolutes; resinoids...; extracted oleoresins	27680	Egypt	12	11680	0,10%
						Tunisia	4	1055	0,38%
Tunisia	109746	38982	35,52%	Hair preparations	20960	Algeria	3568	80750	4,42%
						Morocco	3570	54422	6,56%
						Egypt	1053	50739	2,08%
				Perfumes and toilet waters (excluding after-shave preparations [after-shave lotion] and des personal deodorants)	19312	Libya	1575	N-A	N-A
						Algeria	359	19626	1,83%

Source. Calculated based on the « International Trade Centre » data base, covering the codes 33 and 34 of the harmonized system HS.

[7] This figure was found in the ITC data base as the value of exports of the country of origin. This amount is different from the one relative to the value of imports of the country of destination.

6. Sector of fruits, vegetables and byproducts

The fruits and vegetables sub-sector addressed in this chapter encompasses the cultivation of fruits and vegetables and their processing into frozen, dried, vegetable fats, beverages, and food preparations. More specifically, the following sections of the harmonized nomenclature are addressed[8]:

07	Edible vegetables, plants, roots and tubers
08	Edible fruits; peel of citrus fruits or melons
15	Animal or vegetable fats and oils; their cleavage products; dietary fats...
20	Preparations of vegetables, fruit or other parts of plants
21	Miscellaneous edible preparations
22	Beverages, spirits and vinegar
23	Residues and waste from the food industries; prepared animal fodder

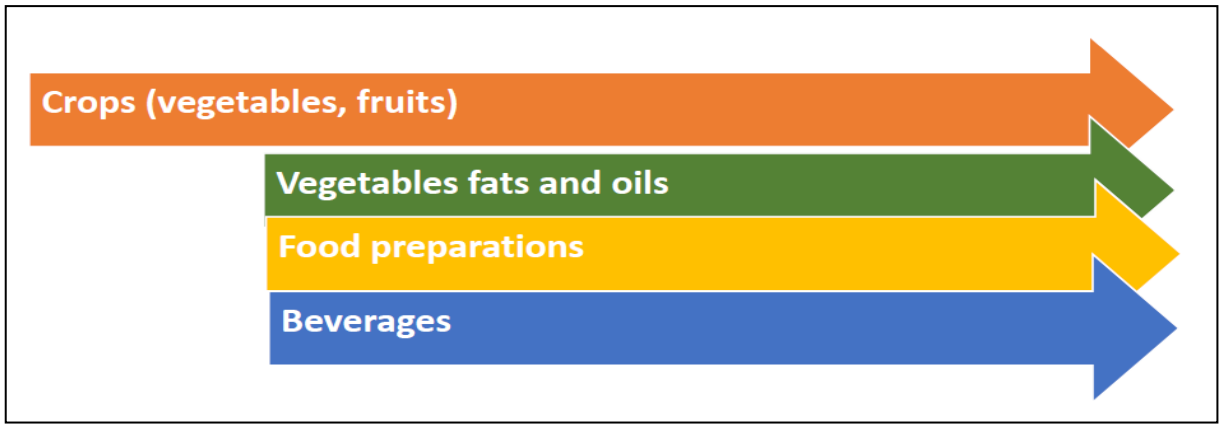
These sub-sectors are of vital importance as they, together with other agri-food sectors, are at the heart of the population's diet.

The following section discusses the global performance of North-African countries in international trade exchanges as well as the countries of the region's specialization in the various segments of the value chain.

6.1. Structure of the North-African market gardening and fruit growing value chains

The value chain of this sub-sector can be illustrated as follows:

Figure 8: North-African market gardening and fruit growing value chains



Morocco, Egypt and Tunisia are the main players in this sub-sector.

In Morocco, the surface areas devoted to market garden production exceed 280,000 ha with a combined production of more than 6.5 million tons in 2016. Potato, tomato and onion crops are the most important. According to Agrimaroc[9], early fruits and vegetables make up a

[8] The analysis of sugar beet growing will be integrated into the chapter on grains and sugars.

[9] Agrimaroc.ca

significant share of this sector and have been undergoing considerable changes over the past decade to adjust to the needs of international markets and respond to quality standards and export schedules.

Arboriculture also occupies a significant position in the sector. Olive, almond and citrus crops are the largest in terms of surface areas, followed by date palms. Altogether, these crops span more than 1,350 hectares and helped produce more than 3.5 million tons of fruit in 2016.

Table 17. Cultivated area, production and yield of fruits and vegetables crops in Morocco (20 2016 agricultural season)

	Surface area (1,000 Ha)	Production (1,000 quintals)	Yields (quintals/Ha)
Market gardening	218,5	65 742,0	300,9
Tomato	15,2	12 312,5	807,9
Potato	59,4	17 436,2	293,4
Oinon	25,1	6 856,5	273,3
Other market gardening crops	118,7	29 136,9	245,5
Citrus fruits	122,5	20 349,0	166,2
Almond trees	165,8	1 126,8	6,8
Olive trees	1 008,4	14 161,1	14,0
Date palm trees	58,1	1 253,3	21,6
Vines	46,0	3 648,7	79,3

Source. Ministry of Agriculture, Fisheries, Rural Development and Water and Forests

According to the Interprofessional Group of Vegetables, the vegetable sector in Tunisia extends over an area of approximately 167 thousand ha/year, divided among 90 thousand farms. Average overall production over the last five years was around 3.2 million tons per year, representing 16% of the value of agricultural production and 28% of the value of plant production. It is known for the diversity of its species, among which the main ones are: tomato, potato, onion, pepper, artichoke,..

As can be seen in table 18, tomato, potato and onion crops are at the top of market gardening in terms of crops and production, with a respective production of 1 million, 400 thousand and 240 thousand tons in 2017.

Table 18. Cultivated area and production in Tunisia, market gardening

Activity	Unit	2016-17 Agricultural season
Market gardening		
Field, off-season tomato	production (1000 tons)	110
	surface réalisée (thousand ha)	2,819
In-season tomato	production (1000 tons)	850
	area (thousand ha)	14,2
Late, off-season tomato	production (1000 tons)	110
	area (thousand ha)	2,695
In-season potato	production (1000 tons)	220
	area (thousand ha)	10,6
Off-season potato	production (1000 tons)	160
	area (thousand ha)	11,77
Early and extra-early potato	production (1000 tons)	40 to 43
	area (thousand ha)	2,337
Summer onion	production (1000 tons)	240
	area (thousand ha)	7,1

Source. National Observatory of Agriculture (onagri.nat.tn).

The arboriculture subsector is dominated by olives, citrus fruits and dates, with a total production exceeding 1.3 million tons in 2017. The production of olives is particularly important insofar as it is the main component in the production of olive oil, an export product of strategic importance.

Table 19. Cultivated area and production in Tunisia, arboriculture

Activity	Unit	Agricultural season 2016-17
Oil olives	production (1000 tons)	500
Olive oil	production (1000 tons)	100
Citrus fruits	production (1000 tons)	560
Dates	production (1000 tons)	242

Source. National Observatory of Agriculture (onagri.nat.tn)

In Egypt, the production of fruits (orange, watermelon, grape, date and banana) and vegetables (mainly tomato, potato, eggplant, onion) in 2010 reached 9.7 and 20.2 million tons respectively. Since that date, production has been on the rise[10].

The 2016 statistics on intra-regional trade, described in table 20, prompt the following comments:

- Three countries: Egypt, Morocco and Tunisia[11], have a positive or favorable trade balance for his subsector:
- Tunisia had the strongest performance in 2016, with a coverage of imports by exports of more than 180%, followed by Morocco (150%), and Egypt;
- Algerian and Libyan exports of this subsector are well below their imports, causing very low coverage rates.

Table 20. International trade in the subsector, 2016 (thousand US dollars)

	Exports	Imports	Coverage rate
Algeria	65599	2632490	2,5%
Egypt	2993256	3119251	96,0%
Libya	6714	920686	0,7%
Morocco	2350750	1561320	150,6%
Mauritania	120073	119908	100,1%
Tunisia	948352	512997	184,9%
Sudan	164387	403436	40,7%

Source. « International Trade Centre » data base.

While it is true that the global analysis of the value chain is useful, it is definitely not sufficient for understanding the potentialities of the region. As a consequence, the following provides a description of export performance by product.

What products of this value chain are being exported? this is the question that the following analysis attempts to answer.

The statistics of exports, per country, reveal the following:

- Edible fruits (section 8), and vegetables (section 7) represent almost 10% of total exports of goods in Egypt, occupying the 4th and 6th places of exported products. Exports of these same products represent more than 7% of total exports in Morocco;
- In Tunisia, as far as exports are concerned, this value chain is somewhat dominated by vegetable oils, which in 2016 accounted for 3.77% of total exports of goods. This value chain is dominated by olive oil (US$ 402,454 million in 2016). Fruit exports rank second (and 15th in total exports of goods);
- In Sudan, vegetable exports exceeded $93 million in 2016, reaching 2.57% of total exports;

[10] Source: Egypt: Agricultural context and international relations, French Ministry of Food and Agriculture. http://agriculture.gouv.fr/egypte

[11] For the case of Mauritania, these statistics must be treated with caution since sections HS 2 digits are considered, while sections 15 and 23 (Residues and waste from the food industries, prepared feeds and animal or vegetable fats and oils and their cleavage products; dietary fats…) include mainly processed fishery products for Mauritania. The level of coverage, once this sector is subtracted, becomes very low.

- In Algeria, Libya, Mauritania, none of the products of this value chain exceeds 1% of total exports of goods, reflecting a situation where focus is more geared towards other value chains (energy or fisheries);
- The exports of processed products (preparations of fruits and vegetables) have also been dominated by Morocco, Egypt and Tunisia, which accounted for more than $590 million in exports in 2016.

After this analysis of the trade performance of North African countries for this value chain, the following section will focus on intra-regional exchanges in the value chain.

Table 21. Main products exported to North-African countries

Countries	Section	Products	Exports (1000 USD)	Share in the total exports of goods	Rank in the export of goods
Algeria	'08	Edible fruits; peel of citrus fruits or melons	37807	0.13%	7
	'07	Edible vegetables, plants, roots and tubers	4358	0.01%	20
	'20	Preparations of vegetables, fruit or other parts of plants	2865	0.01%	25
Egypt	'08	Edible fruits; peel of citrus fruits or melons	1196098	5.31%	4
	'07	Edible vegetables, plants, roots and tubers	967149	4.30%	6
	'20	Preparations of vegetables, fruit or other parts of plants	376942	1.67%	16
	'15	Animal or vegetable fats and oils; their cleavage products; dietary fats...	161742	0.72%	33
Libya	'07	Edible vegetables, plants, roots and tubers	3783	0.04%	18
	'21	Miscellaneous edible preparations	1767	0.02%	23
Morocco	'07	Edible vegetables, plants, roots and tubers	902564	3.95%	8
	'08	Edible fruits; peel of citrus fruits or melons	742282	3.25%	10
	'15	Animal or vegetable fats and oils; their cleavage products; dietary fats...	237141	1.04%	18
	'20	Preparations of vegetables, fruit or other parts of plants	191413	0.84%	21
	'22	Beverages, spirits and vinegar	23297	0.10%	50
Mauritania	'08	Edible fruits; peel of citrus fruits or melons	202	0.01%	15
Sudan	'07	Edible vegetables, plants, roots and tubers	93662	2.57%	6
	'08	Edible fruits; peel of citrus fruits or melons	15490	0.43%	11
	'20	Preparations of vegetables, fruit or other parts of plants	389	0.01%	39
Tunisia	15	Animal or vegetable fats and oils; their cleavage products; dietary fats...	511530	3.77%	6
	'08	Edible fruits; peel of citrus fruits or melons	267150	1.97%	15
	'07	Edible vegetables, plants, roots and tubers	55768	0.41%	29
	'22	Beverages, spirits and vinegar	40620	0.30%	35
	'20	Preparations of vegetables, fruit or other parts of plants	24657	0.18%	44

Source. Calculated based on the « International Trade Centre » data base.

Table 22. Cross trade between countries of North Africa in the value chain in 2016 (in thousands of $US)

		Country of destination							Total exports to North African countries	Total exports to the rest of the world	Intra north-Africa exports as a % of total exports
		Algeria	Egypt	Libya	Morocco	Mauritania	Tunisia	Sudan			
Country of origin	Algeria	---	11	10175	2065	1372	2586	0	16209	65599	**24,71%**
	Egypt	101137	---	42	71753	1015	22370	55362	224204	2993256	**7,49%**
	Libya	0	0	---	29	0	4850	0	4879	6714	**72,67%**
	Morocco	28091	11729	38732	---	35311	15214	67	120184	2350750	**5,11%**
	Mauritania	0	0	0	0	---	2119	0	105	120073	**0,09%**
	Tunisia	9115	2049	117670	59391	3929	---	874	184087	948352	**19,41%**
	Sudan	0	181	0	0	0	17	---	17	164387	**0,01%**
Total imports from North-African countries		138333	8420	158049	110547	38644	43842	51850	549685	6649131	**8,27%**
Total imports		2632490	3119251	920686	1561320	119908	512997	403436	9270088		
Intra-North African imports as a % of total imports		**5,25%**	**0,27%**	**17,17%**	**7,08%**	**32,23%**	**8,55%**	**13%**	**5,93%**		

Source. Calculated based on the « International Trade Centre » data base.

6.2. Analysis of intra-regional trade of the subsector and existing RVCs

Table 22 illustrates the international trade (exports and imports) of North African countries in the value chain. We can retain that:

- Intra-regional exports account for 8.2% of the region's total exports, which seem significant, above average, but inadequate. Imports-wise, the ratio is below 6%;
- A closer analysis shows that among the region's top three exporting countries in this value chain, Tunisia has the highest ratio (19.41%), followed by Egypt (7.49%) and of Morocco (5/11%). Tunisian exports to Libya drove up this ratio. As a matter of fact, this relatively important integration is reflected in the $117 million in exports. At the regional level, the prime destination for Egyptian products of this value chain is the Algerian market and, to a lesser extent, the Moroccan market;
- Regarding the unharnessed potential, it is interesting to note that Sudan exported in excess of 160 million dollars worth of products from the value chain (vegetables, fruits, etc.), of which only 0.01% intended to other North African countries;
- With regard to imports, Mauritania, Libya and Sudan are sourcing substantial quantities from the other North African countries (respectively 32%, 17% and 13% of total imports).

6.3. Opportunities and challenges for the construction of RVCs in the sector

With 6.6 billion dollars of exports and 9.2 billion dollars of imports by the value chain, the potential for intra-regional exchanges cannot be denied. Yet only 8.2% of exports and 6% of imports are intra-regional. The construction of value chains in the sector is subject to several prerequisites:

- In light of the importance of non-tariff measures in this sector, harmonizing standards and adopting international standards are essential, particularly to facilitate trade in intermediate goods. Bilateral agreements for mutual recognition of certificates of compliance of products are very important in this context. Some progress has been made in the region (example: Tunisia-Egypt, Tunisia-Morocco, Tunisia-Libya, ...);
- Since the sector develops basically in irrigation farming, concerted action and agreements for the joint management of water resources are essential (example: Algeria-Tunisia-Libya for the North Sahara Aquifer System; Egypt-Sudan for the Nile...) ;
- Intra-regional trade in the sector is contingent on the development of the agri-food sector. The promotion of intra-regional Foreign Direct Investment can also serve as a driver for the development of RVCs;
- The development of certification high value-added crops (organic, labels, registered designation of origin, halal, etc.) along with the promotion of regional brands can be a catalyst for the development of RVCs in that they improve the region's competitiveness on foreign markets and improve consumer visibility and confidence in the countries of the region, thereby generate additional demand;
- The value chain also depends on inputs from other sectors (such as fertilizers); thus the analysis of RVCs could be facilitated by increasing the rate of trade in these sectors;
- Seed exchanges (resulting from research and development in the region) can also be a driver for the development of RVCs as local R&D makes it possible to take into account the bioclimatic characteristics of the region (crops adapted to the climate, to natural resource constraints and to the varieties adapted to the tastes and needs of consumers in the region).

7. Sector of cereals and sugar

Grains are the mainstay of food in North Africa. According to the Food and Agriculture Organization (FAO), cereals, roots and tubers account for half of food energy intake.[12] Grains consist of major cereals (maize, rice, wheat,), coarse grains (barley, sorghum, oats, millet, rye...) and minor cereals and similar plants (fonio, quinoa...). Sugar is extracted primarily from sugar cane or sugar beet. It is also an important source of energy for humans.

Cereals are processed by the different professions in the cereal chain. Examples include processing soft wheat in flour and breads, biscuits and cookies, durum wheat in semolina to make pasta or couscous. In addition, they can provide fodder. Cereals are the staple food in most southern Mediterranean countries. As such, they are strategically important for the food security of the population. Among the cereals, wheat (soft wheat for bread and durum wheat for semolina) plays a considerable role in North African countries' diets.

Sugar can also be used in both food and non-food applications. In fact, the production of refined sugar and molasses - from local production or imported raw sugar - can be used for final consumption but also by the agri-food industry as an input for the production of confectionery, dairy products, pastries, soft drinks... Sugar is also used in other industries (chemical, pharmaceutical, construction, detergents...).

The consolidated value chain in this section includes the production of cereals and sugar and their processing into food products.

7.1. Structure of the value chain in North Africa

The simplified value chain of the sector may be broken down into three steps:

- First, production of cereals and sugar crops (mainly sugar cane or sugar beet) is a primarily agricultural activity. Production site can be close to processing plants, or these products can be exchanged (exports/imports) ;
- In the second phase, the processing of these products is carried out by the Industries (flour mills, sugar factories);
- Finally, the food industry can take over by providing preparations (pasta, bakery products, pastries, biscuits, sweets). This stage is not required as these products can also be sold directly to consumers (sugars), or used by craftsmen as bread, pastries...

[12] www.faostat.org (data from food and agriculture, food security)

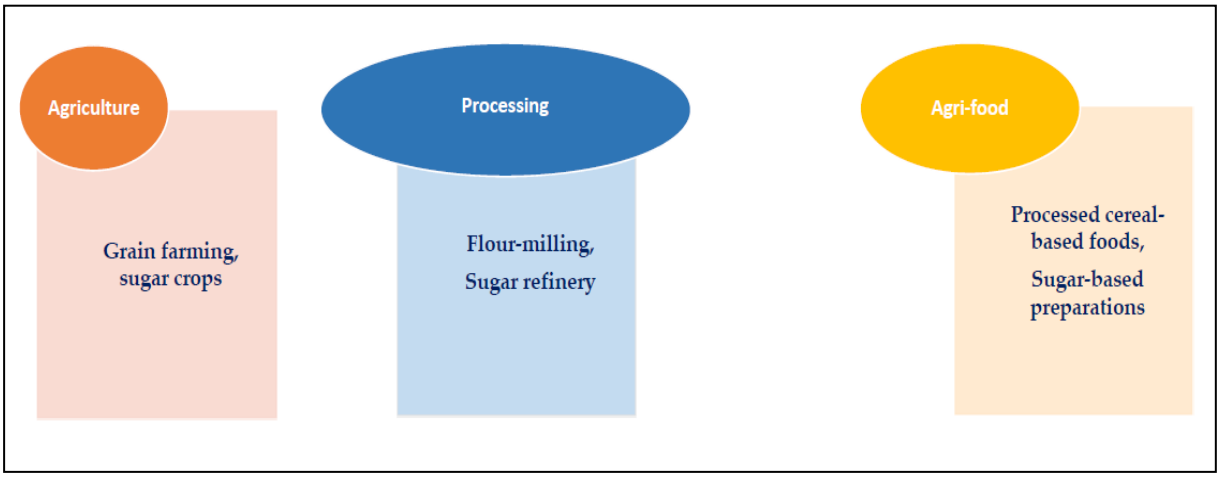
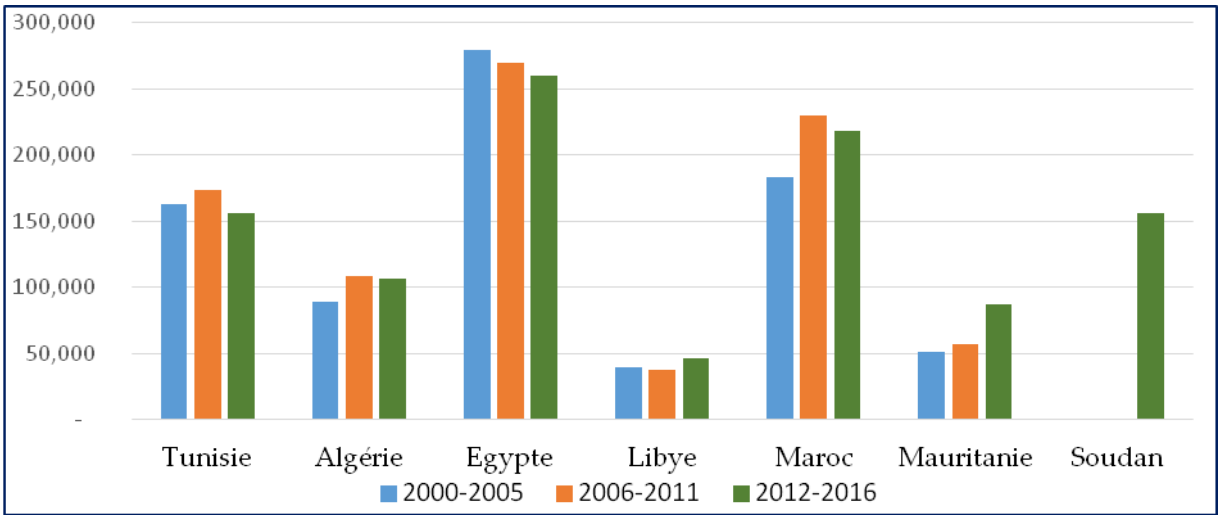


Figure 9. Value chain of the sector of cereals and sugar

Cereal farming in North Africa is a long-standing tradition, stretching back to the ancient Egyptian era. Numidia (west of Tunisia and east of Algeria) was the grain basket of Rome. This area was historically a net exporter of cereals. At present, and as illustrated in the following graph, cereal farming is quite advanced in Egypt and, to a lesser extent, in Morocco and Tunisia.

Figure 10. Production of cereals (tons/1,000 inhabitants)



Source. FAO

The agricultural sector in Egypt is dominated by grain farming in Upper and Middle Egypt. The main grain is wheat, sown in winter in over a third of the cultivated areas. Maize production is intended for animal feed. Finally, rice, as the main summer crop, occupies about 46,000 ha. Production is above 2.5 quintals per capita. It is noteworthy that Egypt's[13] performance is due to a yield higher than that of the other countries in the region (see graph).

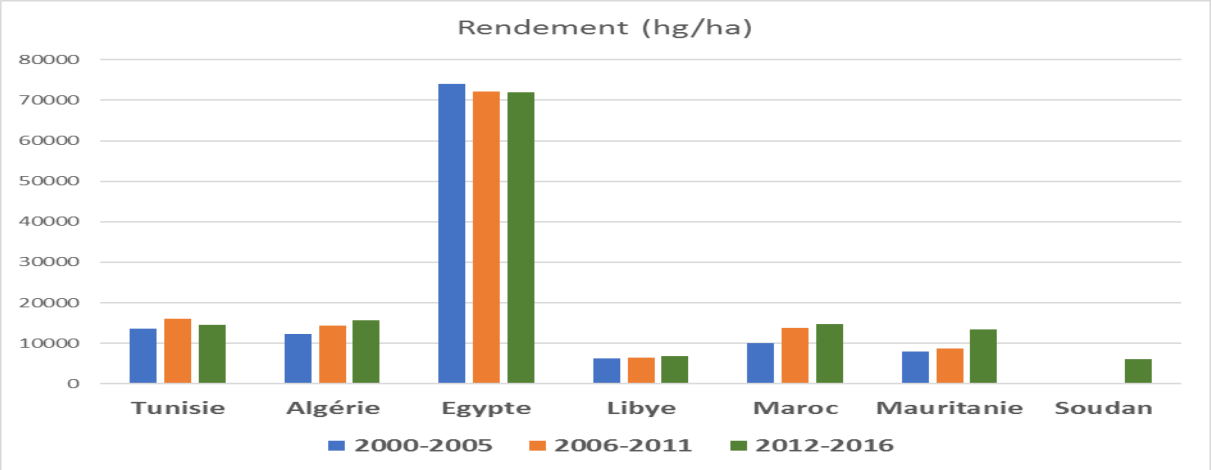
[13] Farming policies worldwide: some examples, Ministry of Agriculture, Food and Forest, France (http://agriculture.gouv.fr/sites/minagri/files/1506-ci-resinter-fi-Egypt.pdf)

The sector is also quite important in Morocco. As shown in the graph, production is over 2 quintals per capita. The sector contributes between 10 and 20% .[14]. to agricultural GDP. It is worth noting that the industrial fabric of the grain sector is composed of 211 units (flour mills, semolina mills, barley mills and artisanal units). It is also worthy of note that while Morocco's per capita production is slightly lower than that of Egypt, yields are much lower. Actually, almost 5 million hectares are planted with cereals, compared to only 3 million in Egypt.

Extending almost 1.4 million hectares, the grain farming in Tunisia covers a third of the utilized agricultural area and employs 50% of the agricultural workforce, or 240,000 farmers, and contributes on average 13% of the agricultural added- value (ONAGRI). Output is over 1.5 quintals per capita but yields are relatively low with around 15 quintals per hectare.

In Algeria, durum wheat is the most popular grain, ahead of barley and soft wheat. The output varies widely depending on rainfall. Average production since 2000 was about 100 kg per capita, with yields comparable to those of Tunisia or Morocco.

Figure 11. Yield (kg/ha)



Source. FAO

Introduction of sugar cultivation in North Africa started in Egypt in the 19th century. Egypt, Morocco and Sudan have the most developed harvested area. Egypt is well ahead, with nearly 400,000 hectares cultivated, making it the largest African producer. Sudan also benefited from the investments necessary for the development of this sector (69,564 hectares in 2016) second to Morocco (with more than 70,000 hectares).

Table 23. Surface areas cropped in hectares over the 2016 farming season

Countries	Products	Surface areas
Egypt	Sugar, beet	254991
	Sugar, canne	137011
Morocco	Sugar, beet	60978
	Sugar, canne	10434
Sudan	Sugar, canne	69564
Tunisia	Sugar, beet	320

Source: FAO

[14] Ministry of Agriculture, Ocean Fisheries, Rural Development, Water and Forests (http://www.agriculture.gov.ma/filieres?page=3)

With regard to production, Egypt tops the list again (with an average production of over 26 million tons), ahead of Sudan (with more than 5.9 million tons) and Morocco (with more than 3 million tons). In terms of yields, cane sugar in Egypt ranks first, ahead of Sudanese cane sugar and Moroccan and Egyptian sugar beet. Tunisia appears to be an outlier: from the mid-1990s to 2013, sugar beet cultivation in the country was discontinued, only to resume in 2014.

Table 24. Production and Yields of sugar in North Africa (average rates, 2011-2016)

Countries	Products	Yield (hg/ha)	Production (tons)
Egypt	Sugar, beet	513 756,8	10501396,5
	Sugar, canne	1 147 585,7	15802330,8
Morocco	Sugar, beet	619 658,3	3017868,7
	Sugar, canne	455 380,2	504138,2
Sudan	Sugar, canne	878 894,8	5970345,4
Tunisia	Sugar, beet	432 513,4	8400,0

Source. FAO.

The statistics do not reflect the refining from raw sugar. As with Tunisia or Algeria, raw sugar may be imported for refining and then resold to the final consumer or the industry.

A review of the trade performance of North African countries illustrates the weakness of these sectors. All countries of North-Africa are in fact mainly net importers. Similarly, coverage rates do not exceed 20% in all countries.

Table 25. International exchanges within the value chain, 2016 (thousands of US dollars)

Countries	Exports	Imports	Coverage rate
Algeria	240985	3951231	6,10%
Egypt	687296	3844768	17,88%
Libya	524	795511	0,07%
Morocco	265266	2484460	10,68%
Mauritania	0	182574	0,00%
Tunisia	164975	1051302	15,69%
Sudan	69209	1127734	6,14%

Source. « International Trade Centre » data base.

Egypt is the leading exporter in the region, with over $680 million in exports in 2016, followed by Morocco, Algeria and Tunisia. As far as imports are concerned, Algeria is the largest importer (more than 3.9 billion), followed by Egypt (3.8 billion), and Morocco (2.4 billion). These figures are indicative of the importance of these products for the consumers in the region.

Table 26, which details exports by product, reveals the weakness of the cereals chain, with exports of only less than 1% of total exports of goods.

Sugars and sugar confectionery products accounted for 0.78% of Algerian exports, 1.86% of Egyptian exports, 0.94% of Moroccan exports, 1.8% of Sudanese exports, and 0.5% of Tunisian exports of goods. This sector is believed to be the most dynamic with overall exports exceeding $1 billion in 2016.

Table 26. Main product exports by North-African countries

Countries	Section	Product	Exported value	Share in the total exports of goods	Rank in the export of goods
Algeria	‘17	Sugars and sugar confectionery	233923	0,780%	4
	'19	Preparations of cereals, flour, starch or milk; pastrycooks' products	6139	0,020%	19
	'11	Products of the milling industry, malt, starches; inulin; wheat gluten	910	0,003%	32
Libya	'10	Cereals	380	0,004%	33
Egypt	'19	Preparations of cereals, flour, starch or milk; pastrycooks' products	116	0,001%	40
	'17	Sugars and sugar confectionery	419170	1,862%	12
	'19	Preparations of cereals, flour, starch or milk; pastrycooks' products	140277	0,623%	36
	'11	Products of the milling industry, malt, starches; inulin; wheat gluten	96715	0,430%	43
	'10	Cereals	31134	0,138%	60
Morocco	'17	Sugars and sugar confectionery	214797	0,940%	19
	'19	Preparations of cereals, flour, starch or milk; pastrycooks' products	41828	0,183%	43
	'11	Products of the milling industry, malt, starches; inulin; wheat gluten	7448	0,033%	68
	'10	Cereals	1193	0,005%	82
Tunisia	'19	Preparations of cereals, flour, starch or milk; pastrycooks' products	82254	0,606%	25
	'17	Sugars and sugar confectionery	68601	0,505%	27
	‘11	Products of the milling industry, malt, starches; inulin; wheat gluten	13180	0,097%	61
	'10	Cereals	940	0,007%	86
Sudan	'17	Sugars and sugar confectionery	65731	1,807%	7
	'10	Cereals	3298	0,091%	21
	'11	Products of the milling industry, malt, starches; inulin; wheat gluten	153	0,004%	46

Source. « International Trade Centre » data base.

A more detailed analysis of the commercial transactions in the two value chains resulted in the following findings:

For cereals, all countries of the region had a largely negative trade balance. In terms of trade balance for 2016, the countries are all ranked 140th and more;

- For processed cereal products (grain mill products, starch, etc.), things are better, especially for Egypt, with a positive balance in the 23rd place in the world. Morocco and Tunisia also have a positive balance (from 2013 to 2015 for Morocco and in 2016 for Tunisia);
- Concerning the third tier of the value chain, namely cereal-based foods, Tunisia has consistently had positive balances, placing it at 26th place in 2016. There was even a relatively large trade surplus for these products in 2013, exceeding $90 million. Like all other countries in the region, the region shows negative balances for these products, with the exception of 2016, which saw a trade surplus in excess of $10 million.

Table 27. Trade balance of the grains sector

Countries	Balance in value in 2013	Balance in value in 2014	Balance in value in 2015	Balance in value in 2016	Rank 2016
Cereals					
Mauritania	-167477	-170468	-195996	-120538	142
Sudan			-32210	-339832	174
Libya	-1028518	-770815	-618332	-396671	180
Tunisia	-992901	-878391	-937280	-816475	195
Morocco	-1516289	-2137813	-1387650	-1887931	210
Algeria	-3273025	-3647285	-3516564	-2783044	215
Egypt	-4523728	-5017165	-4282261	-3074082	217
Products of the milling industry, malt, starches; inulin; wheat gluten					
Egypt	22819	30789	70932	54488	23
Tunisia	-6639	-3148	4017	-53	56
Mauritania	-7036	-3404	-3321	-3492	92
Morocco	71100	57435	21766	-4636	105
Algeria	-40904	-34205	-30619	-27873	170
Libya	-12831	-9188	-9673	-30793	175
Sudan			-201674	-172634	207
Preparations of cereals, flour, starch or milk; pastrycooks' products					
Tunisia	92419	68563	73611	52031	26
Egypt	-34079	-77706	-70278	10593	32
Mauritania	-14589	-19590	-24079	-21020	119
Sudan			-9932	-21275	120
Morocco	-51985	-59258	-37530	-49554	155
Libya	-311772	-261016	-301412	-220403	206
Algeria	-218930	-271350	-237869	-220837	207

Source. « International Trade Centre » data base.

In the sugar sector, there was little improvement in the ranking of the countries in the region as regards their trade balance, ranking them above the 130th place. Algeria suffers the largest deficits (over $600 million).

Table 28. Trade balance of the sugar sector

Countries	Balance in value in 2013	Balance in value in 2014	Balance in value in 2015	Balance in value in 2016	Rank 2016
Mauritania	-20875	-15091	-31868	-37524	138
Tunisia	-188502	-191185	-157557	-121830	174
Libya	-192171	-155523	-82894	-147146	181
Egypt	-155766	-299147	-224261	-148471	182
Morocco	-422960	-312777	-246145	-277073	206
Sudan			-473836	-400412	213
Algeria	-670090	-680484	-601994	-678492	216

Source. « International Trade Centre » data base.

Having analyzed the performance of the countries of the region in these sectors, we now turn our attention to the regional aspect through the analysis of existing intra-regional exchanges in the sector and the existing RVCs.

7.2. Analysis of the sector's intra-regional trade and existing RVCs

Table 29 illustrates the importance of intra-regional exchanges in the sector. It emerges that the share of exports going to the countries of the region is relatively high: 22.6% of total exports. Only in Sudan are the intra-regional exports low (no exports to other countries in the region) and in Mauritania, where no exports of these products were made in 2016.

Conversely, Tunisia has quite significant intra-regional exports (with 46% in 2016). This performance is attributable to exports of cereal-based foods, and to a lesser extent of sugars and sugar confectionery to Libya.

In the same way, Algeria has fairly well-developed relations in this sector with other countries in the region. The proof is that more than a third of exports were made to the region, and particularly to Mauritania, Egypt and Libya in the case of sugars and sugar confectionery.

Moreover, Egypt also has high regional integration levels in this sector, mainly with Sudan. This performance was made possible by "sugars obtained from sugar cane or beet and chemically pure sucrose, in solid form" and to a smaller extent, by the "sugar confectionery" products.

Furthermore, about 18% of Moroccan exports are destined for the other countries of North Africa, particularly Egypt, Mauritania and Libya.

Table 29. Cross trade between countries of North Africa for the value chain in 2016 (in thousands of $US)

		Country of destination							Total exports to North African countries	Total exports to the rest of the world	Intra north-Africa exports as a % of total exports
		Algeria	Egypt	Libya	Morocco	Mauritania	Tunisia	Sudan			
Country of origin	Algeria	---	27115	18269	8	36481	1334	0	83207	240985	34,53%
	Egypt	2290	---	0	8458	634	3251	101135	115768	687296	16,84%
	Libya	0	0	---	0	0	102	0	102	524	19,47%
	Morocco	3490	16530	11028	---	11442	2815	2936	48241	265266	18,19%
	Mauritania	0	0	0	0	---	0	0	0	0	
	Tunisia	5982	140	68190	1792	399	---	98	76601	164975	46,43%
	Sudan	0	0	0	0	0	0	---	0	69209	0,00%
Total imports from North-African countries		11762	43785	97487	10258	48956	7502	104169	323919	1428255	22,68%
Total imports		3951231	3844768	795511	2484460	182574	1051302	1127734	13437580		
Intra-North African imports expressed as a % of total imports		0,30%	1,14%	12,25%	0,41%	26,81%	0,71%	9,24%	2,41%		

Source. Calculated based on the « International Trade Centre » data base.

Import rates are very low, not exceeding 2.5%. Aside from Mauritania, Libya and Sudan, which source respectively 26%, 12% and 9% from other countries, the region has low integration rates. In the following, we focus on imports from these three countries.

For Mauritania, which sources its supplies from Algeria and of Morocco, the relatively high rates were made possible by "cane sugar or beet sugar and the solid-form chemically pure sucrose" and by the "preparations of cereals, flour, starch or milk; pastrycooks' products" and "sugar confectionery".

Libya sources its regional imports mainly from Tunisia and, to a lesser extent, Algeria and Morocco. Libya mainly imports from Tunisia "pasta products", "bakery, pastry or biscuit products" and "sugar confectionery" being the most important part of these flows.

7.3. Opportunities and challenges for the construction of RVCs in the subsectors of Cereals, Sugars and Fisheries

As mentioned in the previous section, inter-regional trade in the sector is relatively high. In this respect, it is important to strengthen this regional integration in the supply chain and to promote the regional division of production processes, and thereby the creation of RVCs.

The development of RVCs in this value chain requires:

- The development of the activities for the processing of value chain products;
- The development of intra-regional transport infrastructures; and cooperation between operators to control distribution channels in the countries of the region;
- The promotion of intra-regional foreign direct investments, which can also be a driver of RVC development;
- The promotion of seed exchanges (resulting from research and development in the region) may also be a driver for the development of RVCs, in that local R&D makes it possible to focus on the bioclimatic characteristics of the region (matching crops to climate, to natural resource constraints and production of varieties to suit regional consumers' tastes and preferences);
- Developing certification, high value-added crops (organic, labels, registered designation of origin, halal, etc.) and promoting regional brands may become an RVC development vehicle in that they improve the region's competitiveness on foreign markets and enhance consumer visibility and confidence in the countries of the region in the products, generating additional demand;

This value chain also has certain challenging characteristics. For instance, the products of the value chain are heavily subsidized. Hence, government-to-government agreements on trade liberalization and tax harmonization can be a valuable means of developing RVCs. Alternatively, cooperation arrangements for compensation between consumer subsidies can be used to institutionalize trade and reduce parallel trade.

8. Fisheries sector

The activity of fishing as a source of human food can be traced back to prehistoric times. With the increasing evolution of global demand, his trend is not expected to diminish in importance. As a result, fish consumption has risen to over 20 kilos of fish per capita per year. That is more than twice the consumption level in the mid-1990s.

The fishing sector (fishing and aquaculture) is an important, not to say essential, activity for economic development in North Africa, with a clear potential. In addition to the Nile (inland fisheries), all countries have access to the sea (Mediterranean, red sea) or the Atlantic Ocean. The diversity of products in the region and the potential of all countries in this sector are expected to be important sources of intra-regional exchanges, along with the possibility of developing RVCs.

This section will seek to detect the existence of RVCs and will, where relevant, make proposals for their development. The sector in question includes the following products[15]

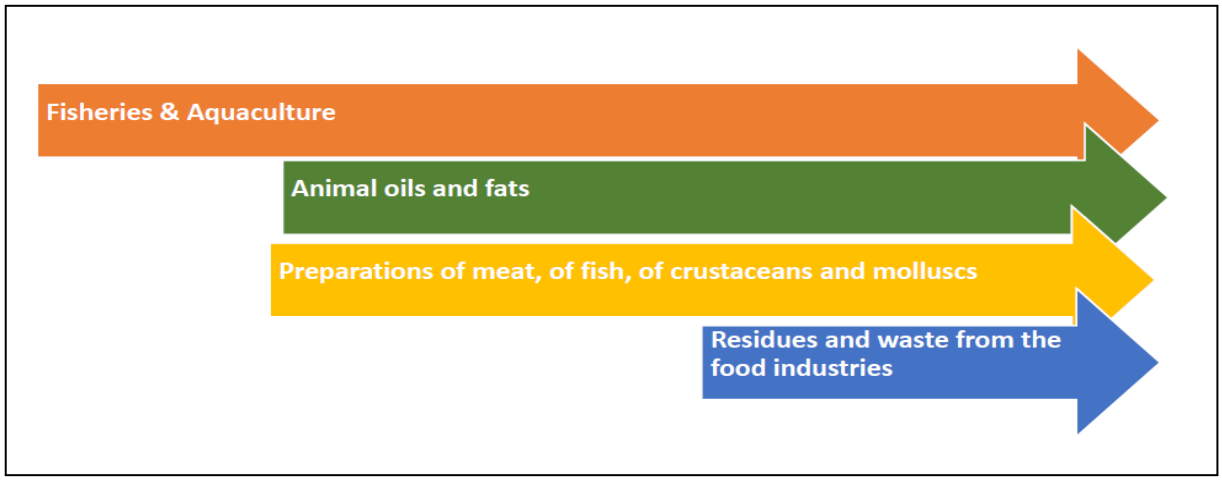
- fish and shellfish, molluscs and other aquatic invertebrates;
- Animal or vegetable fats and oils; their cleavage products; dietary fats... ;
- Preparations of meat, fish or crustaceans, molluscs or other aquatic invertebrates[16] ;
- Residues and waste from the food industries; prepared animal fodder.

8.1. Structure of the value chain of the fisheries sector in North Africa

Taken as a whole, the fisheries value chain is expected to include shipbuilding, fisheries, aquaculture and agri-food industries that provide resources development. Other activities are related, such as feeding, fish medicines for aquaculture.

This section focuses on the very core of the sector, namely fisheries products and their processing: oils or food preparations as well as waste (see Figure 12).

Figure 12: Value chain of the fisheries sector



We will start the analysis with a quick description of the sector in the countries of the region.

[15] Chapters 3, 15, 16 and 23 of the HS nomenclature
[16] For Mauritania and – in part – Morocco only (the exports of the products in this section are negligeable for the other countries).

Fishing is a leading economic sector in Mauritania. As can be seen from the table below, total annual production for 2016 was about 600,000 tons, i.e. more than 12% of GDP. With more than 700 kilometers of coastline, and one of the world's most abundant sources of fish, industrial fishing:[17]

- represents more than 40% of the exports of goods
- generates 55,000 direct and indirect jobs.

Table 30. Production of fishery products (in tons)

Countries		2013	2014	2015	2016
Algeria	Inland waters	1 840	1 460	960	991
	Maritime waters	101 410	98 779	96 319	95 370
Egypt	Inland waters	1 347 740	1 374 083	1 416 010	1 602 619
	Maritime waters	106 662	107 800	102 934	103 655
Libya	Inland waters	10	10	10	10
	Maritime waters	36 004	25 003	26 002	30 002
Mauritania	Inland waters	15 000	15 000	15 000	15 000
	Maritime waters	372 833	363 339	388 776	594 754
Morocco	Inland waters	15 562	15 652	15 586	16 134
	Maritime waters	1 245 127	1 353 485	1 355 695	1 439 113
Sudan	Inland waters	32 200	32 500	35 751	35 751
	Maritime waters	4 008	3 008	1 757	1 751
Tunisia	Inland waters	1 992	2 068	2 397	2 229
	Maritime waters	118 902	120 537	131 045	129 001

Source. FAO, Fishery Statistical Collections (http://www.fao.org/fishery/statistics/global-

With its 3,500 km Mediterranean and Atlantic coastlines, the Moroccan fishing sector is a significant driver of economic development, making it Africa's leading producer of sea products (more than 1 million 400 thousand tons in 2016). Fishing also provides 600,000 direct and indirect jobs and is the source of livelihood for about 3 million people.[18]

Despite the potential and the investments to develop the sector, production in Algeria stands at around 100,000 tons per year. It is worth noting, in passing, that production has been declining since 2013.

During the period 2006-2016, the fisheries and aquaculture sector in Tunisia contributed 6.4% to the value of agricultural production, 12.9% to the value of agricultural exports and provided 51,261 direct jobs. The average annual per capita consumption of seafood and aquaculture products is approximately 12 kg/year. In all, there are 41 fishing ports with a capacity to accommodate 150,000 T/year and 2 fishing ports under construction and 13,908 fishing units, of which 12,775 are active units.[19]

In contrast to other countries in the region, Egypt and Sudan are operating the Inland waters (the Nile) as well as aquaculture for Egypt. In fact, in 2010, this activity accounted for more

[17] Source: http://afrique.le360.ma/mauritanie/economie/2018/01/13/18042-mauritanie-letat-etouffe-la-peche-locale-au-profit-des-etrangers-18042 production/en).
[18] Source: Snapshot of the maritime fishing sector in Morocco. (http://www.reapcmaroc.com/pages/pub/doc/portrait_peche.pdf).
[19] Source: National Agriculture Observatory (www.onagri.nat.tn).

than 50% of total production. It is worth noting that sectoral production in the Inland waters is fairly high at over 1 million 600 thousand tons in 2016.

After the description of these sectors, we will analyze in the next section the region's trade performance in the sector. Mauritania stands out from the rest as it has exported US$732 million, and only imported 27 million. Morocco also has a largely positive trade balance: its exports are threefold higher than its imports. Conversely, all other countries have a trade deficit.

Table 31. International trade exchanges of the sector, 2016 (thousands of US dollars)

Countries	Exports	Imports	Coverage rate
Algeria	7185	733920	1.0%
Egypt	124351	1574225	7.9%
Libya	27082	243739	11.1%
Morocco	2137491	696305	307.0%
Mauritania	732215	27311	2681,0%
Tunisia	167453	204189	82.0%
Sudan	15971	41347	38.6%
Total countries North Africa	**3211748**	**3521036**	**91.2%**

Source. Calculated based on the « International Trade Centre » data base.

While an analysis of the sector's aggregate commercial performance would prove useful, it is not enough to understand the dynamics of trade between the various products in the sector. The following table provides details of exports, by product, with emphasis on the relative importance in relation to products.

For all its natural potential, the sector has not been given due importance in Algeria, Egypt, Libya and Sudan's exports. Conversely, in the case of Tunisia, the amounts are relatively large (over $150 million in exports), but the share in total exports of goods amounts to a mere 1%.

At the same time, the most performing countries in the region in this sector are Morocco and Mauritania. As a matter of fact, for Morocco, exports of fish, fats and fish preparations exports are fairly high. Fish, shellfish and preparations based on these products make up almost 8% of exports of goods. The whole sector totals more than $2 billion in exports. Finally, for Mauritania, and as noted above, this is a strategic sector, in that fish are the second most important export product (after minerals). The sector even exceeds 40% of total exports of goods.

Table 32. Main products exported by North African countries

Countries	Section	Product	Exported value	Share in the total exports of goods	rank in the exports of goods
Algeria	'03	Fish, crustaceans, molluscs or other aquatic invertebrates	7036	0,023%	17
	'16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	125	0,000%	50
Egypt	'03	Fish, crustaceans, molluscs or other aquatic invertebrates	42231	0,19%	57
	'16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	2343	0,01%	73
Libya	'03	Fish, crustaceans, molluscs or other aquatic invertebrates	27071	0,04%	8
Morocco	'03	Fish, crustaceans, molluscs or other aquatic invertebrates	1222939	5,35%	5
	'16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	658307	2,88%	11
	'15	Animal or Vegetable Fats and Oils and their Cleavage Products; Prepared Edible Fats	237141	1,04%	18
	'23	Residues and waste from the food industries; prepared animal fodder	173260	0,76%	22
Mauritania	'03	Fish, crustaceans, molluscs or other aquatic invertebrates	607275	35,25%	2
	'23	Residues and waste from the food industries; prepared animal fodder	94472	5,48%	4
	'15	Animal or vegetable fats and oils; their cleavage products; dietary fats...	25399	1,47%	6
Tunisia	'03	Fish, crustaceans, molluscs or other aquatic invertebrates	126159	0,93%	20
	'16	Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	24555	0,18%	46
	'23	Residues and waste from the food industries; prepared animal fodder**	16739	0,12%	55
Sudan	'15	Animal or vegetable fats and oils; their cleavage products; dietary fats...	25402	0,70%	9
	'23	Residues and waste from the food industries; prepared animal fodder	14445	0,40%	12
	'03	Fish, crustaceans, molluscs or other aquatic invertebrates	1526	0,04%	26

* incl. 35% of vegetable fats and oils and their fractions, of fish or marine mammals, even refined, ...

** there is no information available on the breakdown of this statistic over different value chains.

8.2. Analysis of the sector's intra-regional trade and existing RVCs

Having thoroughly described the exchanges of the countries in the region, we will now attempt to determine the share of intra-regional exchanges to detect the existence of RVCs. There is very little performance. In fact, aside from the intra-regional exports of Morocco and Mauritania, the other two main performers in the region remain very low. Of the $732 million exported by Mauritania in 2016, only $4.8 million was directed to North Africa's markets, while in the same year, the region imported $3.5 billion. This indicates a substantial growth potential for intra-regional trade. Intra-regional exports are also relatively low for Morocco, below 2%, while exports exceeded US$2.13 billion.

More than 9% of Tunisia's $167 million was exported to North Africa, with Libya being the main destination.

Libya, Algeria and Sudan have weak export performances (amounting approximately to 50 million), implying that efforts must be made internally to boost the sector, both for the domestic market and for exports.

8.3. Opportunities and challenges for the construction of RVCs in the subsectors of Fisheries

In the previous section, it was clearly shown that this sector holds significant potential, although it has remained untapped. The construction of RVCs requires:

- the promotion of processing activities of the sector's products in the region;
- Bilateral agreements on the reciprocal recognition of certificates of conformity for important products; designed to facilitate trade.
- bilateral and regional fisheries agreements providing for trade facilitation in this sector;
- the activity of aquaculture being one of the driving forces behind the development of the sector, all inputs necessary for this activity (food, medicines, etc.) can be given particular attention with a view to accelerating the creation of RVCs in this sector.

Table 33. Cross trade between North-African countries for the sector in 2016 (in thousands of $US)

		Country of destination							Total exports to North Africa	Total exports to the rest of the world	Intra north-Africa exports as a % of total exports
		Algeria	Egypt	Libya	Morocco	Mauritania	Tunisia	Sudan			
Country of origin	Algeria	---	181	0	0	0	106	0	287	7185	**3,99%**
	Egypt	0	---	42	22691	0	357	4979	28069	124351	**22,57%**
	Libya	0	0	---	0	0	547	0	547	27082	**2,02%**
	Morocco	4725	13467	2549	---	13140	2814	975	37670	2137491	**1,76%**
	Mauritania	229	1580	0	0	---	2876	0	4685	732215	**0,64%**
	Tunisia	2543	511	12066	65	0	---	154	15339	167453	**9,16%**
	Sudan	0	181	0	0	0	0	---	181	15971	**1,13%**
Total imports from North-African countries		7497	15920	14657	22756	13140	6700	6108	39102	3211748	**1,22%**
Total imports		733920	1574225	243739	696305	27311	204189	41347	3521036		
Intra-North African imports expressed as a % of total imports		**1,02%**	**1,01%**	**6,01%**	**3,27%**	**48,11%**	**3,28%**	**14,77%**	**1,11%**		

Source. Calculated based on the « International Trade Centre » data base.

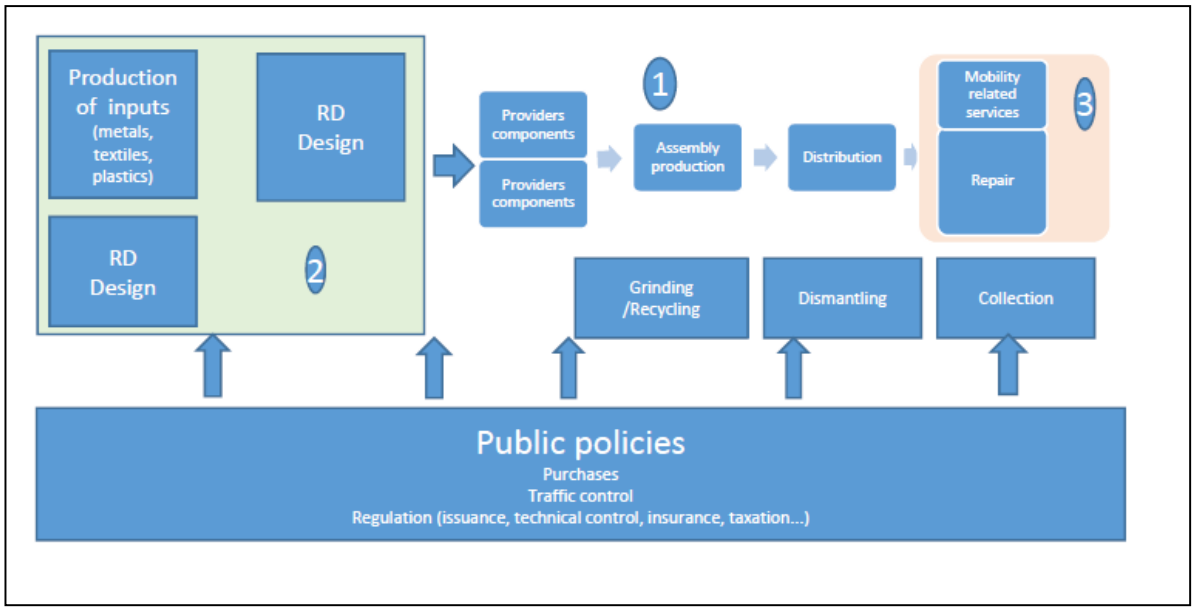
9. The automotive sector

The automotive sector is assuming increasing importance in North Africa. As a result of the massive relocation of production from the developed world (USA and Europe) to emerging economies (especially Asia), the sector is undergoing rapid global change. This change has prompted major manufacturers to seek new markets and new countries to serve as production platforms, providing a timely opportunity for the North African countries to step up their integration into the global economy.

The configuration of the automotive industry has changed. Led by a number of prominent companies, the industry is becoming increasingly fragmented and internationalized. A number of new relationships have emerged among the main industrial actors. The manufacturers, always high up in the pyramid, control the fields of technological research, overall strategy, patents and the brand. They have a decisive influence on the development of the entire value chain. As such, they are the ones who decide directly or indirectly what should be produced, where and by whom. Automobile manufacturers also trade-off between the internalization and outsourcing of production and between integration and spatial disintegration.

The remaining portion of the chain is supplied by various equipment manufacturers. Most automakers are mere assemblers, assembling parts produced by equipment manufacturers. The latter are responsible for the design and manufacture of parts or subsets such as chassis, engines, bodies, seats, electrical equipment and tires. First-tier equipment manufacturers, also known as Code Designers, are more than simple manufacturers. Along with the manufacturers, they are viewed as "leading" companies in the automotive value chain. They are the patent holders of the products they design and carry out the research and development function. At the base of the pyramid lie the subcontractors working closely with first-tier equipment manufacturers. The global value chain in the automotive sector can be described as follows:

Figure 13: Value chain of he automotive sector



Source. PIPAME, BIPE (2010).

The section "1" of Figure 13 shows the traditional value chain of the automotive industry. Sections "2" and "3" respectively describe the integrated upstream and downstream activities

of the chain. Finally, the phases of collection-dismantling, recycling-reclamation and/or crushing also form a fourth sector that is part of the main automotive sector.

9.1. Structure of the value chain of the automotive sector in North Africa

Some of the countries of North Africa have a long established automotive history and are relatively better positioned than others with respect to global value chains. There are several similarities between Morocco, Tunisia and, to a lesser extent, Egypt, which point to the potential for cooperation in this sector. The automotive industry in the region is largely in the hands of multinational companies, focusing on the manufacture of parts and components (Table 33). The presence in the region of world-class automotive manufacturers should help to introduce more technological drivers and improve their positions in the global value chain. Renault's installation in Morocco has enabled it to become Africa's second largest automotive producer.

Table 34: Map of the value chain of parts and components manufacturing

VC segment	Algeria	Egypt	Morocco	Tunisia
Engines & engine parts				
Engine		No production		
Fuel tank		x	x	x
Carburator	x	x	x	x
Pistons		No production		
Pigments & other parts	x	x	x	x
Wiring		x	x	x
Frame				
Steel parts		x	x	
Surface coatings				
Steel		No production		
Plastics/composite packagings				
For the chassis		x	x	x
Brake system		No production		
Brake units		x	x	x
Exterior				
Glass	x	x	x	x
Optical units		x	x	x
Tires		x		
Interior				
Seats		x	x	
Fabric		x		
Plastics		x	x	x
Suspension systems		No production		
Electronics		x	x	x
Safety features		x	x	x
Electrical and wiring devices		x	x	x

Source. ECA (2016)

Morocco

The Moroccan automotive sector is one of North Africa's most globally integrated value chain. The history of the automotive industry in Morocco may be divided into two major periods, the period before and the period after 2005.

The first period consists of four phases, the first of which started in 1959 with the creation of the Société marocaine de construction automobile (SOMACA). SOMACA has specialized in the assembly of mechanical parts and kits and bodywork for passenger and commercial vehicles for the Fiat, Citroën and Renault brands. Phase two involved the development of the automotive component manufacturing industry, starting in 1995 with the signing of an agreement with Fiat Auto S.P.A. for the economic car project (50% integration rate), followed by Phase three involving the signing; in 1996, of two agreements with PSA Peugeot-Citroën and Renault for the assembly of economic light utility vehicles at a 100% integration/compensation rate (25% Integration, 75% Compensation). These projects have led to an increase in local demand for automotive components, the initiation of car subcontracting in Morocco and the emergence of new global OEMs. Phase four of the first period began in July 2003 with the signing of an agreement with Renault on the industrial project for the assembly of the "Dacia Logan" family car for the local and international market, further to the privatization of SOMACA. To be able to supply certain Western European countries, particularly France and Spain and the Mediterranean Arab markets (Agadir Agreement), Renault has made the decision to expand SOMACA.

The second period was characterized by the start-up of operations at the Renault-Tangiers industrial complex, a major milestone for the sector, now shifting to the automotive manufacturing segment, promoting the emergence of a world-class Moroccan automotive industry. This period was also marked by the decision of new equipment manufacturers and subcontractors to settle in Morocco.

Morocco became Africa's second largest vehicle producer after South Africa (table 34), and in 2016 exports of cars outperformed those os phosphates, becoming therefore the first product sold to the rest of the world. In 2016, the industry's turnover was 60 billion dirhams, versus 40 billion in 2014, that is, a 50% increase. The growth rate of the export turnover over the period 2010-2016 was 25%.

Table 35. Automotive production in Africa by top manufacturers (Number of vehicles)

		2000	**Share**			**2016**	**Share**
1	South Africa	2305771	77%	**1**	South Africa	335539	48%
2	Egypt	39888	13%	**2**	**Morocco**	313868	45%
3	**Morocco**	17359	6%	**3**	Algeria	42008	6%
4	Nigeria	7834	3%	**4**	Egypt	10930	2%
Total production in Africa		298778		**Total production in Africa**		702345	

Source. Data sourced from the International Organization of Motor Vehicle Manufacturers (OICA)

From 2005 to 2015, the automotive sector's exports soared from $155.6 million to $3,941 million, reflecting an average annual growth rate of 34 per cent. In 2015, motor vehicle exports accounted for 61% of the automotive industry's exports, compared with just 2% in 2005. This increase has been at the expense of component exports, which declined from 98% in 2005 to 39% in 2015 of total automotive industry exports, largely as a result of the decrease in the share of bodywork exports from 33% to 4% and the bodywork and/or power train system from 17% to almost 0%.

Electrical systems still remain the most automotive component product exported, in spite of the decline in their share in the total automotive industry exports from 45% to 32%. In value terms, exports of components rose from $152.7 million to $1,522.1 million and electrical systems from $69.7 million to $1,268 million.

About 90% of the total production is made up of component exports. Foreign companies are the dominant exporters with a high degree of concentration, with 79% of the total value being exported by only 8 of the 200 companies operating in this field. Quite a large number of Moroccan SMEs operate in this sector, although their share of exports remains relatively low. Their contribution to the assembly phase is also limited.

Tunisia

During the 1960s and 1970s, Tunisia embarked on an industrialization process based on import substitution, notably through the development of an automotive industry centred on vehicle assembly activities. As a result, Tunisia supported the local production of light commercial vehicles and industrial vehicles, mainly by the Tunisian Automobile Industry Company (STIA). But the small-scale nature of the domestic market impeded the development of domestic production, thereby forcing Tunisia, relatively early on, to refocus its expansion strategy from automotive industry to equipment manufacturing industry. And unlike Morocco, which before Delphi's arrival in 1999, had an equipment production aimed essentially at supplying the domestic market (SOMACA), Tunisian equipment manufacturers have since the late 1980s been targeting the international market.

Tunisian authorities have exerted tremendous efforts to align national textile, mechanical, electrical and electronic production to the international automotive industry requirements. Tapping into the multiple advantages offered by the Tunisian authorities in taxes and customs, geographic proximity and lower labour costs, the subsidiaries of multinational companies, notably in wire harness, engine parts (Delafontaine), hood locks (MGI Coutier), steering wheels and safety belts (Autoliv), electronic displays (Johnson Controls) and shock absorbers (Record France) decided to set up shop in Tunisia[20].

The long-standing experience gained in this sector paved the way for the development of specific resources that today give Tunisia a competitive advantage beyond the simple salary[21] cost advantage. The gradual intensification of the equipment fabric and the noticeable improvement of its technical and organizational skills owing to a high-quality training offer, have enabled Tunisia to move up the value chain successfully, to ensure the transition from assembly to higher value-added activities and to forge a significant network of suppliers and partners. Tunisia currently has 230 companies active in the automotive components sector, 134 of which are fully export-oriented (the 2014 Invest in Tunisia International Conference). The electrical sector continues to be by far the strongest area of the automotive industry.

The sector has experienced sustained growth since the 2000s, both production-wise and exports-wise, with an average annual growth rate of 11% in production from 2005 to 2014 and 7.5% in exports from 2008 to 2014. In the components part, the " drive system " achieved the highest average annual growth rates with 19% during the period 2005-2015.

Over the period 2005-2015, the automotive industry's average annual export growth rate was 5%, compared with only 1% in 2015 for motor vehicle exports, up from 2% in 2005. And yet, the tariff and customs protection of commercial vehicles, buses and coaches has favoured the creation of turnkey manufacturers with an annual output of around 5,000 vehicles.

[20]LAYAN et LUNG (2008)
[21]LAYAN et LUNG (2008)

Algeria

The Algerian automotive industry was established in June 1957 with the setting-up of Berliet's first heavy goods vehicle factory. In 1967, the Algerian authorities created the *Société Nationale de Construction Mécanique* (SONACOM), known since 1981 under the name of *Entreprise Nationale de Véhicule Industriel* (SNVI)[22]. Together with Mercedes-Benz, the latter owns a number of production sites in Algeria, notably in Rouïba and Tiaret. The off-road Mercedes Benz G-Class cars produced by the Tiaret plant are intended for government institutions, mainly the Ministry of National Defence and the Directorate-General of National Security (DGSN).

On the whole, the car assembly sector is booming in Algeria, but the 5 assembly plants are at present working to satisfy a large part of the demand on the national market through the assembly of 260,000 cars. Created on 31 January 2013 in Oran, *Renault Algérie Production SPA* (RAP SPA) expects a production of 80,000 cars in 2018. In addition to the current models, RAP SPA[23] intends to introduce new models, i. e. Renault Clio with DCI and Symbol diesel engine. In addition, the Tahkout group, owner of the Hyundai brand's car assembly plant in Tiaret and Suzuki in Saida, is planning to assemble 100,000 vehicles in 2018. In addition, SOVAC plans to assemble 35,000 to 40,000 cars[23] covering the following five models: Caddy, Golf 7, Polo, Oktavia and SEAT Ibiza. Finally, *KIA Algérie*, located in the wilaya of Batna, plans to produce 40,000 cars

Algeria is not part of the global value chains as a supplier but more so as a consumer. In the run-up to South Africa, Algeria is the Continent's 2nd largest market for cars and trucks, with an annual average of 350,000 new imported vehicles. In 2012, Algeria had to import 500,000 vehicles worth $6 billion. To address this situation, particularly after the fall in foreign exchange reserves from $174 billion in 2012 to $98 billion in November 2017, the Algerian authorities are appealing to car dealers to review their manufacturing policies on the Algerian marketplace. To meet the domestic demand, these dealers must set up their assembly units in Algeria and reduce to a minimum the import of finished products.

Total Algerian exports to the rest of the world reached almost 30 billion dollars, consisting mainly of mineral products, while the automotive exports did not exceed $321,000, of which 72.6% were exported to the Tunisian market.

Egypt

As with Algeria, Egypt set up in 1957, the Al-Nasr[24] Company, the first car manufacturer, with the aim of producing the first all-Egyptian car. Although the company never achieved this objective, it still managed to assemble 19 models for the Fiat brand. The transition to a market economy and the supply of new models on the Egyptian market has prompted the government to shut down this company in 2009[25].

In 2015/16, Egypt imported an estimated $1.5 billion worth of private vehicles. According to the *International Organization of Motor Vehicle Manufacturers* (OICA), sales of vehicles in Egypt have been falling sharply since 2014. Actually, only 264,100 vehicles were sold in 2016 compared to 349,100 in 2014. The main cause of the drop in sales is the rise in prices, induced by the depreciation of the national currency.

To address this sharp fall in sales and cut down on vehicle imports, a new strategy is implemented by the government to develop local car assembly by attracting investors and raising the local share of components in assembled vehicles from 45.5% to 60% in 2023. Furthermore, the government hopes to produce an all-Egyptian car soon, along with a project to relaunch Al-Nasr[26] .

[22]AMEUR DJELLAL Nezha « The new changes in the global automotive geography and the development of the automotive industry in Algeria and in Morocco: a comparative analysis»
https://www.asjp.cerist.dz/en/downArticle/154/10/1/16163

[23]http://www.maghrebemergent.info/entreprises-9/algerie/81396-algerie-l-industrie-de-montage-automobile-promet-260-000-voitures-en-2018.html

[24]Nasr Automotive Manufacturing Company

[25] https://www.sasapost.com/car-assembly-in-arab-world/

[26] Which was forced to end its operations seven years ago.

The Egyptian automotive industry accounts for a mere 0.68% in the country's total exports to the rest of the world. The value of these exports reached $152,581,000, of which 5.44% were for North Africa, mainly Sudan.

Sudan

In Sudan, the "Giad industrial city" was inaugurated in March 1997 and commissioned on 26 October 2000. Part of this zone was dedicated to the automotive industry with a total capacity of 14,000 units (cars, trucks and tractors). The first car and truck assembly unit "Giad Motor Company", a 350-person company, was inaugurated in 2004, followed by a second unit called "GIAD TRUCK COMPANY LTD" and then another dedicated to after-sales service[27].

But in spite of this, the Sudanese automotive imports nowadays is still very high, at 525 million dollars, or 7.3% of total imports, compared to nearly 1.5 million worth of exports in 2016. At present, Sudan exports $6.65 billion, with only 0.03% of that in the form of automotive products.

Lybia

The *International Organization of Motor Vehicle Manufacturers* estimates that in 2016 vehicle sales reached 46,400 units of all types and 0 units produced on the Libyan market. According to the figures of the ITC for 2016, Libya imported a total of $9.8 billion, 3.4% of which consisting of imports of automotive and accessory products, while its automotive and accessory exports to the rest of the world reached $2 million, or 0.08% only of the total Libyan exports. Of these automotive products, 26.65% are exported to North Africa, mainly to Egypt and Tunisia.

Mauritania

According to the *International Organization of Motor Vehicle Manufacturers*, the 2016 vehicle sales in Mauritania reached 11,000 units of all types. In the absence of an automobile industry in the country, Mauritania imports $108,426,000 worth of vehicles and accessories out of a total of $2,282,363,000, or 4.75% of total imports. Mauritanian automobile imports from North Africa came to $1,862,000, or 1.72% of the total automobile imports, mainly from the Moroccan market (98%).

9.2. Analysis of existing intra-regional trade in the sector and existing RVCs

The automotive sector is undergoing a major transformation at the international level. With the widespread relocation of production from the developed world (USA and Europe) to emerging economies, especially in Asia, major manufacturers are now looking for new markets but also new countries as their production platforms. These emerging countries are offering the most affordable wages and fairly competitive production costs. The North-African automotive sector is assuming increasing importance, particularly because of its geographical proximity to Europe, with which several countries in the region have already entered into free trade agreements. This provides a boon for North African countries to intensify their integration into the global economy.

The exports of North African countries to the rest of the world continue to be very low compared to their total exports, at 3.66%, led mainly by Morocco, and to a lesser extent, by Tunisia and Egypt. Exports of the automotive industry from other countries to the rest of the world are negligible. Furthermore, the domestic markets of several countries in the region are still small.

[27] www.afrigatenews.net/content/

Table 36. Regional and global exports of the North-African automotive sector in 2016 (in thousands of US dollars)

		Country of destination							Total exports automobiles to North African countries	Total exports of cars to the ROW	Intra-N-A exports in % of total car exports	Total exports to the rest of the world	Exports of cars in % of total car exports
		Algeria	Egypt	Lybie	Morocco	Mauritania	Sudan	Tunisia					
Country of origin	Algeria	--	0	0	0	0	0	233	233	321	72,59%	29 992 101	0,00%
	Egypt	613	--	168	0	0	7 400	114	8 295	152 581	5,44%	22 507 389	0,68%
	Lybie	0	1 992	--	11	0	Ind	1 319	2 003	7 515	26,65%	9 576 255	0,08%
	Morocco	5 997	228 654	16	--	1 818	76	28 783	265 344	3 139 072	8,45%	22 858 289	13,73%
	Mauritania	0	0	0	0	--	0	0	0	0		1 722 938	0,00%
	Sudan	0	0	Ind	0	0	--	0	0	1 165	0,00%	3 649 941	0,03%
	Tunisia	72 799	212	2 972	4 879	44	379	--	81 285	504 217	16,12%	13 575 131	3,71%
Total imports from North-African countries		79 409	230 858	3 156	4 890	1 862	7 855	29 130	357 160	3 804 852	9,39%	103 882 044	3,66%

Source. Author calculations, Trade-map (ITC).

9.3. Opportunities and challenges for the construction of RVCs in the automotive sector

The trade between North African countries is close to 10% due in particular to exports by Morocco of tourist cars to Egypt and Tunisia, to the exports of intermediate and accessory goods by Tunisia to Algeria, Morocco and Libya and finally to the Egyptian exports to Sudan. Table 36)

The signing of the Agadir free trade agreement, the geographical proximity and importance of local markets and the strong political will to invest in training and logistics are some of the factors that paved the way to this intra-regional trade increase. However, the bulk of this intra-regional trade occurs in passenger cars and not in components, reflecting North-Africa's limited regional value chain integration.

The bulk of Morocco's exports to North African countries are passenger cars. In 2016, Morocco's exports to Egypt and Tunisia reached US$228,555,000 and US$27,626,000 respectively, out of a total amount exported by the Moroccan automotive sector to North African countries of US$265,344,000, or 96.6% of total exports of the Moroccan automotive sector and 72% of intraregional sectoral trade.

In 2016, a total of US$57,619,000 worth of trailers and semi-trailers for all vehicles were exported to Algeria, the remainder being distributed over special purpose motor vehicles (US$7,936,000), tractors (US$5,083,000), freight motor vehicles (US$1,364,000) and finally tractor parts and accessories (US$722,000). Tunisian exports to Morocco amounted to US$4,605,000 in tractor parts and accessories, US$155,000 in motorcycle parts and accessories and US$100,000 in trailers and semi-trailer trucks. Finally, Tunisia's exports to Libya reached $1,799,000 worth of trailers and semi-trailers for all vehicles, $469,000 worth of motor vehicles for the transport of goods, $234,000 worth of passenger vehicles, $202,000 worth of special-purpose vehicles, $191,000 worth of tractors and finally $50,000 worth of tractor parts and accessories.

Tunisia's main challenge for the automotive industry is the absence on its territory of internationally renowned car manufacturers. To address these challenges, Tunisia must (i) increase the added value of the product range through increased investment in R&D and innovation, (ii) expand upstream and downstream logistics activities, (iii) and forge synergies with other industrial sectors in the country as well as between Industries, academia and research laboratories.

Egypt exports to Sudan trailers and semi-trailers to the tune of US$7,324,000, and tourist cars to the tune of US$57,000. Egypt exports to Algeria $586,000 worth of trailers and semi-trailers. Likewise, Egyptian exports to Tunisia reached $112,000 as tractor parts and accessories and $2,000 worth of motorcycle parts and accessories. Part of the challenge facing the Egyptian authorities is the uncontrolled inflation, which has risen to over 30%.

Algeria's exports to Tunisia are only USD 233,000 worth of tractor bodies. Among other problems impeding the development of the automotive sector, the small size of private companies working in the sector, the small share in the domestic market and the lack of certification compared to Tunisia and Morocco.

Libyan exports to the Egyptian market in the form of special purpose motor vehicles amounted to US$1,968,000. Libya also exports $633,000 worth of passenger cars, $595,000 worth of motor vehicles for the carriage of goods, $70,000 worth of special purpose motor vehicles and $18,000 worth of tractors.

There are still several challenges to be met by North-Africa's countries before they can strengthen their positions in the regional, but also global, value chains, particularly targeted training. The countries of the region have some similarities which are likely to create

competition between them instead of regional cooperation. It is noteworthy here that some models in East Asia, in particular, have shown that value-chain-based regional integration has the potential to strengthen the ability of the countries of the region to move up the global value chain (OCP, 2017) at least by enhancing the attractiveness of FDIs. With the development of assembly activities in Morocco, the potential complementarity of the automotive industries between Morocco and Tunisia will be further explored[28]. A further problem holding back integration across regional value chains is that the region's sector being controlled by powerful multinational companies. However, the latter are located in several countries of the region and hence commonizing the financial and human resources between different sectors can strengthen regional integration. Thus, to cope with intra-regional competition and strengthen cooperation between these countries, the latter could create Maghrebian businesses through the creation of joint ventures active in several countries in the sub-region.

10. Aeronautics sector

Like other strategic industrial activities, aeronautics has long remained concentrated in the countries of origin. However, the pace of internationalization of upstream activities has accelerated and the number of new facilities has increased (Malika Hattab-Christmann, 2009)[28]. The aeronautics industry is a distinct industry. It is defined "as a set of activities aimed at manufacturing and keeping in operating condition products that are moving in a third dimension" (Belis and Frigant, 2006)[29]. It includes associated products, equipment and systems for aircraft simulation, navigation, guidance, control, communication, surveillance and defence. It stands out from other industries in several respects, namely (Thierry Petit: (2005))[30]:

This high-tech and high capital-intensive sector requires significant productive and R&D investments and relies on highly qualified personnel, particularly for security purposes.

This is also an industry producing small or medium volumes, where economies of scale are relatively more difficult to achieve compared to other manufacturing industries. Only airlines, charter companies, large manufacturers of private jets and the State for military products are targeted. It is a dual industry, with a strong military component, conferring on it a strategic character, with a high involvement of the State.

While the aeronautics industry is cyclical and dependent on the geopolitical environment, its impact on the foreign trade balance of exporting countries is particularly positive. The aeronautical sector is also characterized by a rapidly expanding global market, driven by low borrowing costs, improved airline profitability, growth of low-cost carriers and fleet replacement programs developed by the carriers[31]. It is estimated by the International Civil Aviation Organization (ICAO) that the number of passengers carried by airlines should reach 10 billion in 2040 instead of 3.8 billion in 2016.

With increasing global competition, individual operators have been forced to shift their strategies in favour of more outsourcing, particularly to countries with globally competitive offers.

10.1. Structure of the value chain of the aeronautics sector in North Africa

Historically, aircraft manufacturers used to design, engineer and build their aircrafts to a very large extent in-house. The integrated firm model gave way to a new model in the 1980s. As a result, aircraft manufacturers started outsourcing the design and engineering of entire parts of the aircraft to subcontractors. These companies have now moved from the category of "aeronautical manufacturers" to that of "aeronautical systems assemblers".

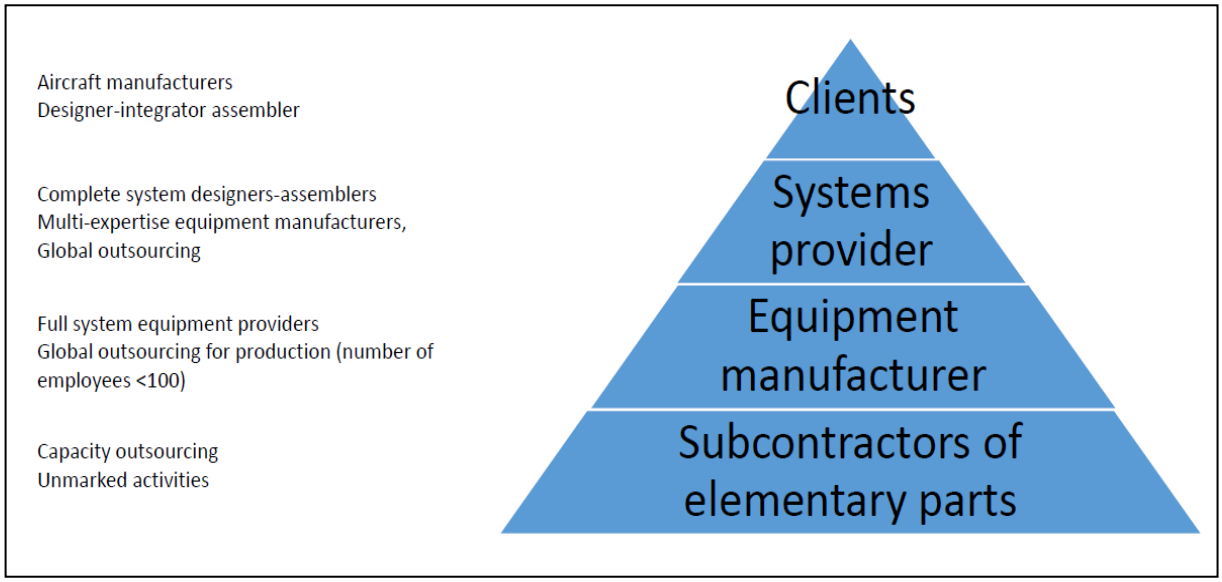
[28] Hattab-christmann Malika , (2009) « mutations dans l'industrie aéronautique française et nouvelles localisations au Maroc Vers l'émergence de nouveaux territoires de l'aéronautique ? » dans « Géographie, économie, société », 2009/3 (Vol. 11) Éditeur: Lavoisier.

29 Belis-Bergouignan Marie-Claude & Frigant Vincent (2006), « Le potentiel scientifique et technologique Aéronautique & Espace des regionss SUDOE » Projet Intereg IIIB Sudoe, Rapport Final 2005-2006.

30 Thierry Petit (2005), « La filière industrielle aérospatiale en Ile-de-France, état des lieux et enjeux » Etude N° 6.04.06, IAURIF, septembre.

31 Organisation d'Avion Civile Internationale

Figure 14: Global aviation industry value chain



Source. Benhar Z (2016)[32]

The global aviation industry value chain comes in the form of a 4 pyramid-shaped levels (Figure 14). The top of the pyramid is controlled by aircraft manufacturers, considered as major customers. These architectural firms have managed to break down the aircraft, a modular product above all, into a series of sub-assemblies which are independent in their design and production and at the same time interdependent in the combination to form the final product, i. e. the aircraft[33].

These major customers were thus able to outsource an important component of the aircraft or a complete module to the same global subcontractor - incl. research, development, industrialization and production. The latter is carried out by the 1st tier subcontractor or "system or module integrators". These world-class groups are fairly independent from the aircraft manufacturer and possess industry-specific know-how and are part of the global subcontracting offer. Being part of a modular value chain, they often become major customers themselves (Figure 14).

The second tier consists of "OEMs or full system equipment suppliers". As such, they are part of the global production subcontracting process since their skills, very limited in R&D, are acknowledged in the production process.

Lastly, subcontractors manufacturing primary parts, also known as "Primary Parts Subcontractors", are found at the bottom of the pyramid.

The reconfiguration of the global and modular aerospace value chain, the increasing competition, the gradual State disengagement and the outsourcing of non-strategic activities in the aerospace sector have all prompted major European subcontractors to refocus their strategies to outsourcing to emerging countries.

While South Africa has long been considered the sole actor in the African aeronautics sector, North Africa, leveraging its proximity to the European market and low overall wage costs, is asserting itself as a player in the aeronautics sector. A number of countries in the region have

[32] Benhar Zakaria (2016) « the determinants of the performance of Moroccan aeronautical subcontractors in the greater Casablanca regions», doctoral thesis; Group of higher institute of Trade and Business Administration, June.
[33] Kechidi Med, Talbot Damien (2013), « Changes in the French Civil Aeronautical Industry: concentration, outsourcing and pivotal firms », REVUE ENTREPRISE ET HISTOIRE, 2013/4 (n° 73).

established themselves in the aeronautics market through the manufacture of private business jets, particularly light aircraft, along with helicopters and military aircraft. But only a few of these are truly present on the international market, notably Tunisia and Morocco. According to GITAS[34], Tunisia offers a wide range of services including surface treatment, machining and precision mechanics, metal working, fine sheet metal working and assembly, engineering and design office, electronics, foundry, plastics processing, aircraft maintenance, aerospace wire harness, equipment and aeronautical systems, and finally aerospace tooling. As in Tunisia, the Moroccan industrial fabric is comprised of the Assembly of structural elements, Wiring and Electrical Connectors, Aeronautical Sheet Metal Forming, Electricity, Electronics, Engineering and Studies, Aircraft and Engine Maintenance, Composite Materials, Precision Mechanics and Machining, Aeronautical Molding, Chemicals, Surface Treatment, Aeronautical Sheet Metal, Aerospace Tooling, Engine Repair, Waste Treatment and Services and Distribution.

Morocco

One of the North African countries that have been able to strengthen their position in the global aerospace value chain is Morocco. Morocco's successful implementation of large-scale projects within the framework of its successive[34] industrial strategies, but also its geographical, cultural, and geopolitical factors, has established the country as a credible and attractive platform for major groups in the global aviation sector.

Only two companies operated in this sector in 1999, EADS Morocco Aviation and the RAM repair and maintenance centre.

Currently, more than 120 companies are operating on the Moroccan aerospace sector, including BOMBARDIER; EADS, BOEING, SAFRAN, LISI AEROSPACE, LE PISTON FRANÇAIS, DAHER, SOURIAU, RATIER FIGEAC, EATON, AEROLIA, LES ATELIERS DE LA HAUTE GARONNE, ALCOA, all of which are members to the Moroccan Aeronautics and Space Industries (GIMAS) Group, the State's main partner for the development of the Moroccan aeronautics sector.

According to the foreign exchange office, in 2017, the Moroccan aeronautics industry's exports reached almost 10 billion dirhams against 8.42 billion one year earlier, up by more than 18%. Morocco's aeronautics industry has also generated nearly 15,000 jobs and reached a local integration rate of 29%, up by 12 points since the launch of the Industrial Acceleration Plan. This plan included the launch in July 2015 of 4 industrial ecosystems in the aeronautics sector: 1/ Assembly ; 2/ Electrical Wiring Interconnection Systems (EWIS) ; 3/ Maintenance, Repair and Overhaul (MRO) ; 4/ Engineering.

Tunisia

Drawing on its appealing geostrategic position, linguistic and organizational proximity to Europe, Tunisia invested heavily in the training of engineers and technicians, and boasts a qualified and competitive[35] labour force. Housed in the El Mghira aeronautics aeropole, the Aeronautics Professions Excellence Center has the capacity to train 600 students a year. The higher education training facilities also provide a comprehensive and business-oriented programme and place each year more than 4,500 specialized engineers and higher technicians on the job market: Engineering Schools, Higher Institutes of Technical Education, National Institute of Applied Sciences, Polytechnic School, Institute of Aeronautics[36] professions

34 " Emergence Program", "National Pact for Industrial Emergence" / Industrial Acceleration Pact " Refer to the preceding chapter.

35 Ministry of Trade and Industry of the Republic of Tunisia, (2017) « The **Tunisian Aeronautics Industry,** a Complete and Integrated Supply Chain », "**le courrier de l'industrie", N° 136 - June issue**

36 http://investintunisia.tn

Tunisia has also acquired an industrial platform, the M'Ghira aeropole, which is located in the southern suburbs of Tunis and which stretches over an area of over 200 hectares, including 20 hectares dedicated to the Stelia Aerospace aeronautical park (formerly Aerolia Tunisia); a competitiveness cluster in Sousse (center east); two active economic activity parks providing high quality services: the Bizerte Park, based in the city's port (60 km from Tunis airport) and the Zarzis Park, a half hour from Jerba airport; and about 100 industrial zones covering the whole country.

More recently, Tunisia put in place fiscal arrangements to allow fully export-oriented capital goods companies to enjoy duty and tax exemptions and abolition of tariffs on imports of equipment and raw materials from the European Union.

With these comparative advantages, the Tunisian authorities have managed to convince large internationally renowned groups to open subsidiaries in Tunisia, as in the case of the LATECOERE group in 1998, the SABENA TECHNICS group in 2002, the ZODIAC AEROSPACE group in 2005 and STELIA of the EADS group in 2011. As a result, a seven-fold increase in the number of units specializing in the production of sub-assemblies for the Aeronautics sector was noted, from 11 units in 2004 to 77 units in 2017. This has enabled them to create nearly 15,000 jobs and export 631 MTDN (229 million Euros) in 2016 compared to a mere 85 MTDN (30 million Euros) in 2010.

The long-term objective of Tunisia is to establish a "Tunisia Aeronautic Valley" cluster to attract more aeronautical operators, leverage synergies and economies of scale in the sector and to eventually become a major regional platform for the aeronautics industry.

Egypt

The Egyptian aerospace industry is mainly dominated by military aviation. The production of aircraft in Egypt began after the Second World War. An aviation plant was established in 1950 by the government in Hilwan to produce basic instrument training devices and prototypes, and the Hilwan Engine Company was established in 1960 to manufacture aircraft engines. The basis for these efforts was imported technology, mainly from German, Swedish and French experts. The Egyptian industry built several hundred aircraft in the 1960s, some of which were exported.

Later, Egypt created a military-industrial complex dubbed the Arab Organization for Industrialization (AOI). By the early 80's, the AOI had already produced about $100 million in 9 Egyptian factories, employing a few tens of thousands of people. The bulk of this production was destined for the Egyptian forces and the balance exported to Iraq and other Arab and African countries.

The AOI projects are the foundation of the Egyptian aerospace industry. Between 1982 and 1985, the Hilwan plant assembled no less than 37 French Alpha aircraft with nearly half of the local components, specifically flaps, rudders, tail cams and avionics. A new Arab-British company, "Helicopter Company", assembles two or three lightweight Gazelle helicopters per month. There are currently 3 factories in Hilwan that assemble, repair and overhaul aircraft engines.

France is a major partner of Egypt in developing more sophisticated assembly and production facilities.

With foreign exchange earnings declining, Egypt plans to increase its exports of military aircraft to Iraq, Somalia, Oman, Sudan and Yemen.

In the period 2000-2010, the AOI manufactured 120 K8E aircraft and by 2013, it had already started to manufacture an UAV in collaboration with China with an integration rate of 59%[37].

[37] www.raseef22.com

Algeria

Military aircraft production started in Algeria in the 1980s. This was followed in 1987 by the signing of a contract with the former Czech Republic for the assembly of the Zlin-142 trainer aircraft. Algeria further created the Tafraoui Aeronautical Construction Company (ECA) in Oran in 1993, with responsibility for the construction and assembly of the Firnas-142 and Safir-43 trainer aircrafts and finally the X-3A agricultural planes. In collaboration with the South African company ATE, Algeria has also been able to build a number of Russian helicopters.

An unpiloted plane of the "Amel1-400" type was developed in 2013 and an 100% Algerian unmanned plane of the "Amel2-700" type was developed in 2015.

Algeria is seeking to rekindle its aeronautics industry. To achieve this, it has set up a consortium of companies exclusively dedicated to research and development, which may subsequently evolve into a platform for subcontracting in the aeronautics and space sectors. This initiative to set up a consortium, entrusted with all aspects of pedagogy, research and development, is the result of some twenty companies, research and development institutes and airlines. The Consortium brings together the Institute of Aeronautics and Space Studies of Saâd-Dahleb University in Blida, the Directorate-General for Scientific Research, the Algerian Space Agency (ASAL), the Directorate for Civil Aviation (DACM), the National Air Navigation Authority (ENNA) and the National Meteorological Office (ONM). The Consortium also includes several companies such as Air Algérie, Tassili Airlines, Tassili Travail Aérien, Air Express, Star Aviation, Société de Gestion de Services et d'Infrastructures Aéroportuaires (SGSIA), and Entreprise de Gestion de Services Aéroportuaires (EGSA Alger). Acting as an advisory and scientific consultation body, this consortium is intended to provide Algeria with an effective tool to optimize existing capacities in the field of air transport, aeronautics and aerospace.

Sudan

The Safatt Aviation Complex, a company specializing in the construction of all kinds of airplanes, was created in 2004 to produce its first aircraft in 2009, including "Safatt 01". The group also produces a "Safatt 03" aircraft and a "Safatt2" helicopter.

The Safatt Group is also involved in other aircraft construction-related areas, including aircraft maintenance and upgrades, research and development and employment by businesses involved in irrigation and transport services, as well as in vocational training provided by an aerospace and engineering academy.

In 2016, Sudan exported a total of $577,000 worth of aircraft or helicopter parts to the rest of the world (ITC).

Mauritania and Libya

Mauritania, like Libya, is not yet in the process of producing aircraft. But during his visit to Sudan on 7 November 2017, the President of the Republic announced that Mauritania was going to cooperate with Sudan on the manufacture of aircrafts.

10.2. Analysis of intra-regional trade of the sector and existing VCs

It is indeed true that the reconfiguration of the global and modular aerospace value chain, coupled to the increased competition, the gradual disengagement of States and the outsourcing of non-strategic activities in the aerospace sector have prompted the main subcontractors to reorient their strategies to outsource to emerging countries. This is a real opportunity for North African countries, particularly as they are geographically close to

Europe. Yet in the end, Europe and the United States will continue to control the final assembly of aircraft, as production requires the existence of large-scale manufacturing facilities which are capital intensive and quite reliant on skilled human resources.

Manufacturers are still the main contributors to added-value creation in the sector. With its position as the overall architect of and its role in building the structure, the aircraft manufacturer contributes 62.5% of the added value of an aircraft, while the engine manufacturers make a contribution of 24.5%, of which 20% for the engine and 4.5% for the nacelle production. In turn, OEMs provide about 13% of the value of a civil aircrafts of the 380[38] type.

The development of the North African aviation sectors will target the areas of comparative and competitive advantage for the countries of the region, which will translate into further integration of the region to the global aviation value chain, up to a certain limit.

The exports of the countries of North Africa to the rest of the world still remain very low compared to total exports, at 0.69%, driven primarily by Tunisia and Morocco (Table 37). Exports of the aeronautic industry from other countries to the rest of the world are trivial. Also, the domestic markets in several countries of the region are still small.

Table 37. Regional and global exports of the North-African aeronautics sector in 2016 (in thousands of US dollars)

		Country of destination							Total aeronautical exports to North African countries	Total aeronautical exports to the rest of the world	intra-North African exports in % of total aeronautics exports	Total exports to the rest of the world	Aeronautic sector's exports in % of total exports
		Algeria	Egypt	Lybia	Morocco	Mauritania	Sudan	Tunisia					
Country of origin	Algeria	--	0	0	0	0	0	0	0	1 165	0,00%	29 992 101	0,00%
	Egypt	0	--	0	0	0	0	0	0	0		22 507 389	0,00%
	Lybia	0	0	--	0	0	Ind	0	0	350	0,00%	9 576 255	0,00%
	Morocco	0	0	0	--	23	0	96	119	442 444	0,03%	22 858 289	1,94%
	Mauritania	0	0	0	0	--	0	0	0	0		1 722 938	0,00%
	Sudan	0	0	Ind	0	0	--	0	0	578	0,00%	3 649 941	0,02%
	Tunisia	3	0	0	29	3	0	--	35	269 350	0,01%	13 575 131	1,98%
Total imports from North-African countries		3	0	0	29	26	0	96	154	713 887	0,02%	103 882 044	0,69%

Source. Calculated by the author, Trade-map (ITC).

[38] OCP (2016) et PIPAME (2009) « **Study of the aeronautical industry's value chain », September** https://archives.entreprises.gouv.fr/2012/www.industrie.gouv.fr/p3e/etudes/aeronautique/etudes3.html.

10.3. Opportunities and challenges for the construction of RVCs in the aeronautics sector

Intra North-African trade flows have also remained very low with only 0.02% of total aeronautical exports made to the rest of the world. The ITC estimates that intra-regional exports from Morocco and Tunisia amount, in 2016, to respectively 0.03% and 0.01% of their total exports to the rest of the world.

Morocco[39] exports $96,000 to Tunisia mostly in the form of other aircraft or helicopters parts ($43,000) and aircraft parts n°. 8802/2010/3010/4010 ($51,000). Morocco also exports $23,000 to the Mauritanian market as other aircraft or helicopters parts ($18,000) and $5,000 on propellers & rotors and their parts.

Of the US$269.4 million worth of aeronautical products exported to the rest of the world in 2016, Tunisia only exported $35,000 to North Africa as aircraft or helicopter parts, of which $29,000 to Morocco, $3,000 to Algeria and $3,000 to Mauritania.

The main problem hindering regional integration in North Africa lies in the fact that they have closer commercial ties with developed countries than with their neighbors. These countries should find a way to transform this integration to the GVCs into a catalyst for further regional integration, which may subsequently improve their positioning in the GVCs[40]. The role of FDIs could be decisive. And yet, FDIs originating from other regions are more important than those originating from the region. To add to this, the few foreign companies established in several countries of the region cannot operate these production units in a way that creates or strengthens regional value chains.

Despite the scant intra-regional trade level and the specific features of the aeronautics sector, the latter still constitutes an opportunity for North African countries.

By way of illustration, Morocco has become the world's fourth largest producer of aircraft wiring. However, the consolidation of its position in the value chain is hampered by several challenges, notably the diversification of the exportable supply, resulting in a positioning on several segments of the aeronautical GVC, and the availability of skilled workforce.

As a consequence of the gains achieved in recent years, the Tunisian aeronautics industry, already covering several segments, has the potential to be better positioned on new markets. Nevertheless, a number of challenges obviously still need to be met, inter alia:

- the sluggish implementation of the reforms necessary,
- the slow and cumbersome nature of administrative procedures, and finally
- the mismatch between vocational training and market needs.

In the aerospace value chain, the various actors involved in the aerospace sector of both countries could generally be positioned in an intermediate stage between the subcontractors of primary parts and the equipment manufacturers.

To ensure a successful gradual transition to OEM status and the further consolidation of the status of primary parts subcontractor, these countries would have to gain new skills in marketing, technology watch and networking skills.

At the global level, the sector is constrained by several factors, namely the passing of risk from air transport to the aviation industry, the evolution of long-term aviation market segmentation and the fallout from the 2008 crisis on the sector.

[39] The statistics of total aeronautical sector's exports announced by the Moroccan government are different than those provided by the ITC.
[40] Case of East Asia (OCP, 2016).

On a regional scale, and with a view to better integration into the global aeronautics value chains, every North African country should identify its position in the value chain in line with its capacities. Thus, to maximize the opportunities offered by this GVC, it should establish a conducive environment for its development, particularly by boosting the economy's competitiveness as a whole, and more so that of the aviation sector through the provision of necessary skills and quality infrastructures. Likewise, the quality of institutions and authorities are two key factors in ensuring FDI attractiveness.

And finally, the political, security-related, social and economic (and in some cases financial and monetary) uncertainty, which remains the most significant barrier to FDI attractiveness, is the most important challenge to be tackled in the region.

11. Proposing a regional action plan for the promotion of RVCs in North Africa

In this report, the objective was to provide a mapping of the current situation of RVCs across a range of strategic sectors in the North-African region. That being said, the review of constraints and opportunities for each of these sectors is inevitably limited by the overall nature of the review. A finer-grade analysis at a more detailed level of the sectors or products will provide a better appreciation of the opportunities for RVC promotion. It would therefore require a much more in-depth evaluation of the value chain, and subsequent targeted interventions, in order to develop an action plan to tap the potential provided by any given value chain.

A set of recommendations can thus be formulated in this report as a regional action plan aimed to address the regulatory, institutional and logistical challenges associated with the development of RVCs. The intended purpose, the feasibility of each action on the short, medium and long term along with the relevant sector have been defined. The action plan may revolve around the following three areas:

Axe 1. Trade facilitation among countries of North Africa

Axe 2. Institutional reforms

Axe 3. Capacity building of local actors

This clearly does not prevent us from tabling a set of recommendations aimed at promoting the construction of RVCs in North Africa.

11.1. Trade facilitation between countries of North Africa

Trade facilitation between North African countries calls for the implementation of regional and national programs including growth-generating projects in the fields of transport and logistics (road and motorway network, interconnected railway systems, maritime and air links, equipment and support services). As indicated in a report published by the Economic Commission for Africa[41] in 2015, further steps should be taken to improve physical connectivity between African countries, which would be conducive to facilitating intra-regional trade. Recommended actions are summarized as follows:

[41] ECA (2015), «International transport and trade facilitation in North Africa », Rabat, page 73.

Sectors concerned	Nature of actions to be taken	Description and objective of the action/measure	Feasibility on The ST, MT & LT
All sectors	Develop the logistics and transport infrastructure adapted to each sector and specific to certain products	Facilitate the carriage of freight and goods between North African countries, while shortening transit times and costs.	Short and medium term
	Develop an efficient transport (overland, sea and railway) network between different countries.	Facilitate cross trade of heavy and fairly dangerous products (products of the chemical and oil industries).	Medium and long term
	Further simplify customs and border control procedures.	Facilitate trade and border control procedures for goods.	Short term
	Reciprocal recognition of the technical, sanitary and phytosanitary standards.		
	Signature of bilateral agreements for mutual recognition of the certificates of compliance of important products to facilitate trade.	Facilitate trade exchanges between North African countries.	Short term

11.2. Institutional reforms

Improving the institutional and administrative framework should seek to alleviate existing bottlenecks and all the measures for action we propose to adopt must work towards a trade facilitation dynamic through the construction of RVCs. The goal of the recommended actions is to get different countries of North Africa to share the same institutional framework and administrative arrangements needed to facilitate the exchange of goods to promote the construction of RVCs. In other words, a number of good practices guided by international standards and norms should be adopted regarding trade laws and regulations. Recommended actions are summarized as follows:

Sectors concerned	Nature of actions to be taken	Description and objective of the action/measure	Feasibility on The ST, MT & LT
All sectors	Fight against the preponderance of the informal market in certain countries of North Africa.	Protect national firms threatened by an informal market fuelled by imports (from China and Turkey) offered at low prices.	Short and medium term
	Foster the creation of « corporate networks » through the organization of business events (fairs and exhibitions, visits of businessmen) to promote exchange of experiences, improve the business climate and cut the transaction costs.	Facilitate the construction of regional value chains.	Short term
	Develop an e-business platform to connect the firms and businesses operating in the region.	Develop corporate networks, in order to enhance business-to-business cooperation.	
Énergies and renewable energies	Create a regional market for electricity production and export.	Optimize the production of electricity by cutting costs and encouraging the export of this commodity.	Short term
	Adopt the regulations necessary for the promotion of investments by local solar plant operators		
	Attract multinational firms specializing in photovoltaic panel production to establish subsidiaries in at least one of the countries of the region.	Foster the shift to production, assembly and installation of photovoltaic panels.	Short term
Essential oils	Encourage and help farmers and rural populations to plant and crop trees and flowers using forests and government lands.	Increase plant resources used essential oils extraction.	Short term
Fruits, vegetables and byproducts	Reduce the tariff barriers to regional exchanges of agricultural products.	Promote the construction of value chains in the sector and increase regional exchanges.	Short and medium term
	The development of the certification, of high-value crops (organic, labels, registered designation of origin, halal…)	Improve the competitiveness of the region on external markets and those of the region.	Short and medium term
	Enhance the exposure of regional brands	Build confidence and ensure the visibility of consumers vis-a-vis the products of the region.	Short and medium term

11.3. Capacity building of local actors

The actions taken by the different countries of North Africa to foster intra-regional trade deserve to be reinforced to ensure better sharing of experiences and enhanced collaboration between operators both within and between countries in the sub-region. A number of additional actions must therefore be targeted at building the capacities of local actors to improve their competitiveness and strengthen regional cooperation. This approach will ensure that the promotion of RVCs is effective. Recommended actions can be summarized as follows:

Sectors concerned	Nature of actions to be taken	Description and objective of the action/measure	Feasibility ST, MT, LT
Textile & clothing	Build the capacity of local companies, including through adoption of new techniques and production technologies.	Enable regional businesses to improve quality and productivity to compensate for relative weaknesses in competitiveness associated with relatively high labour costs	Short and medium term
Essential oils	**Tunisia and Morocco:** Encourage the processing of essential oils into perfumes and toilet waters.	Leverage the expertise of companies in these countries to promote the creation of an RVC and to expand export flows to other countries in North Africa.	Short term
	Morocco, Egypt and Tunisia: Encourage the processing of essential oils into cosmetic products and hair preparations.	Leverage the expertise of companies in these countries to promote the creation of an RVC and to expand export flows to other countries in North Africa.	Short term
	Algeria: Development of crops suitable for the production of essential oils.		Short and medium term
	Encourage the development of organic essential oils.	Boost the competitiveness of domestic producers of essential oils	Short term
Oil and gas	Install new oil refining units in the exporting countries (Algeria, Egypt, Sudan) and the importing units (Morocco and Tunisia).	Increase the production capacity of refined petroleum and its derivatives.	Short and medium term
	Create new oil and gas processing facilities	Production of plastic goods (for the automotive and aeronautics industries), synthetic fibres and fabrics (for the textile industry) and electricity (to be exported to the European countries).	Medium and long term
Fruits, vegetables and byproducts	Develop activities around the processing of the products of the fruits and vegetables value chain in the region (Egypt, Morocco and Tunisia).	Promote the construction of industrial value chains and increase regional exchange flows.	Short and medium term

Conclusion

While most North African countries have made substantial efforts to facilitate trade, to reform the institutional framework governing further regional integration and to improve basic infrastructure in the transport sector, these efforts have not had much impact to date on RVC promotion. It is therefore worth noting that the successful implementation of these various opportunities calls for the introduction of certain political initiatives, such as:

- Readiness of the various North African countries' authorities to actually pursue regional and deeper integration;
- Improved security and political situation, with particular emphasis on Libya and Sudan.

A preliminary action plan has been suggested to promote the construction of RVCs, along with a set of recommendations intended to palliate the deficiencies identified. All these measures have been classified according to the nature of the actions to be taken (trade facilitation, institutional framework reform and capacity building of local actors in each country) and according to the sector concerned.

The present study revealed the availability of significant opportunities for North-Africa to build RVCs. At the same time, however, there is a need for more detailed sectoral studies to help further identify the location and method of their construction.

Annex

Table A1. Cross trade of countries of North Africa in 2015 (in thousands of $US and in %)

		Country of destination							Total exports to North African countries	Total exports to the rest of the world	Intra north-Africa exports as a % of total exports
		Mauritania	Morocco	Algeria	Tunisia	Libya	Egypt	Sudan			
Country of origin	Mauritania	---	201	7 117	3 250	68	1 657	0	12 293	1 831 727	0,7%
	Morocco	162 203	---	196 884	109 254	68 296	253 626	11 622	801 885	22 036 820	3,6%
	Algeria	57 055	629 897	---	846 023	22 515	495 996	0	2 051 486	34 795 951	5,9%
	Tunisia	21 892	180 102	558 162	---	540 044	71 769	5328	1 377 297	14 073 488	9,8%
	Libya	N-A	N-A	N-A	N-A	---	N-A	N-A	N-A	11 658 547	N-A
	Egypt	13072	353 050	467 027	154 526	572 003	---	548 539	2 108 217	21 967 323	9,6%
	Sudan	0	9 188	2 294	13 180	585	151 764	---	177 011	5 587 517	3,2%
Total imports from North-African countries		254 222	1 172 438	1 231 484	1 126 233	1 203 511	974 812	565 489	**6 528 189**	111 951 373	5,83%
Imports from the ROW		3 703 430	37 545 666	51 803 071	20 202 503	12 981 495	74 361 267	8 413 439	209 010 871		
Intra-North African imports expressed as a % of total imports		**6.9%**	**3.1%**	**2.4%**	**5.6%**	**9.3%**	**1.3%**	**6.7%**	**3.1%**		

Source. Calculated based on the « International Trade Centre » data base (spanning all sections of the HS 2).

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